National Aeronautics and Space Administration



### PREVIOUS EARTH RESOURCE BIBLIOGRAPHIES

Remote Sensing of Earth Resources	(NA SA SP-7036)
Earth Resources	(NA SA SP-7041(01))
Earth Resources	(NA SA SP-7041(02))
Earth Resources	(NA SA SP-7041(03))
Earth Resources	(NA SA SP-7041(04))
Earth Resources	(NA SA SP-7041(05))
Earth Resources	(NA SA SP-7041(06))
Earth Resources	(NA SA SP-7041(07))
Earth Resources	(NA SA SP-7041(08))
Earth Resources	(NA SA SP-7041(09))
Earth Resources	(NA SA SP-7041(10))
Earth Resources	(NA SA SP-7041(11))
Earth Resources	(NA SA SP-7041(12))
Earth Resources	(NA SA SP-7041(13))
Earth Resources	(NA SA SP-7041(14))
Earth Resources	(NA SA SP-7041(15))
Earth Resources	(NA SA SP-7041(16))

This bibliography was prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by Information Systems Company

## EARTH RESOURCES

# A Continuing Bibliography With Indexes Issue 17

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced between January 1, 1978 and March 31, 1978

- Scientific and Technical Aerospace Reports (STAR)
- International Aerospace Abstracts (IAA)



### INTRODUCTION

The technical literature described in this continuing bibliography may be helpful to researchers in numerous disciplines such as agriculture and forestry, geography and cartography, geology and mining, oceanography and fishing, environmental control, and many others. Until recently it was impossible for anyone to examine more than a minute fraction of the earth's surface continuously. Now vast areas can be observed synoptically, and changes noted in both the earth's lands and waters, by sensing instrumention on orbiting spacecraft or on aircraft

This literature survey lists 775 reports, articles, and other documents announced between January 1 and March 31, 1978 in Scientific and Technical Aerospace Reports (STAR), and International Aerospace Abstracts (IAA)

The coverage includes documents related to the identification and evaluation by means of sensors in spacecraft and aircraft of vegetation, minerals, and other natural resources, and the techniques and potentialities of surveying and keeping up-to-date inventories of such riches. It encompasses studies of such natural phenomena as earthquakes, volcanoes, ocean currents, and magnetic fields; and such cultural phenomena as cities, transportation networks, and irrigation systems. Descriptions of the components and use of remote sensing and geophysical instrumentation, their subsystems, observational procedures, signature and analyses and interpretive techniques for gathering data are also included. All reports generated under NASA's Earth Resources Survey Program for the time period covered in this bibliography will also be included. The bibliography does not contain citations to documents dealing mainly with satellites or satellite equipment used in navigation or communication systems, nor with instrumentation not used aboard aerospace vehicles.

The selected items are grouped in nine categories. These are listed in the Table of Contents with notes regarding the scope of each category. These categories were especially chosen for this publication, and differ from those found in STAR and IAA.

Each entry consists of a standard bibliographic citation accompanied by an abstract. The citations and abstracts are reproduced exactly as they appeared originally in STAR, or IAA, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the variation in citation appearance.

Under each of the nine categories, the entries are presented in one of two groups that appear in the following order:

IAA entries identified by accession number series A78-10,000 in ascending accession number order;

STAR entries identified by accession number series N78-10,000 in ascending accession number order.

After the abstract section, there are five indexes

subject, personal author, corporate source, contract number and report/accession number.

### AVAILABILITY OF CITED PUBLICATIONS

#### IAA ENTRIES (A78-10000 Series)

All publications abstracted in this Section are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc. (AIAA), as follows. Paper copies of accessions are available at \$6.00 per document up to a maximum of 20 pages, the charge for each additional page is \$0.25. Microfiche<sup>(1)</sup> of documents announced in IAA are available at the rate of \$2.50 per microfiche on demand, and at the rate of \$1.10 per microfiche for standing orders for all IAA microfiche. The price for the IAA microfiche by category is available at the rate of \$1.25 per microfiche plus a \$1.00 service charge per category per issue. Microfiche of all the current AIAA Meeting Papers are available on a standing order basis at the rate of \$1.35 per microfiche.

Minimum air-mail postage to foreign countries is \$1.00 and all foreign orders are shipped on payment of pro-forma invoices

All inquiries and requests should be addressed to AIAA Technical Information Service. Please refer to the accession number when requesting publications

#### STAR ENTRIES (N78-10000 Series)

One or more sources from which a document announced in STAR is available to the public is ordinarily given on the last line of the citation. The most commonly indicated sources and their acronyms or abbreviations are listed below. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source line.

Avail NTIS Sold by the National Technical Information Service Prices for hard copy (HC) and microfiche (MF) are indicated by a price code followed by the letters HC or MF in the STAR citation. Price codes are given in the tables on page vii of the current issue of STAR.

Microfiche is available regardless of age for those accessions followed by a # symbol

Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) is available at greatly reduced unit prices. For this service and for information concerning subscription to NASA printed reports, consult the NTIS Subscription Unit

NOTE ON ORDERING DOCUMENTS When ordering NASA publications (those followed by the \* symbol), use the N accession number NASA patent applications (only the specifications are offered) should be ordered by the US-Patent-Appl-SN number Non-NASA publications (no asterisk) should be ordered by the AD, PB, or other *report* number shown on the last line of the citation, not by the N accession number It is also advisable to cite the title and other bibliographic identification

Avail SOD (or GPO) Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The current price and order number are given following the availability line. (NTIS will fill microfiche requests, at the standard \$3.00 price, for those documents identified by a # symbol.)

<sup>(1)</sup> A microfiche is a transparent sheet of film 105 by 148 mm in size containing as many as 60 to 98 pages of information reduced to micro images (not to exceed 26.1 reduction)

- Avail NASA Public Document Rooms Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 20546, or public document rooms located at each of the NASA research centers, the NASA Space Technology Laboratories, and the NASA Pasadena Office at the Jet Propulsion Laboratory
- Avail ERDA Depository Libraries Organizations in U.S. cities and abroad that maintain collections of Energy Research and Development Administration reports, usually in microfiche form, are listed in *Nuclear Science Abstracts*. Services available from the ERDA and its depositories are described in a booklet, *Science Information Available from the Energy Research and Development Administration* (TID-4550), which may be obtained without charge from the ERDA Technical Information Center
- Avail Univ Microfilms Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) and microfilm All requests should cite the author and the Order Number as they appear in the citation
- Avail USGS Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed in this introduction. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.
- Avail HMSO Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House. Inc. (PHI), Redwood City, California. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.
- Avail. BLL (formerly NLL) British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England Photocopies available from this organization at the price shown (If none is given, inquiry should be addressed to the BLL)
- Avail ZLDI Sold by the Zentralstelle fur Luftfahrtdokumentation und -Information, Munich, Federal Republic of Germany, at the price shown in deutschmarks (DM)
- Avail Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.
- Avail U.S. Patent Office Sold by Commissioner of Patents, U.S. Patent Office, at the standard price of 50 cents each, postage free
- Other availabilities If the publication is available from a source other than the above, the publisher and his address will be displayed entirely on the availability line or in combination with the corporate author line

#### **ADDRESSES OF ORGANIZATIONS**

American Institute of Aeronautics and Astronautics Technical Information Service 750 Third Ave New York, N.Y. 10017

British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England

Commissioner of Patents U.S. Patent Office Washington, D.C. 20231

Energy Research and Development Administration Technical Information Center P O Box 62 Oak Ridge, Tennessee 37830

ESA-Space Documentation Service ESRIN Via Galileo Galilei 00044 Frascati (Rome) Italy

Her Majesty's Stationery Office P O Box 569, S E 1 London, England

NASA Scientific and Technical Information Facility P O Box 8757 B W I Airport, Maryland 21240

National Aeronautics and Space
Administration
Scientific and Technical Information
Office (NST-41)
Washington, D.C. 20546

National Technical Information Service 5285 Port Royal Road Springfield, Virginia 22161 Pendragon House, Inc 899 Broadway Avenue Redwood City, California 94063

Superintendent of Documents U S Government Printing Office Washington, D C 20402

University Microfilms A Xerox Company 300 North Zeeb Road Ann Arbor, Michigan 48106

University Microfilms, Ltd Tylers Green London, England

U S Geological Survey 1033 General Services Administration Building Washington, D C 20242

U S Geological Survey 601 E Cedar Avenue Flagstaff, Arizona 86002

U S Geological Survey 345 Middlefield Road Menlo Park, California 94025

U S Geological Survey Bldg 25, Denver Federal Center Denver, Colorado 80225

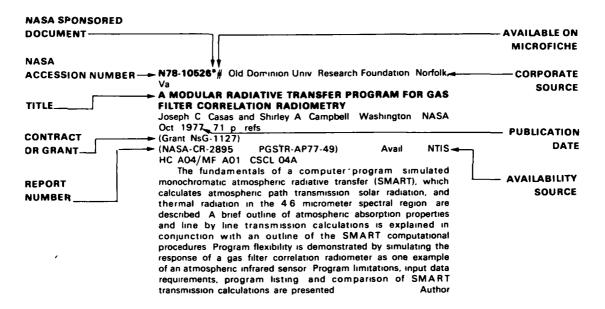
Zentralstelle fur Luftfahrtdokumentation und -Information 8 Munchen 86 Postfach 880 Federal Republic of Germany

# TABLE OF CONTENTS

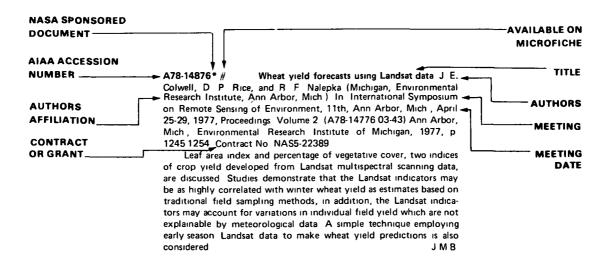
### **Subject Categories**

Abs	stracts in this Bibliography are grouped under the following categories page 2	ge
01	AGRICULTURE AND FORESTRY	
	Includes crop forecasts, crop signature analysis, soil identification, disease detection, harvest estimates, range resources, timber inventory, forest fire detection, and wildlife migration patterns	1
02	ENVIRONMENTAL CHANGES AND CULTURAL RESOURCES	
	Includes land use analysis, urban and metropolitan studies, environmental impact, air and water pollution, geographic information systems, and geographic analysis	15
03	GEODESY AND CARTOGRAPHY Includes mapping and topography	29
04	GEOLOGY AND MINERAL RESOURCES Includes mineral deposits, petroleum deposits spectral properties of rocks, geological exploration, and lithology	35
05	OCEANOGRAPHY AND MARINE RESOURCES Includes sea-surface temperature, ocean bottom surveying imagery, drift	
	rates, sea ice and icebergs, sea state, fish location	41
06	HYDROLOGY AND WATER MANAGEMENT Includes snow cover and water runoff in rivers and glaciers, saline intru-	
	sion, drainage analysis, geomorphology of river basins, land uses, and estuarine studies	55
07	DATA PROCESSING AND DISTRIBUTION SYSTEMS Includes film processing, computer technology, satellite and aircraft hard-	
	ware, and imagery	71
08	INSTRUMENTATION AND SENSORS Includes data acquisition and camera systems and remote sensors	95
09	GENERAL Includes economic analysis	105
	JBJECT INDEX	
	RSONAL AUTHOR	
	ORPORATE SOURCE INDEX	
	EPORT/ACCESSION NUMBER INDEX	

#### TYPICAL CITATION AND ABSTRACT FROM STAR



#### TYPICAL CITATION AND ABSTRACT FROM IAA



## EARTH RESOURCES

### A Continuing Bibliography (Issue 17)

#### **APRIL 1978**

## 01 AGRICULTURE AND FORESTRY

Include crop forecasts, crop signature analysis soil identification disease detection harvest estimates range resources, timber inventory, forest fire detection and wildlife migration patterns

A78-10521 Yield/reflectance relations in cabbage J R Thomas and A H Gerbermann (U S Department of Agriculture, Agricultural Research Service, Weslaco, Tex.) Photogrammetric Engineering and Remote Sensing, vol. 43, Oct. 1977, p. 1257-1261, 1263-1266, 16 refs

The reported investigation was conducted to measure the effects of nitrogen stress on the absorption and scattering coefficients and asymptotic reflectance of light from green cabbage wrapper feaves. The effects of nitrogen and water stress on the reflectivity of a cabbage crop were evaluated and the observed film optical densities were related to cabbage yields. It was found that in the visible spectral region nitrogen stress decreased the absorptive coefficient and increased the asymptotic reflectance of cabbage leaves. The scattering coefficient was not affected by nitrogen deficiency. The information provided by aerial photographs was useful for predicting cabbage yields.

A78-10522 Detection of oak wilt with color IR aerial photography J J Ullman and D W French (Minnesota, University, St Paul, Minn) Photogrammetric Engineering and Remote Sensing, vol 43, Oct 1977, p 1267-1272 5 refs

A78-10523 Measuring soil moisture with an airborne imaging passive microwave radiometer J E Estes (California, University, Santa Barbara, Calif), M R Mel (Escatech, Playa del Key, Calif), and J O Hooper (U S Navy, Naval Weapons Center, China Lake, Calif) Photogrammetric Engineering and Remote Sensing, vol 43, Oct 1977, p 1273-1281 9 refs Contract No N00123-73-C-2352

A78-12878 # Results of a remote sensing study of the effects of hail on vegetation (Risultati di un'esperienza di telerilevamento degli effetti delle grandinate sulla vegetazione) E Rosini, M R Sciarretta, and D Vento (Ministero dell'Agricoltura e delle Foreste, Ufficio Centrale di Ecologia Agraria, Rome, Italy) In

International Scientific-Technological Conference on Space, 17th, Rome, Italy, March 25, 26, 1977, Proceedings Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1977, p. 49-56. In Italian

Landsat imagery is used in examining the distribution and severity of crop damage inflicted by hallstorms in Switzerland, ground-truth assessments and radar imagery of the hail-generating clouds are also analyzed Spectral variations in satellite imagery obtained before and after hailstorms are employed to determine the extent of injury inflicted to the vegetation Ground measurements of the force and size of the impacting hailstones are also cited. J M B

A78-12904 # Anisotropic reflection properties of vegetated surfaces K T Kriebel (Munchen, Universitat, Munich, West Germany) In International Scientific-Technological Conference on Space, 17th, Rome, Italy, March 25, 26, 1977, Proceedings Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1977, p. 391-4400

Results are reported for measurements of the bidirectional reflectance properties of four vegetation-covered surfaces at a wavelength of 0.52 micron. The surfaces include a savannah, a bog, pasture land, and a coniferous forest. It is found that there is a strong azimuthal anisotropy in the bidirectional reflectance factor of the surfaces at medium and high zenith angles of incidence and that the anisotropy increases with increasing wavelength. This phenomenon is attributed to shadowing effects caused by the vertical structure of the vegetation.

A78-12931 # Agricultural applications of satellite remote sensing - The measurement and prediction of principal harvests (Le applicazioni in agricultura del telerilevamento da satellite - Misura e previsioni dei principali raccolti) M Checchi and F Smania (Italeco S p A , Rome, Italy) In International Electronics Congress, 24th, Rome, Italy, March 28-30, 1977, Proceedings

Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale,

1977, p 57-61 In Italian

The use of satellite data to monitor agricultural production and

The use of satellite data to monitor agricultural production and the state of development of crops is discussed. Computer programs which permit a nearly real-time analysis of satellite imagery are reviewed, an interpretive technique which relies on both automatic processing and visual assessment of imagery is mentioned. J M B

A78-13060 Color aerial photography in the plant sciences and related fields, Proceedings of the Fifth Biennial Workshop, Sioux Falls, S. Dak, August 19-21, 1975. Workshop sponsored by the American Society of Photogrammetry, Falls Church, Va, American Society of Photogrammetry, 1977. 166 p. \$8.00.

Papers are presented on quality color photographic production at the EROS Data Center, photographic image enhancement and processing, the role of remote sensing in preventing plant disease, a method for detecting the imported fire ant, and tree stress detection through spectral rationing of color film records Consideration is also given to the use of color IR photography for the detection of forest damage, surface resource inventory of Eastern Montana rangelands, and forest type mapping of the Atchafalaya River Basin from satellite and aircraft imagery

A78-13062 Quality control techniques for high altitude color photography R L LaPado (ESL, Inc , Sunnyvale, Calif ) In Color aerial photography in the plant sciences and related fields, Proceedings of the Fifth Biennial Workshop, Sioux Falls, S Dak , August 19-21, 1975 Falls Church, Va , American Society of Photogrammetry, 1977, p. 11-27 6 refs

The Airborne Instrumentation Research Project, based at NASA Ames Research Center, conducts approximately 200 photographic missions every year, employing two high-altitude U-2 aircraft There are two techniques under development aimed at improving both the consistency and quality of the U-2 photographic imagery. The first is a film response calibration procedure which determines the filtration and exposure shift needed to achieve a standard sensitivity response for each film type used. The second is an exposure calculation model that calculates the exposure required to produce a specified mean density on a photographic image. The model is a wavelength dependent function that produces an f number as a function of shutter speed and 10 other input parameters. (Author)

A78-13065 Tree stress detection through spectral ratioing of color film records T M Lillesand, R H Brock, W L Johnson (New York, State University, Syracuse, N Y), and J L Roberts (USAF, Rome Air Development Center, Griffiss AFB, N Y) In Color aerial photography in the plant sciences and related fields, Proceedings of the Fifth Biennial Workshop, Sioux Falls, S Dak, August 19-21, 1975 Falls Church, Va, American Society of Photogrammetry, 1977, p 79-107 24 refs Research supported by the U S Forest Service

The paper reviews research being carried out at the SUNY College of Environmental Science and Forestry at Syracuse, New York in the photographic detection of tree stress. Two studies are highlighted (1) the use of close-range (one meter) photography to monitor the spectral and spatial response of young poplars to ozone furnigation under controlled lab conditions, and (2) the application of an Experimental Photometric Interpretation Console in bi-band spectral rationing of color film records acquired under field conditions, in this part of the program enhanced detection of Fomes annosus in red pines and potassium deficiency in white spruce has been realized.

A78-13066 Spectral reflectance deduced from color-infrared photos for forest damage detection P A Murtha (British Columbia, University, Vancouver, Canada) In Color aerial photography in the plant sciences and related fields, Proceedings of the Fifth Biennial Workshop, Sioux Falls, S Dak , August 19-21, 1975 Falls Church, Va , American Society of Photogrammetry, 1977, p 109-116 9 refs

A television scanning densitometer was adapted to produce color images from which relative spectral reflectance data could be deduced. The technique involved placing colored filters (blue, green, red) between the return-beam-vidicon (RBV) camera lens and the original, color-infrared positive transparency located on a light table. The technique permitted analysis of density patterns of the individual dye layers in the positive transparency. The technique which was tested with large-scale photos was also applied to 1 160,000 color-infrared photos of an SO2 damage site. The results of the large-scale photo test are presented. (Author)

A78-13067 Surface resource inventory of eastern Montana rangelands utilizing high altitude color infrared aerial photography F T Batson (U S Bureau of Land Management, Billings, Mont ) and J C Elliott In Color aerial photography in the plant sciences and related fields, Proceedings of the Fifth Biennial Workshop, Sioux Falls, S Dak , August 19-21, 1975 Falls Church, Va , American Society of Photogrammetry, 1977, p 117-128 6 refs

A78-13068 Forest type mapping of the Atchafalaya River Basin from satellite and aircraft imagery J E DeSteiguer (Texas A & M University, College Station, Tex.) In Color aerial photography in the plant sciences and related fields, Proceedings of the Fifth Biennial Workshop, Sioux Falls, S Dak, August 19-21, 1975

Falls Church, Va , American Society of Photogrammetry, 1977, p 129-141 14 refs

RB-57 aircraft photography, Skylab photography, and Landsat-1 imagery were tested and compared for forest type mapping of the Atchafalaya River Basin, Louisiana Variance ratio tests indicated a significant difference in overall accuracy did not exist between maps prepared from the three types of imagery Significant differences in accuracy were found between four regions of the basin, and were related to the extent, rather than type, of forests Several possibilities exist for improving map accuracy Satellite and high altitude aircraft imagery should receive increasing acceptance for extensive forest type mapping (Author)

A78-14791 # Progress and needs in agricultural research, development, and applications programs D G Moore and V I Myers (South Dakota State University, Brookings, S Dak.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1
Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p 257-266, 18 refs

The application of remote sensing to agriculture is discussed with particular reference to user structure (global, international, national, state level, regional, cooperatives, and individuals) and to the use of Landsat imagery. It is noted that possibly the greatest deterrent to the application of remote sensing to agriculture is a combination of effects of data scale from satellites and timeliness of data availability, a deterrent which can be overcome.

A78-14792 # Remote sensing and today's forestry issues L Sayn-Wittgenstein (Department of Fisheries and the Environment, Forest Management Institute, Ottawa, Canada) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1

Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 267-276 39 refs

The paper examines the actual and desirable roles of remote sensing in dealing with current issues in forestry, i.e., national forest policy, supply and demand for forest products, and competing demand for forest land Remote sensing is discussed with reference to wood shortage and the need for forest management and regional inventories. The utilization of Landsat for inventories in temperate zones and of Skylab for forest sensing is described and attention is given to evaluation of accuracy, large-scale photography, support of intensive forest management, forest protection, and biomass energy production.

A78-14804 \* # LACIE - A look to the future R B Mac-Donald and F G Hall (NASA, Johnson Space Center, Houston, Tex) In International Symposium on Remote Sensing of Environment, 11th, Ann' Arbor, Mich , April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 429-465 14 refs

The Large Area Crop Inventory Experiment (LACIE) is a 'proof of concept' project designed to demonstrate the applicability of remote sensing technology to the global monitoring of wheat This paper discusses the need for more timely and reliable monitoring of food and fiber supplies, reviews the monitoring systems currently utilized by the USDA and United Nations Food and Agriculture Organization in the United States and in foreign countries, and elucidates the fundamentals involved in assessing the impact of variable weather and economic conditions on wheat acreage, yield, and production The experiment's approach to production monitoring is described briefly, and its status is reviewed as of the conclusion of 2 years of successful operation Examples of acreage and yield monitoring in the Soviet Union are used to illustrate the experiment's approach (Author)

A78-14808 \* # Use of multispectral data in design of forest sample surveys S J Titus and L C Wensel (California, University, Berkeley, Calif) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich , Environment

tal Research Institute of Michigan, 1977, p 505-513 9 refs Contract No NAS9-14552

The use of multispectral data in design of forest sample surveys using a computer software package, WILLIAM, is described. The system allows evaluation of a number of alternative sampling systems and, with appropriate cost data, estimates the implementation cost for each.

(Author)

A78-14809 # Monitoring irrigated land acreage using Landsat imagery - An application example W C Draeger (U S Geological Survey, EROS Data Center, Sioux Falls, S Dak.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1

Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p. 515-524

The utility of Landsat imagery for quickly and cheaply estimating irrigated land area was demonstrated in the Klamath River basin of Oregon Landsat color composite images, at 1 250,000 scale, acquired on two dates during the 1975 growing season, were interpreted Irrigated lands were delineated manually, and the irrigated area was estimated, based on dot-grid sampling of the manually delineated lands. The image interpretation estimate of irrigated area was then adjusted by a comparison of interpretation results with ground data on 45 sample plots each 2.6 square kilometers in size. Two interpreters independently estimated the irrigated area. Their adjusted estimates were 115,000 hectares and 108,000 hectares respectively, with corresponding 95 percent confidence intervals of + or - 7,880 hectares and + or - 14,000 hectares The estimated cost of the survey, exclusive of management costs and training, was \$1,500 (Author)

A78-14812 # Multi-seasonal data analysis and some extensions for environmental monitoring S Tanaka, Y Muranaka (Remote Sensing Technology Center of Japan, Tokyo, Japan), H Miyazawa (Toyo Aero Survey Co, Ltd, Tokyo, Japan), and Y Suga (Hosei University, Koganei, Tokyo, Japan) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 545-561 5 refs

Landsat imagery is employed to study seasonal changes in a rice paddy, to survey the different spectral signatures of winter and summer vegetation, and to assess the amount of land reclaimed in Tokyo Bay over an extended period. In addition, the progress of a rice harvest is monitored by using the Landsat imagery.

A78-14824 # Reindeer range inventory in western Alaska from computer-aided digital classification of Landsat data T H George, W J Stringer, and J N Baldridge (Alaska, University, Fairbanks, Alaska) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 671-682 6 refs

A78-14827 \* # Further tests of the Suits reflectance model E W LeMaster and J E Chance (Pan American University, Edinburg, Tex.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p. 703-710 6 refs Grant No NsG-9033

Experimental measurements of the visible light and infrared reflectance of spring wheat are used in examining the validity of the Suits (19,'2) model for vegetative canopy reflectance. The degree of agreement between the experimental results and the theoretical model suggests a technique for the remote sensing of the leaf area index at 650 nm. However, the Suits model needs to be modified when the sun and observer zenith angles are not small.

A78-14828 \* # Estimation of old field ecosystem biomass using low altitude imagery S M Nor, G Safir, T M Burton, J E Hook, and G Schultink (Michigan State University, East Lansing, Mich.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 711-718 10 refs Grant No NGL-23-004-083

Color-infrared photography was used to evaluate the biomass of experimental plots in an old-field ecosystem that was treated with different levels of waste water from a sewage treatment facility Cibachrome prints at a scale of approximately 1 1,600 produced from 35 mm color infrared slides were used to analyze density patterns using prepared tonal density scales and multicell grids registered to ground panels shown on the photograph. Correlations between mean tonal density and harvest biomass data gave consistently high coefficients ranging from 0 530 to 0 896 at the 0 001 significance level. Corresponding multiple regression analysis resulted in higher correlation coefficients. The results indicate that aerial infrared photography can be used to estimate standing crop biomass on waste water irrigated old field ecosystems. Combined with minimal ground truth data, this technique could enable managers of waste water irrigation projects to precisely time harvest of such systems for maximal removal of nutrients in harvested biomass

(Author)

A78-14829 # The effect of soil water deficit on the reflectance of conifer seedling canopies L. Fox, III (Humboldt State University, Arcata, Calif.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1

Environmental Research Institute of Michigan, 1977, p. 719-728 9 refs. Research supported by the University of Michigan.

A78-14844 \* # Two phase sampling for wheat acreage estimation. R W Thomas and C M Hay (California, University, Berkeley, Calif) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 909-918 6 refs Contract No NAS9-14565

A two-phase Landsat-based sample allocation and wheat proportion estimation method was developed. The technique employs manual, Landsat full frame-based wheat or cultivated land proportion estimates from a large number of segments comprising a first sample phase to optimally allocate a small phase-two sample of computer or manually processed segments. Proportion estimates from each phase are then linked by regression or probability proportional to estimated size estimators to provide wheat proportion estimates and standard errors by reporting unit. Application to the Kansas Southwest CRD (Crop Reporting District) for 1974 produced a wheat acreage estimate for that CRD within 2 42% of the USDA SRS-based estimate using a lower CRD inventory budget than for a simulated reference LACIE (Large Area Crop Inventory Experiment) system.

A78-14845 # Classification of Landsat agricultural data based upon color trends. J D Tubbs (Arkansas, University, Fayetteville, Ark ) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 919-923

A simple procedure has been developed which attempts to automate that portion of the photointerpretation logic process which involves labeling fields or pixels according to their observed color trends. Decision rules have been developed for classifying an unknown observation by matching its color trend with that of expected trends for known crops. The proposed color classifier has been applied to the problem of separating wheat from all non-wheat by using Landsat imagery obtained from at least three distinct growth stages for wheat.

A78-14846 \* # The use of Landsat digital data to detect and monitor vegetation water deficiencies D R Thompson (NASA, Johnson Space Center, Houston, Tex ) and O A Wehmanen (Lockheed Electronics Co , Inc , Houston, Tex ) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 925-931 9 refs Contract No NAS9-15200

In the Large Area Crop Inventory Experiment a technique was devised using a vector transformation of Landsat digital data to indicate when vegetation is undergoing moisture stress A relation was established between the remote-sensing-based criterion (the Green Index Number) and a ground-based criterion (Crop Moisture Index). (Author)

A78-14847 # Pre-visual detection of stress in pine forests. C E Olson, Jr (Michigan, University, Ann Arbor, Mich.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p. 933-944 60 refs

Extensive tree mortality due to recent attacks by the southern pine beetle has resulted in renewed interest in pre-visual detection of forest stress (an analysis applied when trees show no visible sign of damage but appear different from non-stressed trees in non-visible parts of the spectrum). This paper summarizes available information relating to pre-visual detection of forest stress with particular reference to detection of attacks by pine bark beetles. Preliminarly efforts to obtain early detection of attacks by pine bark beetles, using MSS data from the ERIM M-7 scanner, have not been sufficiently successful to demonstrate an operational capability, but indicate that joint processing of the 0.71-0.73, 2.00-2.60 and 9.3-11.7 micron bands holds some promise

A78-14860 \* # Evaluation of spectral channels and wavelength regions for separability of agricultural cover types R Kumar (Instituto de Pesquisas Espaciais, São José dos Campos, São Paulo, Brazil) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 1081-1090 13 refs Grant No NGL-15-005-112

The purpose of this study was to evaluate the spectral channel as well as wavelength regions - visible, near infrared, middle infrared and thermal infrared - with respect to their estimated probability of correct classification (P-c) in discriminating agricultural cover types Multispectral scanner data in twelve spectral channels in the wavelength range of 0.4 to 11.7 micron acquired in the middle of July for three flightlines were analysed by applying automatic pattern recognition techniques. The same analysis was performed for the data acquired in the middle of August, over the same three flightlines, to investigate the effect of time on the results. The effect of deletion of each spectral channel as well as each wavelength region on P-c is given. Values of P-c for all possible combinations of wavelength regions in the subsets of one to twelve spectral channels are also given. The overall values of P-c were found to be greater for the data of the middle of August than the data of the middle of July (Author).

A78-14863 # An application of Landsat digital technology to forest fire fuel type mapping P H Kourtz (Canadian Forestry Service, Forest Fire Research Institute, Ottawa, Canada) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p. 1111-1115

A78-14864 \* # Landsat image interpretation aids R A Abotteen and H Malek (Lockheed Electronics Co , Inc , Houston, Tex ) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich , Environmental

Research Institute of Michigan, 1977, p 1117-1121 6 refs Contract No NAS9-15200

In the Large Area Crop Inventory Experiment, image interpretation aids were produced to assist in selecting and/or identifying representative samples of signatures in a given Landsat scene. The three methods employed are based on clustering techniques, information extraction, and aggregation of like spectral information on a two-dimensional spectral plot. (Author)

A78-14876 \* # Wheat yield forecasts using Landsat data J. E. Colwell, D. P. Rice, and R. F. Nalepka (Michiqan, Environmental Research Institute, Ann Arbor, Mich.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 1245-1254 Contract No. NAS5-22389

Leaf area index and percentage of vegetative cover, two indices of crop yield developed from Landsat multispectral scanning data, are discussed. Studies demonstrate that the Landsat indicators may be as highly correlated with winter wheat yield as estimates based on traditional field sampling methods, in addition, the Landsat indicators may account for variations in individual field yield which are not explainable by meteorological data. A simple technique employing early-season. Landsat data to make wheat yield predictions is also considered.

A78-14879 # Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy J Dejace, J Mégier, and W Mehl (EURATOM and Comitato Nazionale per l'Energia Nucleare, Centro Comune de Ricerche, Ispra, Italy) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2
Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 1269-1278 7 refs

A set of results concerning the processing and analysis of data from Landsat and airborne scanner is presented. The possibility of performing inventories of irrigated crops - rice, planted groves, poplars, and natural forests in the mountains - beeches and chestnuts, is investigated in the Po valley and in an alpine site of Northern Italy. Accuracies around 95 percent or better, 70 percent and 60 percent respectively, are achieved by using Landsat data and supervised classification. Discrimination of rice varieties is proved with eight channels data from airborne scanner, processed after correction of the atmospheric effect due to the scanning angle, with and without linear feature selection of the data. The accuracies achieved range from 65 percent to more than 80 percent.

A78-14880 \* # The influence of multispectral scanner spatial resolution on forest feature classification F G Sadowski, W A Malila, J E Sarno, and R F Nalepka (Michigan, Environmental Research Institute, Ann Arbor, Mich ) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 1279-1288 8 refs Contracts No NAS9-14123, No NAS9-14988.

A78-14897 \* # Airborne monitoring of crop canopy temperatures for irrigation scheduling and yield prediction J P Millard (NASA, Ames Research Center, Moffett Field, Calif), R D Jackson, R J Reginato, S B Idso (U S Department of Agriculture, Agricultural Research Service, Phoenix, Ariz), R C Goettelman (LFE Corp, Richmond, Calif), and R L LaPado (ESL, Inc, Sunnyvale, Calif) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p 1453-1461 11 refs.

The aim of the program discussed was to develop techniques for remotely measuring crop irrigation needs and predicting crop yields, with emphasis on wheat Airborne measurements, using an IR line

scanner and color IR photography, were made to evaluate the feasibility of measuring minimum and maximum (dawn and afternoon) crop temperatures to compute a parameter, termed 'stress degree day' (SDD) - a valuable indicator of crop water needs, which can be related to irrigation scheduling and yield Crop canopy temperature measurements by airborne IR techniques revealed the superiority of thermal IR data over color IR photography Water stress undetected in the latter technique was clearly detected in thermal imagery Color IR photography, however, is valuable in discerning vegetation. The pseudo-colored temperature-difference images (and pseudo-colored images, reading directly in daily SDD increments) are shown to be well suited for assessing plant water status and, thus, for determining the irrigation needs and crop yield potentials

A78-14899 \* # Landsat data from agricultural sites - Crop signature analysis P N Misra and S G Wheeler (IBM, Federal Systems Div, Houston, Tex) In-International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Mich. Environmental Research Institute of Michigan, 1977, p. 1473-1482 9 refs Contract No NAS9-14350

The Landsat multispectral scanner (MSS) data have been analyzed with a view toward classification to identify wheat. The notion of spectral signature of a crop, a commonly used basis for classification, has been found to be inadequate. Data analysis has revealed that the MSS data from agricultural sites are essentially two dimensional, and that the data from different sites and different acquisitions lie on parallel planes in the four-dimensional feature space. These results have been exploited to gain new insight into the data and to develop alternate models for classification. In particular, it has been found that the temporal pattern of change in the spectral response of a crop constitutes its signature and provides a basis for crop classification

A78-14900 # Inventory of ricefields in France using Landsat and aircraft data T Le Toan, P Cassirame, J Quach (Centre d'Etude Spatiale des Rayonnements, Toulouse, France), and R Marie (Institut National de la Recherche Agronomique, Montpellier, France) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 1483-1495 7 refs

A78-14901 # Forestland type identification and analysis in Western Massachusetts - A linkage of a Landsat forest inventory to an optimization study G T Rafsnider (US Department of Agriculture, Forest Service, Upper Darby, Pa.), R. H. Rogers, and A. Morse (Bendix Corp , Aerospace Systems Div , Ann Arbor, Mich ) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich, Environmental Research

Institute of Michigan, 1977, p 1497-1505 7 refs

A78-14902 # Large scale 70mm photography for range resources analysis in the western United States P T Tueller (Nevada, University, Reno, Nev.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2 Ann Arbor. Mich, Environmental Research Institute of Michigan, 1977, p 1507-1514 31 refs

Large scale 70mm aerial photography is a valuable supplementary tool for rangeland studies A wide assortment of applications have been developed varying from vegetation mapping to assessing environmental impact on rangelands. Color and color infrared stereo pairs are useful for effectively sampling sites limited by ground accessibility. They allow an increased sample size at similar or lower cost than ground sampling techniques and provide a permanent record.

A78-14903 # Assessment of forest plantations from low altitude aerial photography H A Nelson (Weyerhaeuser Co, Plymouth, NC) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p. 1515-1522

A78-14904 \* # Performance tests of signature extension algorithms R Abotteen, S Levy, M Mendlowitz, T Moritz, J Potter, S Thadani, and O Wehmanen (Lockheed Electronics Co., Inc., Houston, Tex.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 1523-1532 6 refs Contract No NAS9-15200

Comparative tests were performed on seven signature extension algorithms to evaluate their effectiveness in correcting for changes in atmospheric haze and sun angle in a Landsat scene. Four of the algorithms were cluster matching, and two were maximum likelihood algorithms. The seventh algorithm determined the haze level in both training and recognition segments and used a set of tables calculated from an atmospheric model to determine the affine transformation that corrects the training signatures for changes in sun angle and haze level. Three of the algorithms were tested on a simulated data set. and all of the algorithms were tested on consecutive-day data. The classification performance on the data sets using the algorithms is presented, along with results of statistical tests on the accuracy and proportion estimates. The three algorithms tested on the simulated data produced significant improvements over the results obtained using untransformed signatures. For the consecutive-day data, the tested algorithms produced improvements in most but not all cases The tests indicated also that no statistically significant differences were noted among the algorithms

A78-14907 # Estimation of soil moisture with radar remote sensing P P Batlivala and F T Ulaby (University of Kansas Center for Research, Inc , Lawrence, Kan ) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2 Ann Arbor. Mich, Environmental Research Institute of Michigan, 1977, p. 1557-1566

The radar response to soil moisture content was investigated using a truck-mounted 1-18 GHz (30-1 67 cm wavelength, respectively) Active Microwave Spectrometer system. The sensitivity to soil moisture content and the accuracy with which it could be estimated were evaluated for both bare and vegetation-covered fields. Bare field experiments were conducted to determine the optimum radar parameters (frequency, angle of incidence range and polarization configuration) for minimizing the response to surface roughness while retaining strong sensitivity to moisture content. In the vegetation-covered case, the effects of crop type, crop height and row direction relative to the radar look direct were evaluated

(Author)

A78-14915 # Passive microwave remote sensing of soil mois ture K la Kondrat'ev, V V Melent'ev, lu I Rabinovich, and E M Shul'gina (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR) In International Symposium on Remote Sensing of Environ ment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 1641-1661 18 refs

Research and development work carried out on passive microwave remote sensing of soil moisture is discussed. The theory and calculation of microwave emission from a medium with depthdependent physical properties are outlined. Méans of determining vertical temperature and humidity profiles are examined, and laboratory and aircraft measurements of soil moisture are evaluated A technique developed for determining the productive-moisture content of soils is described

Convective cloud plumes mark Canadian fire A78-15308 # sites F C Parmenter (NOAA, National Environmental Satellite Service, Washington, D.C.) Weather, vol. 32, Nov. 1977, p. 424-427
Visible satellite data taken by GOES on June 5th, 1976, over the central U.S. and the Plains of Canada showed a number of smoke-cloud plumes generated Dy some of the larger forest fires burning in northwestern Ontario. Each plume commences as a bright, sharp point source that increases in length and breadth downwind much in the fashion of satellite-viewed thunderstorms.

P.T. H. 1976, over 1977, p. 1976, over 1976, over 1976, over 1977, over 1977

A78-15392 \* Using Landsat data to estimate evapotranspiration of winter wheat E T Kanemasu, J L Heilman, J O Bagley, and W L Powers (Kansas State University of Agriculture and Applied Science, Manhattan, Kan ) Environmental Management, vol 1, no 6, 1977, p 515-520 8 refs NASA-supported research

Results obtained from an evapotranspiration model as applied to Kansas winter wheatfields were compared with results determined by a weighing lysimeter, and the standard deviation was found to be less than 0.5 mm/day (however, the 95% confidence interval was between plus and minus 0.2 mm/day) Model inputs are solar radiation, temperature, precipitation, and leaf area index, an equation was developed to estimate the leaf area index from Landsat data The model provides estimates of transpiration, evaporation, and soil moisture

A78-16508 # A Finnish system for forest management planning using aerial photographs H Leppanen and M Myllyniemi (FINNMAP, Helsinki, Finland) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper. 8 p

Production of 1 10,000 scale forestry management maps for Finland is discussed. The production process involves use of 1 20,000 scale black and white infrared aerial photographs which are enlarged and processed to create stereophotographs. The stereophotographs can be analyzed in the field with a simple pocket stereoscope. The forestry maps are intended to provide a means for separating and classifying timber stands, and for assessing the development of the stands.

A78-16513 # The use of remote sensing in the detection of crop damage (Utilisation de la télédétection dans la connaissance des dommages causés aux cultures) C -M Girard (Paris-Grignon, Institut National Agronomique, Thiverval Grignon, Yvelines, France) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 7 p. In French

The study of plant pathology and insect infestations in crops through such remote sensing techniques as panchromatic or infrared color photographs, multispectral scanning imagery and thermograms is reviewed. Remote detection programs cited include those presently in operation in Canada, the Netherlands, France, Great Britain, Italy, the German Democratic Republic, the Soviet Union and the U.S. surveillance programs for corn blight, potato mildew, tomato and tobacco mosaic, and diseases of fruit trees are mentioned. In addition, proposed projects involving the detection of nitrogen, potassium and magnesium deficiencies in coconuts (Ivory Coast) and the assessment of insect infestations (Mali) are considered.

A78-16515 # Approaches for solving forestry problems by utilizing aerospace methods (Wege zur Losung forstwirtschaftlicher Aufgaben unter Ausnutzung von aerokosmischen Mitteln) S G Sinitsin and V I Sukhikh (National Committee of Photogrammetrists, Moscow, USSR) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 10 p. In German,

Remote sensing methods are widely used in the USSR to solve various types of forestry problems. Multispectral aerial photos with scales in the range from 1 10,000 to 1 15,000 provide important information concerning the available forest resources. Various technologies for forestry inventory studies have been developed, taking into account the particular characteristics of different forest types. A method based on multispectral aerial color photos is employed to obtain information regarding the conditions of forests which have been adversely affected by parasites or in connection.

with industrial activities. The utilization of earth satellites makes it possible to acquire information which cannot be conveniently provided by aircraft. A description is provided of the requirements which have to be satisfied by photographs obtained with the aid of satellites for forestry applications. Attention is also given to the optimal time periods for obtaining aerial photos, the development of an operational method for the detection of forest fires, and suitable approaches for the interpretation of the photographs.

G.R.

A78-16522 # Mean annual volume growth from sequential volume determination on permanent aerial photographic plots D A Stellingwerf and D Benessalah (International Institute for Aerial Survey and Earth Sciences, Enschede, Netherlands) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 15 p

A combination of field surveys and aerial photography to determine the volume of forest growth and cuttings. The photographic data for the study consisted of 0.05 hectare plots of conifers made on black and white infrared film. Mean annual volume growth was analyzed for two age classes of timber (40 to 120 years and 80 to 120 years), and regression equations were employed to investigate the volume of cuttings during a five-year period. Emphasis was placed on using the least costly combination of field surveys and aerial reconnaissance to develop the forestry study.

A78-16523 # Optimum ratio of photo-field plots for aerial volume and aerial volume growth regression construction D A Stellingwerf (International Institute for Aerial Survey and Earth Sciences, Enschede, Netherlands) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 14 p

The optimum ratio of the number of photo plots to field plots for minimum cost with given standard error or minimum standard error with given cost is calculated for constructing an aerial volume table or aerial volume growth table for a 3000-ha forest of spruce Linear regression equations are used in both cases. For both volume and volume growth, the combination of photo and field plots is always cheaper than field plots alone.

A78-16551 # The dry deciduous forests of Bastar, Central India, on Landsat-1 E van Es (International Institute for Aerial Survey and Earth Sciences, Enschede, Netherlands) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 10 p

A78-16555 # Visual interpretation of Landsat MSS imagery for a reconnaissance soil survey of a part of the Indo-Gangetic plain, India F W Hilwig (International Institute for Aerial Survey and Earth Sciences, Enschede, Netherlands) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 32 p 29 refs

A78-17199 \* Distinguishing vegetation from soil background information A J Richardson and C L Wiegand (US Department of Agriculture, Weslaco, Tex.) Photogrammetric Engineering and Remote Sensing, vol 43, Dec 1977, p 1541 1552 13 refs NASA Order T-4105-B

In aircraft and satellite multispectral scanner data, soil back ground signals are superimposed on or intermingled with information about vegetation. A procedure which accounts for soil background would, therefore, make a considerable contribution to an operational use of Landsat and other spectral data for monitoring the productivity of range, forest, and crop lands. A description is presented of an investigation which was conducted to obtain information for the development of such a procedure. The investigation included a study of the soil reflectance that supplies the background signal of vegetated surfaces. Landsat data as recorded on computer compatible tapes were used in the study. The results of the investigation are discussed, taking into account a study reported by Kauth and Thomas (1976). Attention is given to the determination of Kauth's

plane of soils, sun angle effects, vegetation index modeling, and the evaluation of vegetation indexes. Graphs are presented which show the results obtained with a gray mapping technique. The technique makes it possible to display plant, soil, water, and cloud conditions for any Landsat overpass

Pattern recognition of Landsat data based A78-18248 \* upon temporal trend analysis J L Engvall, J D Tubbs, and Q A Holmes (NASA, Johnson Space Center, Mission Planning and Analysis Div , Houston, Tex ) Remote Sensing of Environment, vol 6, no 4, 1977, p 303-314 10 refs

The Delta Classifier defined as an agricultural crop classification scheme employing a temporal trend procedure is applied to more than 100 different Landsat data sets collected during the 1974-1975 growing season throughout the major wheat-producing regions of the United States The classification approach stresses examination of temporal trends of the Landsat mean vectors of crops in the absence of corresponding ground truth information. It is shown that the resulting classifications compare favorably to ground truth estimates for wheat proportion in those cases where ground truth is available, and that the temporal trend procedure yields estimates of the wheat proportion that are comparable to the best results from maximum likelihood classification with photointerpreter defined training fields

A78-18249 \* Evaluating soil moisture and yield of winter wheat in the Great Plains using Landsat data J L Heilman, E T Kanemasu, J O Bagley, and V P Rasmussen (Kansas State University of Agriculture and Applied Science, Manhattan, Kan ) Remote Sensing of Environment, vol. 6, no. 4, 1977, p. 315-326 NASA supported research

Locating areas where soil moisture is limiting to crop growth is important for estimating winter-wheat yields on a regional basis. In the 1975-76 growing season, we evaluated soil-moisture conditions and winter wheat yields for a five-state region of the Great Plains using Landsat estimates of leaf area index (LAI) and an evapotranspiration (ET) model described by Kanemasu et al (1977) Because LAI was used as an input, the ET model responded to changes in crop growth Estimated soil water depletions were high for the Nebraska Panhandle, southwestern Kansas, southeastern Colorado, and the Texas Panhandle Estimated yields in five-state region ranged from 1 0 to 2 9 metric ton/ha

A78-20172 # Differentiation of selected annual field crops throughout the growing season by their spectral reflectance properties E J Brach and A R Mack (Department of Agriculture, Research Branch, Ottawa, Canada) Canadian Journal of Remote Sensing, vol. 3, Dec. 1977, p. 55 65, 14 refs

N78-10529\* National Aeronautics and Space Administration Goddard Inst for Space Studies New York

REMOTE SENSING OF VEGETATION AND SOIL USING MICROWAVE ELLIPSOMETRY Patent

Siegfried O Auer (NAS-NRC) and John B Schutt inventors (to NASA) Issued 4 Oct 1977 7 p Filed 15 Apr 1976 Supersedes N76-23671 (14 - 14, p 1814)

(NASA-Case-GSC-11976-1, US-Patent-4,052 666

US-Patent-Appl-SN-677352 US-Patent-Class-324-58 5B) Avail US Patent Office CSCL 08F

A method is described of determining vegetation height and water content of vegetation from the intensity and state of elliptical polarization of a reflected train of microwaves. The method comprises the steps of reflecting a circularly polarized train of microwaves from vegetation at a predetermined angle of incidence and detecting the reflected train of microwaves. The ratio of the intensities of the electric field vector components is determined the phase difference of the components is measured, and the refractive index and thickness of the layer of vegetation are computed from a formula. The refractive index is given essentially by the water content of the vegetation

Official Gazette of the U.S. Patent Office

N78-10534\*# Environmental Research Inst of Michigan Ann Arbor

WHEAT PRODUCTIVITY ESTIMATES USING LANDSAT DATA Progress Report, 16 May - 15 Oct. 1977

Richard F Nalepka John Colwell, Principal Investigators, Daniel P Rice, and Patricia A Bresnahan 15 Oct 1977 13 p refs ERTS

(Contract NAS5-22389)

(E78-10009 NASA-CR-155213, ERIM-114800-37-L) Avail NTIS HC A02/MF A01 CSCL 02C

The author has identified the following significant results Large area LANDSAT yield estimates were generated These results were compared with estimates computed using a meteorological yield model (CCEA). Both of these estimates were compared with Kansas Crop and Livestock Reporting Service (KCLRS) estimates of yield, in an attempt to assess the relative and absolute accuracy of the LANDSAT and CCEA estimates Results were inconclusive A large area direct wheat prediction procedure was implemented. Initial results have produced a wheat production estimate comparable with the KCLRS estimate

N78-10538\*# Kansas State Univ, Manhattan Dept of

PLANTING DATA AND WHEAT YIELD MODELS Final Report, 15 Feb. 1975 - 31 Mar 1977 Arlın M Feyerherm, Principal Investigator Sep 1977 89 p

(Contract NAS9-14533)

NASA-CR-151525) NTIS (E78-10013. Avail

HC A05/MF A01 CSCL 02C

The author has identified the following significant results. A variable date starter model for spring wheat depending on temperature was more precise than a fixed date model. The same conclusions for fall-planted wheat were not reached. If the largest and smallest of eight temperatures were used to estimate daily maximum and minimum temperatures respectively, a 1-4 F bias would be introduced into these extremes For Kansas, a reduction of 0.5 bushels/acre in the root-mean-squareerror between model and SRS yields was achieved by a six fold increase (7 to 42) in the density of weather stations. An additional reduction of 0.3 b/A was achieved by incorporating losses due to rusts in the model

N78-12496\* Environmental Research Inst of Michigan, Ann Arbor Infrared and Optics Div

AN EVALUATION OF THE SIGNATURE EXTENSION APPROACH TO LARGE AREA CROP INVENTORIES UTILIZING SPACE IMAGE DATA Final Technical Report, 15 May 1976 - 14 Nov. 1977

Richard F Nalepka, Principal Investigator, Richard C Cicone, John L. Stinson, and Ronald J Balon Nov 1977 117 p refs **EREP** 

(Contract NAS9-14988)

(E78-10016, NASA-CR-151552, ERIM-122700-33-F) Avail NTIS HC A06/MF A01 CSCL 02C

The author has identified the following significant results Two examples of haze correction algorithms were tested CROP-A and XSTAR The CROP-A was tested in a unitemporal mode on data collected in 1973-74 over ten sample segments in Kansas Because of the uniformly low level of haze present in these segments, no conclusion could be reached about CROP-As ability to compensate for haze It was noted, however, that in some cases CROP-A made serious errors which actually degraded classification performance. The haze correction algorithm XSTAR was tested in a multitemporal mode on 1975-76 LACIE sample segment data over 23 blind sites in Kansas and 18 sample segments in North Dakota, providing wide range of haze levels and other conditions for algorithm evaluation. It was found that this algorithm substantially improved signature extension classification accuracy when a sum-of-likelihoods classifier was used with an alien rejection threshold

N78-12521# Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif

#### **EVALUATION OF SKYLAB (EREP) DATA FOR FOREST AND** RANGELAND SURVEYS Final Forest Service Research Pager

Robert C Aldrich 1976 83 p refs Prepared in cooperation with Rocky Mountain Forest and Range Experiment Station, Ft

(PB-270543/2. FSRP-PSW-113) HC A05/MF A01 CSCL 02F

Avail

Data products were examined monocularly or stereoscopically using a variety of magnifying interpretation devices. Land use, forest types, physiographic sites, plant communities, and forest stress were interpreted and mapped at sites in Georgia, South Dakota, and Colorado Microdensitometric techniques and computer assisted data analysis and sampling procedures were developed and tested against ground truth. Results indicate that only Skylab S190B color photographs are good for classification of forest and nonforest land GRA

N78-13499\*# Environmental Research Inst. of Michigan, Ann.

INVESTIGATIONS OF SPECTRAL SEPARABILITY OF SMALL GRAINS, EARLY SEASON WHEAT DETECTION, AND MULTICROP INVENTORY PLANNING Final Report, 15 May 1976 - 14 Nov 1977

Richard F Nalepka, Principal Investigator, William A Malila, and James M Gleason Nov 1977 85 p refs

(Contract NAS9-14988)

(E78-10015 NASA-CR-151553, EIRM-122700-34-F) Avail NTIS HC A05/MF A01 CSCL 02C

The author has identified the following significant results LANDSAT data from seven 5 by 6 segments having crop type information were analyzed to determine the potential for spectral separation of spring wheat from other small grains as an alternative to the primary LACIE procedure for estimating spring wheat acreage Within segment field-center classification accuracies for spring wheat vs barley tended to be best in mid-July when crop color changes were in progress. When correlations were made for differences in atmospheric haze data from several segments could be aggregated, and results that approached within segment accuracies were obtained for selected dates. LACIE field measurement spectral reflectance data provided information on both wheat development patterns and the importance of various agronomic factors on wheat reflectance, the most important being availability of soil moisture. To investigate early season detection for winter wheat, reflectance of developing wheat patterns was simulated through reflectance modeling and was analyzed along with field measured reflectance from a Kansas site. The green component development of the wheat field was analyzed as a function of data throughout the season A selected threshold was not crossed by all fields until mid-April These reflectance data were shown to be consistent actual LANDSAT data

N78-13500\*# Purdue Univ , Lafayette Ind Lab for Applications of Remote Sensing

COMPARING SOIL BOUNDARIES DELINEATED BY DIGITAL ANALYSIS OF MULTISPECTRAL SCANNER DATA FROM HIGH AND LOW SPATIAL RESOLUTION SYSTEMS S J Kristof, Principal Investigator, M F Baumgardner, A L. Zachary, and E R Stoner 1977 11 p refs EREP

(Contract NAS9-14016)

(E78-10017, NASA-CR-151530, LARS-Publ-082477) Avail NTIS HC A02/MF A01 CSCL 08M

The author has identified the following significant results Computer-aided analysis techniques used with aircraft MSS data showed that the spatial resolution was sufficient to recognize each soil mapping unit of the test site. Some difficulties occurred where different soil series were intricately mixed, and this mixture showed as a separate spectral mapping unit, or where the difference between two soils depended on the depth of silty surface material Analysis of LANDSAT data with computer-aided techniques showed that it was not possible to find spectrally homogeneous soil features of the seven soil series on the 40 ha test site on the digital display or on a picture print map Cluster techniques could be used on an extended test area to group spectrally similar data points into cluster classes

N78-13502\* Michigan State Univ , East Lansing USE OF REMOTE SENSING FOR LAND USE POLICY FORMULATION Semiannual Progress Report, Dec. 1976 -May 1977

Myles Boylan, Principal Investigator 28 Aug 1977 31 p refs **ERTS** 

(Grant NGL-23-004-083)

(E78-10020, NASA-CR-155247) HC A03/MF A01 CSCL 08B

NTIS Avail

N78-14455\*# Weyerhauser Co Plymouth, N C
FOREST LAND MANAGEMENT BY SATELLITE LANDSAT-DERIVED INFORMATION AS INPUT TO A FOREST INVENTORY SYSTEM

Darrel L Williams (NASA Goddard Space Flight Center) and Gerald F Haver Principal Investigators Dec 1976 40 p Sponsored by NASA Original contains color imagery Original photography may be purchased from the EROS Data Center SIOUX Falls, S D ERTS

(E78-10038. NASA-CR-155259) NTIS

HC A03/MF A01 CSCL 02F

The author has identified the following significant results Analysis of LANDSAT temporal data specifically the digitally merged winter and summer scenes, provided the best overall classification results. Comparison of temporal classification results with available ground truth reveal a 94% agreement in the delineation of hardwood categories a 96% agreement for the combined pine category, and a greater than 50% agreement for each individual pine subcategory. For nearly 1000 acres, compared clearcut acreage estimated with LANDSAT digital data differed from company inventory records by only 3% Through analysis of summer data, pine stands were successfully classified into subcategories based upon the extent of crown closure. Maximum spectral separability of hardwood and pine stands was obtained from the analysis of winter data

N78-14456\*# Environmental Research Inst. of Michigan, Ann Arbor Infrared and Optics Div

PROCEDURE B A MULTISEGMENT TRAINING SELECTION AND PROPORTION ESTIMATION PROCEDURE FOR PROCESSING LANDSAT AGRICULTURAL DATA Report, 15 May 1976 - 14 Nov 1977

Richard F Nalepka, Principal Investigator R J Kauth, and W Richardson Nov 1977 143 p refs Original contains imagery Original photography may be purchased from the EROS Data Center Sloux Falls, S D EREP

(Contract NAS9-14988)

(E78-10039, NASA-CR-151576, ERIM-122700-31-F) Avail NTIS HC A07/MF A01 CSCL 02F

N78-14459\*# Purdue Univ Lafayette, Ind Lab for Applications of Remote Sensing

AGRICULTURAL SCENE UNDERSTANDING Final Report D A Landgrebe Principal Investigator Marvin E Bauer, LeRoy Silva, Roger M Hoffer, and Marion F Baumgardner Nov 1977 184 p refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls S D EREP

(Contract NAS9-14970)

(E78-10043 NASA-CR-155343, LARS-112677, T-1314/4, MA-129TA) Avail NTIS HC A09/MF A01 CSCL 02C

The author has identified the following significant results The LACIE field measurement data were radiometrically calibrated Calibration enabled valid comparisons of measurements from different dates, sensors and/or locations. Thermal band canopy results included (1) Wind velocity had a significant influence on the overhead radiance temperature and the effect was quantized Biomass and soil temperatures, temperature gradient, and canopy geometry were altered (2) Temperature gradient was a function of wind velocity (3) Temperature gradient of the wheat canopy was relatively constant during the day (4) The laser technique provided good quality geometric characterizaN78-14462\*# Environmental Research Inst of Michigan Ann Arbor

INVESTIGATION OF TECHNIQUES FOR INVENTORYING FORESTED REGIONS VOLUME 1 REFLECTANCE MODELING AND EMPIRICAL MULTISPECTRAL ANALYSIS OF FOREST CANOPY COMPONENTS Final Report, 15 May 1976 - 14 Nov 1977

Richard F Nalepka Principal Investigator, F G Sadowski, and W A Malila Nov 1977 80 p refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sloux Falls S D EREP (Contract NAS9-14988)

(E78-10046, NASA-CR-151561 ERIM-122700-35-F1-Vol-1) Avail NTIS HC A05/MF A01 CSCL 02F

The author has identified the following significant results Effects of vegetation density on overall canopy reflectance differed dramatically, depending on spectral band, base material, and vegetation type. For example, reflectance changes caused by variations in vegetation density were hardly apparant for a simulated burned surface in LANDSAT band 5, while large changes occurred in band 7. When increasing densities of tree overstory were placed over understories, intermediate to dense overstories effectively masked the understories and dominated the spectral signatures. Dramatic changes in reflectance occurred for canopies placed on a number of varying topographic positions. Such changes were seen to result in the spectral overlap of some nonforested with densely forested situations

N78-14463\*# Environmental Research Inst. of Michigan, Ann Infrared and Optics Div

INVESTIGATION OF TECHNIQUES FOR INVENTORYING FORESTED REGIONS VOLUME 2 FORESTRY INFORMA-TION SYSTEM REQUIREMENTS AND JOINT USE OF REMOTELY SENSED AND ANCILLARY DATA Final Report, 14 May 1976 - 14 Nov 1977

Richard F Nalepka Principal Investigator Richard C Cicone William A Malila, and Eric P Crist Nov 1977 145 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center Sloux Falls, S D EREP (Contract NAS9-14988)

(E78-10047, NASA-CR-151575, ERIM-122700-35-F2-Vol-2) Avail NTIS HC A07/MF A01 CSCL 02F

The author has identified the following significant results Effects of terrain topography in mountainous forested regions on LANDSAT signals and classifier training were found to be significant. The aspect of sloping terrain relative to the sun's azimuth was the major cause of variability. A relative insolation factor could be defined which in a single variable, represents the joint effects of slope and aspect and solar geometry on irradiance Forest canopy reflectances were bound, both through simulation and empirically, to have nondiffuse reflectance characteristics. Training procedures could be improved by stratifying in the space of ancillary variables and training in each stratum Application of the Tasselled-Cap transformation for LANDSAT data acquired over forested terrain could provide a viable technique for data compression and convenient physical interpretations

N78-14482\*# South Dakota State Univ Brookings Sensing Inst

PROGRESS AND NEEDS IN AGRICULTURAL RESEARCH, DEVELOPMENT, AND APPLICATIONS PROGRAMS

D G Moore and V I Myers In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 257-266 refs

Avail NTIS HC A99/MF A01 CSCL 02C

The dynamic nature of agriculture requires repetitive resource assessments such as those from remote sensing. Until recently the use of remote sensing in agriculture has been limited primarily to site specific investigations without large-scale evaluations Examples of successful applications at various user levels are provided. The stage of development for applying remote sensing to many agricultural problems is assessed, and goals for planning future data characteristics for increased use in agriculture are suggested

N78-14483\*# Canadian Forestry Service Ottawa (Ontario) REMOTE SENSING AND TODAY'S FORESTRY ISSUES

L. Sayn-Wittgenstein In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol. 1 1977 p 267-276

Avail NTIS HC A99/MF A01 CSCL 02F

The actual and the desirable roles of remote sensing in dealing with current forestry issues such as national forest policy supply and demand for forest products and competing demands for forest land are discussed Topics covered include wood shortage, regional timber inventories, forests in tropical and temperate zones, Skylab photography forest management and protection available biomass studies, and monitoring

N78-14496\*# National Aeronautics and Space Administration Langley Research Center, Langley Station Va LACIE A LOOK TO THE FUTURE

R B MacDonald and F G Hall In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 429-465 refs Avail NTIS HC A99/MF A01 CSCL 02C

The Large Area Crop Inventory Experiment (LACIE) is a project designed to demonstrate the applicability of remote sensing technology to monitor globally an important world food crop wheat The need for more timely and reliable monitoring of food and fiber supplies is discussed, and the monitoring systems currently utilized are reviewed. The fundamentals involved in assessing the impact of variable weather and economic conditions on wheat acreage, yield and production are elucidated. The experiment's approach to production monitoring is described and its status is reviewed. Examples of acreage and yield monitoring in the Soviet Union are used to illustrate the experiment's approach

N78-14500\*# California Univ Berkeley and Resource Management

USE OF MULTISPECTRAL DATA IN DESIGN OF FOREST SAMPLE SURVEYS

Stephen J Titus and Lee C Wensel In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 505-513 refs

(Contract NAS9-14552)

Avail NTIS HC A99/MF A01 CSCL 02F

The use of multispectral data in design of forest sample surveys using a computer software package is described. The system allows evaluation of a number of alternative sampling systems and, with appropriate cost data estimates the implementation cost for each

N78-14516\*# Alaska Univ Fairbanks Geophysical Inst REINDEER RANGE INVENTORY IN WESTERN ALASKA FROM COMPUTER-AIDED DIGITAL CLASSIFICATION OF LANDSAT DATA

T H George, W J Stringer and J N Baldridge In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 671-682 refs

Avail NTIS HC A99/MF A01 CSCL 06C

An inventory of reindeer-range resources was conducted for the USDA Soil Conservation Service of 1.6 million hectares of wildlands in western Alaska using clustering techniques with digital Landsat data. Computer-aided digital analysis produced a provisional map of rangeland types which was used to design the field collection of vegetation and soil types data. This field data facilitated refinement of the inventory map and was used to describe the map units. The informational classes important to range resources were wet, moist and alpine tundra, tidal marsh, brush and open spruce forest. A significant feature of the study was the extraction of acreage figures by administrative boundaries within the study area. In addition to soil and vegetation association map products (at scales of 1 250,000 and 1 63,360) acreage values were tallied from the digital data for each of the four grazing permit areas established by the Bureau of Land Management

N78-14519\*# Pan American Univ Edinburg, Tex FURTHER TESTS OF THE SUITS REFLECTANCE MODEL E W Lemaster and J E Chance In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977

p 703-710 refs \ Avail NTIS HC A99/MF A01 CSCL 20F

Experiments performed by stacking cotton leaves in the port of a spectroradiometer indicate that single leaf reflectance ceases to vary with more than two leaves in the visible region and eight leaves in the infrared region Chance and LeMaster have shown that the Suits spectral reflectance model predicts an asymptotic dependence of crop reflectance on leaf area index (LAI) with crop reflectance static for leaf area indices in excess of two in the visible regions and six in the infrared regions of the spectrum. These results are experimentally verified in the field for Milam and Penjamo spring wheat, and a theoretical relationship is discussed that relates crop reflectance at 650 nm to crop canopy LAI. Experimental data are given that relate observer zenith angle to crop reflectance for wheat The Suits reflectance model calculations for wheat fail to agree with this data.

## N78-14521\*# Humboldt State Coll Arcata Calif THE EFFECT OF SOIL WATER DEFICIT ON THE REFLECTANCE OF CONIFER SEEDLING CANOPIES

L Fox In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 719-728 refs

Avail NTIS HC A99/MF A01 CSCL 02F

The effects of soil water deficit on spruce and pine seedling canopy reflectance needle reflectance and transmittance, and canopy density were measured in a greenhouse with a diffuse source of radiant flux. A potential for early or pre-visual detection of plant water stress was not supported by these measurements made at visible and reflected infrared wavelengths to 1950 nm. Needles were found to transmit approximately thirty percent of the radiant flux incident on them at 780 nm, ten percent at 700 nm and were found to be opaque at 450 550, 600 and 650 nm.

N78-14538\*# California Univ , Berkeley Space Sciences Lab

#### TWO PHASE SAMPLING FOR WHEAT ACREAGE ESTIMA-TION

Randall W Thomas and Claire M Hay In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 909-918 refs (Contract NAS9-14565)

Avail NTIS HC A99/MF A01 CSCL 02C

A two phase LANDSAT-based sample allocation and wheat proportion estimation method was developed. This technique employs manual LANDSAT full frame-based wheat or cultivated land proportion estimates from a large number of segments comprising a first sample phase to optimally allocate a smaller phase two sample of computer or manually processed segments. Application to the Kansas Southwest CRD for 1974 produced a wheat acreage estimate for that CRD within 2.42 percent of the USDA SRS-based estimate using a lower CRD inventory budget than for a simulated reference LACIE system. Factor of 2 or greater cost or precision improvements relative to the reference system were obtained.

N78-14539\*# Arkansas Univ Fayetteville Dept of Mathema-

### CLASSIFICATION OF LANDSAT AGRICULTURAL DATA BASED UPON COLOR TRENDS

J D Tubbs *In* ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 919-923 refs

Avail NTIS HC A99/MF A01 CSCL 02C

An automated classification procedure is described. The decision rules were developed for classifying an unknown observation by matching its color trend with that of expected trends for known crops. The results of this procedure were found to be encouraging when compared with the usual supervised classification procedures.

Author

N78-14540\*# National Aeronautics and Space Administration Lyndon B Johnson Space Center Houston, Tex

### THE USE OF LANDSAT DIGITAL DATA TO DETECT AND MONITOR VEGETATION WATER DEFICIENCIES

D R Thompson and O A Wehmanen (Lockheed Electron Co Inc Houston Tex) In ERIM Proc of the 11th Intern Sympon Remote Sensing of Environment, Vol 2 1977 p 925-931 refs

(Contract NAS9-15200)

Avail NTIS HC A99/MF A01 CSCL 02C

A technique devised using a vector transformation of LANDSAT digital data to indicate when vegetation is undergoing moisture stress is described A relation established between the remote sensing-based criterion (the Green Index Number) and a ground-based criterion (Crop Moisture Index) is discussed

Author

N78-14541\*# Michigan Univ , Ann Arbor School of Natural Resources

PRE-VISUAL DETECTION OF STRESS IN PINE FORESTS
Charles E Olson Jr In ERIM Proc of the 11th Intern Symp
on Remote Sensing of Environment Vol 2 1977 p 933-944
refs

Avail NTIS HC A99/MF A01 CSCL 02F

Pre-visual or early detection of forest stress with particular reference to detection of attacks by pine bark beetles is discussed Preliminary efforts to obtain early detection of attacks by pine bark beetles using MSS data from the ERIM M-7 scanner were not sufficiently successful to demonstrate an operational capability but indicate that joint processing of the 0.71 to 0.73, 2.00 to 2.60, and 9.3 to 11.7 micrometer bands holds some promise Ratio processing of transformed data from the 0.45 to 0.52 1.55 to 2.60 and 4.5 to 5.5 or 9.3 to 11.7 micrometer regions appears even more promising

N78-14554 $^*\#$  Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil)

#### EVALUATION OF SPECTRAL CHANNELS AND WAVE-LENGTH REGIONS FOR SEPARABILITY OF AGRICUL-TURAL COVER TYPES

R Kumar In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1081-1090 refs

Avail NTIS HC A99/MF A01 CSCL 02C

The spectral channels were evaluated as well as wavelength regions, visible, near infrared middle infrared and thermal infrared were evaluated with respect to their estimated probability of correct classification (P sub c) in discriminating agricultural cover types Multispectral scanner data in twelve spectral channels in the wavelength range of 0.4 to 11.7 micrometers acquired in the middle of July for three flightlines were analyzed by applying automatic pattern recognition techniques. The same analysis was performed for the data acquired in the middle of August over the same three flightlines to investigate the effect of time on the results. The effect of deletion of each spectral channel as well as each wavelength region on P sub c was given Values of P sub c for all possible combinations of wavelength regions in the subsets of one to twelve spectral channels were also given The overall values of P sub c were found to be greater for the data of the middle of August than the data of the middle of July Author

N78-14555\*# INTERA Environmental Consultants Ltd Houston Tex

#### THERMAL IMAGERY FOR CENSUS OF UNGULATES

M C Wride and K Baker (Parks Canada, Western Region) In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1091-1099 refs

Avail NTIS HC A99/MF A01 CSCL 06C

A Daedalus thermal linescanner mounted in a light single engine aircraft was used to image the entire 270 square kilometers within the fenced perimeter of EIK Island Park, Alberta, Canada The data were collected during winter 1976 in morning and midday (overcast conditions) processed and analyzed to obtain a number for total ungulates. Five different ungulate species were present during the survey. Ungulates were easily observed.

during the analysis of linescanner imagery and the total number of ungulates was established at 2175 compared to figures of 1010 and 1231 for visual method aerial survey results of the same area that year It was concluded that the scanner was much more accurate and precise for census of ungulates than visual techniques

N78-14557\*# Canadian Forestry Service Ottawa (Ontario) Forest Fire Research Institute

### AN APPLICATION OF LANDSAT DIGITAL TECHNOLOGY TO FOREST FIRE FUEL TYPE MAPPING

P H Kourtz In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1111-1115

Avail NTIS HC A99/MF A01 CSCL 02F

The role of digital classifications suitable as fuel maps was examined A Taylor enhancement was produced for an 8 million hectare fire control region showing water muskeg, coniferous deciduous and mixed stands, clearcut logging, burned areas, regeneration areas, nonforested areas and large forest roads. Use of the map by fire control personnel demonstrated its usefulness for initial attack decision making.

N78-14570\*# Environmental Research Inst. of Michigan, Ann Arbor

#### WHEAT YEILD FORECASTS USING LANDSAT DATA

John E Colwell, Daniel P Rice and Richard F Nalepka In its Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1245-1254

(Contract NAS5-22389)

Avail NTIS HC A99/MF A01 CSCL 02C

Several considerations of winter wheat yield prediction using LANDSAT data were discussed. In addition, a simple technique which permits direct early season forecasts of wheat production was described.

Author

N78-14573\*# Joint Research Centre of the European Communities, Ispra (Italy)

## COMPUTER-AIDED CLASSIFICATION FOR REMOTE SENSING IN AGRICULTURE AND FORESTRY IN NORTHERN ITALY

J Dejace, J Megier, and W Mehl In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol. 2 1977 p. 1269-1278 refs

Avail NTIS HC A99/MF A01 CSCL 02C

A set of results concerning the processing and analysis of data from LANDSAT satellite and airborne scanner is presented The possibility of performing inventories of irrigated crops-rice planted groves-poplars and natural forests in the mountiansbeeches and chestnuts, is investigated in the Po valley and in an alphine site of Northern Italy Accuracies around 95% or better 70% and 60% respectively are achieved by using LANDSAT data and supervised classification Discrimination of rice varieties is proved with 8 channels data from airborne scanner processed after correction of the atmospheric effect due to the scanning angle, with and without linear feature selection of the data. The accuracies achieved range from 65% to more than 80%. The best results are obtained with the maximum likelihood classifier for normal parameters but rather close results are derived by using a modified version of the weighted euclidian distance between points with consequent decrease in computing time around a factor 3 Author

N78-14574\*# Environmental Research Inst of Michigan, Ann Arbor

### THE INFLUENCE OF MULTISPECTRAL SCANNER SPATIAL RESOLUTION ON FOREST FEATURE CLASSIFICATION

F G Sadowski W A Malila, J E Sarno, and R F Nalepka In its Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1279-1288 refs Sponsored in part by Dept of Agriculture

(Contracts NAS9-14123 NAS9-14988) Avail NTIS HC A99/MF A01 CSCL 02F Inappropriate spatial resolution and corresponding data processing techniques may be major causes for non-optimal forest classification results frequently achieved from multispectral scanner (MSS) data Procedures and results of empirical investigations are studied to determine the influence of MSS spatial resolution on the classification of forest features into levels of detail or hierarchies of information that might be appropriate for nationwide forest surveys and detailed in-place inventories. Two somewhat different but related studies are presented. The first consisted of establishing classification accuracies for several hierarchies of features as spatial resolution was progressively coarsened from (2 meters) squared to (64 meters) squared. The second investigated the capabilities for specialized processing techniques to improve upon the results of conventional processing procedures for both coarse and fine resolution data.

N78-14576\*# Food and Agriculture Organization of the United Nations, Rome (Italy)

#### AERIAL ALBEDOS OF NATURAL VEGETATION IN SOUTH-EASTERN AUSTRALIA

J A Howard In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1301-1307 refs

Avail NTIS HC A99/MF A01 CSCL 02C

Black-and-white low-level 70mm photography was used to record the track of the aircraft, which was then plotted on conventional 1 80,000 23 cm photogrammetric photographs and referenced against simultaneous measurements of the beam albedos of vegetation Using stereoscopic pairs of the 70mm photographs, the vegetation was classified into sub-formations Marked differences in the 'sub-formation' albedos were observed A two-way table using stand height and crown cover of the sub-formations clearly showed a very distinctive trend of albedos. This finding may be important in other vegetal studies.

N78-14583\*# Environmental Research Inst of Michigan Ann Arbor

APPLICATIONS OF LANDSAT DATA TO THE INTEGRATED ECONOMIC DEVELOPMENT OF MINDORO, PHILLIPINES T W Wagner and J C Fernandez (Bur of Mines Manila) In Its Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1375-1380

Avail NTIS HC A99/MF A01 CSCL 05C

LANDSAT data is seen as providing essential up-to-date resource information for the planning process LANDSAT data of Mindoro Island in the Philippines was processed to provide thematic maps showing patterns of agriculture, forest cover terrain wetlands and water turbidity A hybrid approach using both supervised and unsupervised classification techniques resulted in 30 different scene classes which were subsequently color-coded and mapped at a scale of 1 250 000. In addition, intensive image analysis is being carried out in evaluating the images. The images, maps and aerial statistics are being used to provide data to seven technical departments in planning the economic development of Mindoro Multispectral aircraft imagery was collected to compliment the application of LANDSAT data and validate the classification results.

N78-14591\*# National Aeronautics and Space Administration Ames Research Center Moffett Field Calif

## AIRBORNE MONITORING OF CROP CANOPY TEMPERATURES FOR IRRIGATION SCHEDULING AND YIELD PREDICTION

John P Millard Ray D Jackson (Agricultural Res Serv Phoenix Ariz J Robert C Goettelman (LFE Corp Richmond Calif) Robert J Reginato (Agricultural Res Serv Phoenix, Ariz ) Sherwood B Idso (Agricultural Res Serv Phoenix Ariz ), and Richard L LaPado (ESL Inc.) In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1453-1461 refs

Avail NTIS HC A99/MF A01 CSCL 02C

Airborne and ground measurements were made on April 1 and 29, 1976, over a USDA test site consisting mostly of wheat in various stages of water stress but also including alfalfa and bare soil. These measurements were made to evaluate the

feasibility of measuring crop temperatures from aircraft so that a parameter termed stress degree day SDD could be computed Ground studies have shown that SUD is a valuable indicator of a crop's water needs and that it can be related to irrigation scheduling and yield. The aircraft measurement program required predawn and afternoon flights coincident with minimum and maximum crop temperatures. Airborne measurements were made with an infrared line scanner and with color IR photography The scanner data were registered, subtracted, and color-coded to yield pseudo-colored temperature-difference images. Pseudocolored images reading directly in daily SDD increments were also produced. These maps enable a user to assess plant water status and thus determine irrigation needs and crop yield potentials Author

N78-14593\*# International Business Machines Corp Houston, Tex Federal Systems Div

#### LANDSAT DATA FROM AGRICULTURAL SITES SIGNATURE ANALYSIS

P N Misra and S G Wheeler In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1473-1482 refs

(Contract NAS9-14350)

Avail NTIS HC A99/MF A01 CSCL 02C

The LANDSAT multispectral scanner (MSS) data were analyzed with a view toward classification to identify wheat The notion of spectral signature of a crop a commonly used basis for classification was found to be inadequate. Data analysis has revealed that the MSS data from agricultural sites were essentially two dimensional, and that the data from different sites and different acquisition lay on parallel planes in the four dimensional feature space. These results were exploited to gain new insight into the data and to develop alternate models for classification. In particular, it was found that the temporal pattern of change in the spectral response of a crop constitutes its signature and provides a basis for crop classification

N78-14594\*# Centre d'Etude Spatiale des Rayonnements Toulouse (France)

#### **INVENTORY OF RICEFIELDS IN FRANCE USING LANDSAT** AND AIRCRAFT

T LeToan, P Cassirame, J Quach and R Marie (Inst. Natl. de Rech Agron , Montpellier, France) In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1483-1495 refs

Avail NTIS HC A99/MF A01 CSCL 02C

The methodology for mapping ricefields in Southern France is developed using 1975 LANDSAT 2 and aircraft data and taking into account the features of the fields

#### N78-14595\*# Forest Service Upper Darby, Pa FORESTLAND TYPE IDENTIFICATION AND ANALYSIS IN WESTERN MASSACHUSSETTS. A LINKAGE OF A LANDSAT FOREST INVENTORY TO AN OPTIMIZATION STUDY

Giles T Rafsnider, Robert H Rogers (Bendix Corp., Ann Arbor Mich) and Anthony Morse (Bendix Corp Ann Arbor Mich) In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1497-1505 refs

Avail NTIS HC A99/MF A01 CSCL 02F

Digital land cover files derived from computer processing of LANDSAT and soil productivity data were linked and used by linear programming model to determine production of forested areas under different management strategies. Results of model include maps and data graphics for four-county region in Western Massachusetts Author

N78-14596\*# Nevada Univ , Reno

#### LARGE SCALE 20mm PHOTOGRAPHY FOR RANGE RESOURCES ANALYSIS IN THE WESTERN UNITED STATES

Paul T Tueller In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1507-1514

Avail NTIS HC A99/MF A01 CSCL 14E

Large scale 70mm aerial photography is a valuable supplementary tool for rangeland studies. A wide assortment of applications were developed varying from vegetation mapping to assessing environmental impact on rangelands. Color and color infrared stereo pairs are useful for effectively sampling sites limited by ground accessibility. They allow an increased sample size at similar or lower cost than ground sampling techniques and provide a permanent record

#### N78-14597\*# Weyerhauser Co., Plymouth N C ASSESSMENT OF FOREST PLANTATIONS FROM LOW ALTITUDE AERIAL PHOTOGRAPHY

Harold A Nelson In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1515-1522

Avail NTIS HC A99/MF A01 CSCL 02F

Vertical color, and color-infrared aerial photography obtained from altitudes between 183 m and 915 m provide a cost effective method of determining tree survival and height growth in pine plantations on the North Carolina Coastal Plain All interpretations were performed by professional forestry personnel from the original 70 mm color transparencies Prompt assessment of tree survival is necessary if failed spots are to be successfully replanted Counts of living trees made after the third growing season and sometimes only two growing seasons after planting are accurate enough to permit planning of replanting operations without extensive ground surveys

N78-15536\*# Department of Agriculture, Washington, D.C. Statistical Reporting Service

#### PILOT STUDY OF THE POTENTIAL CONTRIBUTIONS OF LANDSAT DATA IN THE CONSTRUCTION OF AREA SAMPLING FRAMES

George Hanuschak, Principal Investigator and Kathleen Morrissey Oct 1977 72 p refs Sponsored by NASA Original contains Original photography may be purchased from color imagery the EROS Data Center Sloux Falls, S D ERTS (F78-10037 NASA-CR-155262) NTIS

HC A04/MF A01 CSCL 05B

N78-15539\*# Department of Agriculture, Washington, D.C. Statistical Reporting Service

#### THE AUXILIARY USE OF LANDSAT DATA IN ESTIMATING CROP ACREAGES RESULTS OF THE 1975 ILLINOIS CROP-ACREAGE EXPERIMENT

Chapman Gleason, Principal Investigator Robert R Starbuck, Richard S Sigman, George A Hanuschak Michael E Craig Paul W Cook, and Richard D Allen Oct 1977 86 p refs Sponsored by NASA ERTS

(E78-10049, NASA-CR-15 HC A05/MF A01 CSCL 02C NASA-CR-155508) NTIS

The author has identified the following significant results It was found that classifier performance was influenced by a number of temporal, methodological, and geographical factors. Best results were obtained when corn was tasselled and near the dough stage of development. Dates earlier or later in the growing season produced poor results. Atmospheric effects on results cannot be independently measured or completely separated from the effects due to the maturity stage of the crops. Poor classifier performance was observed in areas where considerable spectral confusion was present

N78-15540\*# Mississippi State Office of Science and Technology, Jackson

#### THE USE OF LANDSAT DIGITAL DATA AND COMPUTER IMPLEMENTED TECHNIQUES FOR AN EROSION HAZARD-REFORESTATION NEEDS ASSESSMENT

James E Anderson Principal Investigator and Armond T Joyce Aug 1977 59 p refs Sponsored by NASA Original contains color imagery Original photography may be purchased from the EROS Data Center, Sloux Falls, S D ERTS (E78-10050 NASA-CR-155509, Rept-165) Avail NTIS HC A04/MF A01 CSCL 05B

#### 01 AGRICULTURE AND FORESTRY

N78-15542\*# South Dakota State Univ , Brookings Remote Sensing Inst

Sensing Inst APPLICATION OF REMOTE SENSING TECHNOLOGY IN SOUTH DAKOTA TO ASSESS WILDLIFE HABITAT CHANGE, DESCRIBE MEANDERING LAKES, IMPROVE AGRICULTURAL CENSUSING, MAP ASPEN, AND QUANTIFY CELL SELECTION CRITERIA FOR SPATIAL DATA

TIFY CELL SELECTION CRITERIA FOR SPATIAL DATA
Semiannual Progress Report, 1 Jul - 31 Dec 1977
Victor I Myers, Principal Investigator, R G Rest, K J Dalsted,
J C Eidenshink, F A Schmer, and M E Wehde 31 Dec
1977 80 p refs Original contains color imagery Original
photography may be purchased from the EROS Data Center,
Sioux Falls, S D ERTS
(Grant NGL-42-003-007)
(E78-10063 NASA-CR-155514 SDSIL-RSI-77-17) Avail

(E78-10053, NASA-CR-155514 SDSU-RSI-77-17) Avail NTIS HC A05/MF A01 CSCL 08F

## Page intentionally left blank

Page intentionally left blank

#### 02

## ENVIRONMENTAL CHANGES AND CULTURAL RESOURCES

Includes land use analysis, urban and metropolitan studies, environmental impact air and water pollution geographic information systems, and geographic analysis

A78-10041 The determination of volatile organic compounds in city air by gas chromatography combined with standard addition, selective subtraction, infrared spectrometry and mass spectrometry C W Louw, J F. Richards (South African Council for Scientific and Industrial Research, Air Pollution Research Group, Pretoria, Republic of South Africa), and P K Faure (Rand Afrikaans University, Johannesburg, Republic of South Africa) Atmospheric Environment, vol 11, no 8, 1977, p 703-717 25 refs

A78-10056 \* Instrumental sensing of stationary source emissions. W F Herget and W D. Conner (U S Environmental Protection Agency, Research Triangle Park, N C) Environmental Science and Technology, vol 11, Oct 1977, p 962-967 5 refs NASA-supported research

A variety of programs have been conducted within EPA to evaluate the capability of various ground-based remote-sensing techniques for measuring the SO2 concentration, velocity, and opacity of effluents from coal-burning power plants. The results of the remote measurements were compared with the results of instack measurements made using EPA reference methods. Attention is given to infrared gas-filter correlation radiometry for SO2 concentration, Fourier-transform infrared spectroscopy for SO2 concentration, ultraviolet matched-filter correlation spectroscopy for SO2 concentration, infrared and ultraviolet television for velocity and SO2 concentration, infrared laser-Doppler velocimetry for plume velocity, and visible laser radar for plume opacity.

A78-10658 \* Quantitative mapping of suspended solids in wastewater sludge plumes in the New York Bight apex R W Johnson (NASA, Langley Research Center, Hampton, Va), I W Duedall (New York, State University, Stony Brook, N Y), R M Glasgow (Vought Corp, Hampton, Va), J R Proni, and T A Nelsen (NOAA, Miami, Fla) Water Pollution Control Federation, Journal, vol 49, Oct 1977, p 2063-2073 13 refs

The purpose of this investigation was to apply the previously reported methodology to remotely sensed data that were collected over wastewater sludge plumes in the New York Bight apex on September 22, 1975 Spectral signatures were also determined during this study. These signatures may be useful in the specific identification of sludge plumes, as opposed to other plumes such as those created by the disposal of industrial acid wastes.

(Author)

A78-11283 \* Characterization of terrestrial service environments - The simultaneous occurrence of combined conditions of solar insolation and climatic variables. R E Thomas, D C Carmichael (Battelle Columbus Laboratories, Columbus, Ohio), and W F Carroll (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif ) In International Solar Energy Society, Annual Meeting, Orlando, Fla., June 6-10, 1977, Proceedings Sections 14-25 Cape Canaveral, Fla, International Solar Energy Society, 1977, p. 14-1 to 14-6 9 refs ERDA-supported research, Contract No NAS7 100

Computational methods for occurrences of combined environmental and pollution variables are compared. General statistical data and diurnal statistics on 24 environmental variables are treated. Combinations of variables dealt with include air temperature, relative humidity, wind speed, total insolation, air temperature and weather event (rain, fog), air pollutant and weather event, wind

speed, wind direction, and weather event, air temperature, total insolation, and weather event, air temperature, relative humidity, wind speed, computed direct insolation levels, air temperature, relative humidity, air pollution R D V

A78-11809 Tropospheric photochemical and photophysical processes J N Pitts, Jr (California, University, Riverside, Calif ) and B J Finlayson-Pitts (California State University, Fullerton, Calif ) In Tunable lasers and applications, Proceedings of the Conference, Loen, Norway, June 6-11, 1976

Berlin and New York, Springer-Verlag, 1976, p 236-258 51 refs Research supported by the California Air Resources Board and Petroleum Research Fund, U.S. Environmental Protection Agency Grant No R-800649, NSF Grants No GP-35424, No MPS-73-08638-A02, No AEN-73-02904-A02

Attention is given to those species known or suspected to be present in ambient air which may have significant chemical, physical, or biological effects and for which no satisfactory conventional monitoring techniques exist at present. In addition, the importance of secondary aerosols (particulates) produced by gas-to-particle conversion processes in the polluted troposphere is discussed, with special emphasis on the problems to which tunable lasers might be applied.

A78-11810 Photochemistry in the stratosphere H S
Johnston (California, University, Berkeley, Calif) In Tunable lasers
and applications, Proceedings of the Conference, Loen, Norway,
June 6-11, 1976 Berlin and New York, SpringerVerlag, 1976, p. 259-278 44 refs

In studies involving aspects of stratospheric photochemistry, measurements of the trace species in the stratosphere could frequently simplify the problem significantly. Attention is given to the screening of solar radiation, diurnal variations, investigations which could be carried out with tunable lasers, the pollution of the stratosphere, and the sources, sinks, and reservoirs of ozone-destroying catalysts. Dominant factors in stratospheric photochemistry are considered, taking into account the formation of ozone in the upper and middle stratosphere in connection with the photolysis of molecular oxygen.

A78-11811 Remote sensing using tunable lasers. K. W Rothe and H Walther (Munchen, Universitat, Garching, Max-Planck-Gesellschaft zur Forderung der Wissenschaften, Munich, West Germany). In Tunable lasers and applications, Proceedings of the Conference, Loen, Norway, June 6-11, 1976

Berlin and New York, Springer-Verlag, 1976, p 279-293 66 refs Research supported by the Bundesministerium für Forschung und Technologie

Lasers constitute a useful tool for remote measurements of atmospheric parameters via backscattering processes. At altitudes higher than 30 km. Rayleigh scattering of laser light related to the presence of the molecular constituents of the air becomes dominant over Mie scattering, associated with aerosols, dust, or other small particles in the lower atmosphere. Rayleigh data provide information regarding the molecular density variation, and thereby, indirectly also the atmospheric pressure and temperature. Trace constituents in the lower atmosphere can be observed with the aid of approaches based on fluorescence, Raman scattering, or absorption effects Absorption methods appear to be especially suitable for pollution monitoring applications. Particular attention is given to the differential absorption method and measurements conducted with it. It is concluded that the differential absorption method constitutes the most sensitive technique known at the present time G.R

A78-12405 Comparability of CO2 measurements. W Bischof (Stockholms, Universitet, International Meteorological Institute, Stockholm, Sweden) Tellus, vol 29, Oct 1977, p. 435-444 14 refs Statens Naturvetenskapliga Forskningsrad Contract No. G0223-060

In measuring the atmospheric CO2 concentration, corrections for the carrier-gas effect are required at present for each individual gas analyzer. It is shown that standard gases of CO2/air composition offer less complication in the data comparison than the CO2/N2 standards most commonly used for calibration. CO2/air standards used in Stockholm and related to the Scripps manometric calibration scale have remained stable over more than 10 years. Aircraft data from the upper troposphere and the lower stratosphere obtained in the Stockholm project are in fair agreement with data from the Mauna Loa and South Pole stations. An accelerating increase over the period from 1963 to 1975 (i.e., about 0.5 ppm/yr at the beginning and about 1.3 ppm/yr at the end of the period) has been observed

(Author)

A78-12938 # A mask correlation remote sensor for measurements of SO2 optical depths on long light source - Instrument distances F Evangelisti, G Giovanelli, G Orsi, T Tirabassi, and O Vittori (CNR, Bologna, Italy) In International Electronics Congress, 24th, Rome, Italy, March 28-30, 1977, Proceedings

Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1977, p. 123-130 5 refs

A78-12955 # The application of remote sensing to the monitoring of coastal water pollution (L'applicazione del telerilevamento al monitoraggio dell'inquinamento di acque costiere). M Benedini (CNR, Istituto di Ricerca sulle Acque, Rome, Italy) In International Electronics Congress, 24th, Rome, Italy, March 28-30, 1977, Proceedings Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1977, p 387-419 6 refs In Italian

The use of remote sensing data from such sources as Landsat for monitoring coastal pollution due to the discharge of solid wastes from rivers is discussed. In addition, it is suggested that satellite imagery may provide assessments of thermal stratifications or petrochemical pollution in coastal waters. Aerial reconnaissance and surface ship monitoring of pollution are also considered.

A78-12971 The growth of aerosol in an urban plume A J Alkezweeny (Battelle Pacific Northwest Laboratories, Richland, Wash) In Atmospheric pollution, Proceedings of the Twelfth International Colloquium, Paris, France, May 5-7, 1976

Amsterdam, Elsevier Scientific Publishing Co , 1976,

Time changes of aerosol particle size distributions in the range of 0.01 to 5.0 micron diameter and concentrations of 0.3, NO, NO2, SO2, several hydrocarbons, and sulfate were measured in an urban plume. The investigation was conducted in a Lagrangian frame of reference using instrumented aircraft. The air parcel trajectory was identified by the movement of a tetroon launched from the ground to an altitude within the plume. This study was carried out in metropolitan. St. Louis, during the Metromex program. A pronounced change in the aerosol particle size distribution and an increase in the total volume of the aerosol were observed. Gas to particle transformation involving existing nuclei is responsible for the aerosol growth.

A78-12975

The arrangement of atmospheric pollution detectors by means of a minicomputer and a multicomponent chemical unit (L'étalonnage de détecteurs de pollution atmosphérique au moyen d'un miniprocesseur et d'une unité chimique multicomposante) H Bultynck, J Kretzschmar, M Loos, and H Peperstraete (Centre d'Etude de l'Energie Nucléaire, Mol, Belgium) In Atmospheric pollution, Proceedings of the Twelfth International Colloquium, Paris, France, May 5-7, 1976
Amsterdam, Elsevier Scientific Publishing Co , 1976, p 279-296 In French

A telemonitoring network for measuring atmospheric SO2, total S, NOx, total hydrocarbons other than methane, and dust is described. The testing of the pollution detectors and the role of the minicomputer are explained. Data processing and the detector-

minicomputer interface are considered. A detailed detector analysis of data obtained by a flame photometric SO2 detector is provided.

A78-12981 Remote optical sensing of the concentration and mass flow of particulate and gaseous pollutants in smoke plumes discharged through chimneys. P Morel C Vavasseur (Commissariat à l'Energie Atomique, Centre d'Etudes Nucléaires de Saclay, Gifsur-Yvette, Essonne, France), and P Zettwoog (Commissariat à l'Energie Atomique, Centre d'Etudes Nucléaire de Fontenay-aux-Roses, Fontenay-aux-Roses, Hauts-de-Seine, France) In Atmospheric pollution, Proceedings of the Twelfth International Colloquium, Paris, France, May 5-7, 1976 Amsterdam, Elsevier Scientific Publishing Co, 1976, p 395-402

A78-12982 The remote sensing of atmospheric pollutants by a CO2 laser apparatus M M H Moreau (Institut National de Recherche Chimique Appliquée, Vert-le-Petit, Essonne, France) In Atmospheric pollution, Proceedings of the Twelfth International Colloquium, Paris, France, May 5-7, 1976
Amsterdam, Elsevier Scientific Publishing Co , 1976, p 405-418
Research supported by the Ministère de la Qualité de la Vie

The principle of the device described is the absorption of an IR beam in the 9 to 11 micron window by sulfur dioxide and some other pollutants. The device consists of a transmitter-receiver and a reflector. The transmitter incorporates two tunable CO2 lasers, whose beams are chopped at different frequencies. This makes it possible to separate the reflected beams at the receiver. The range between the transmitter receiver and the reflector is 1000 to 2000 meters.

A78-13616 Atmospheric particulate properties inferred from lidar and solar radiometer observations compared with simultaneous in situ aircraft measurements - A case study J A Reagan, J D Spinhirne, D M Byrne (Arizona, University, Tucson, Ariz), D W Thomson, R G de Pena, and Y Mamane (Pennsylvania State University, University Park, Pa) Journal of Applied Meteorology, vol 16, Sept 1977, p 911-928 48 refs NSF Grants No GA-31916X2, No DES-72-01309-A03, No DES-75-15551

Particulate size and height distributions, complex refractive index and mass loading have been measured and inferred from direct aircraft and indirect lidar-solar radiometer observations made during a unique joint experiment conducted the week of 18 November 1974 in Tucson, Ariz. The aircraft and lidar-solar radiometer measurements were first analyzed independently and the results were then intercompared. Vertical profiles of particulate extinction obtained from the lidar (monostatic) and aircraft measurements were found to be in excellent agreement on both a relative and absolute basis. Lidar (bistatic and monostatic) inferences of particulate mass loading agreed favorably with the aircraft mass monitor measurements. The aircraft and lidar (bistatic) size distribution determinations were found to be similar in shape and agreed in absolute value within an order of magnitude. The mean particle refractive index inferred from the lidar (bistatic) measurements (n = 1 40-i0 000) agreed with the index of a significant fraction of the particles identified by electron microscope analysis of impactor samples collected with the aircraft (Author)

A78-13617 Estimation of the daytime and nighttime distribution of atmospheric ozone from ground-based millimeter wavelength measurements F i Shimabukuro, P L Smith, and W J Wilson (Aerospace Corp, Los Angeles, Calif) Journal of Applied Meteorology, vol 16, Sept 1977, p 929-934 13 refs Research supported by the Aerospace Corp

The daytime and nighttime distribution of the ozone density in the atmosphere has been determined from ground-based measurements of the emission spectra of the strong 4(0,4) = 4(1,3) rotational line of ozone at 101 737 GHz (wavelength = 2.9 mm) using a least-squares parameter estimation technique. The inversion procedure is described, and a linearized model is used to obtain approximate error bounds on the ozone parameter estimates.

(Author)

A78-13837 \* Comment on 'Relative atmospheric aerosol content from ERTS observations' by Yu Mekler, H Quenzel, G Ohring, and I Marcus. M Griggs (Science Applications, Inc., La Jolla, Calif.) Journal of Geophysical Research, vol. 82, Oct. 20, 1977, p. 4972 Contract No. NAS5-20899

A78-13843 \* Evaluation of a hydrogen chloride detector for environmental monitoring G L Gregory (NASA, Langley Research Center, Hampton, Va) and R H Moyer (GEOMET, Inc., Pomona, Calif.) Review of Scientific Instruments, vol. 48, Nov. 1977, p. 1464-1468 8 refs

The paper describes a hydrogen chloride detector designed to monitor concentrations of hydrogen chloride gas in the ambient environment. The detector was developed for NASA for use in launch vehicle effluent monitoring. The detector operates on chemiluminescence principles with a lower detection limit of less than 5 x 10 to the -3rd ppm (by volume) The hydrogen chloride in the air sample reacts with a bromide-bromate coating in the inlet tube of the instrument producing bromine Bromine is then quantitated by chemiluminescent oxidation of luminol. The visible light generated in the chemiluminescent reaction is proportional to the hydrogen chloride concentration of the sampled airstream. The detector is most suited to laboratory or field studies where hydrogen chloride is the dominant pollutant, as compared to the interfering species. Interferences include strong acids, acid-forming gases, and halogen gases. Of the interferences investigated the most serious in these groups are hydrochloric and sulfuric acid, sulfur dioxide, and chlorine, respectively. The detector has been in use since 1974 and has been found to be highly portable, rugged, and stable under extreme environmental conditions

A78-14082 Tunable dual-line CO2 laser for atmospheric spectroscopy and pollution monitoring. S O Kanstad, A Bjerkestrand, and T Lund (Forsvarets Forskningsinstitutt, Kjeller, Norway) Journal of Physics E - Scientific Instruments, vol 10, Oct 1977, p 998-1000 17 refs

Using two rear reflectors coupled via a common grating into the amplifying medium, two independently tunable lines are selected from the same laser. Piezoelectric transducers length-tune the rear mirrors to produce intermittent pulses at lambda-1 and lambda-2 at any suitable frequency. Details of the resonator design are given, including a folded path in a rigid Invar structure. Signal changes down to 0.1% can be identified by means of real-time rationing and synchronous detection. Across a 1200 m path, 0.5 and 2 ppb densities or ethylene can be measured in a calm and a turbulent atmosphere, respectively (Author)

A78-14174 Photochemical reactions among formaldehyde, chlorine, and nitrogen dioxide in air P L Hanst and B W Gay, Jr. (U S Environmental Protection Agency, Environmental Sciences Research Laboratory, Research Triangle Park, N.C.) (American Chemical Society, Centennial Meeting, San Francisco, Calif., Sept 1976.) Environmental Science and Technology, vol. 11, Nov. 1977, p. 1105-1109. 16 refs.

Photochemical reactions among chlorine, nitrogen dioxide, and formaldehyde were studied, using parts-per-million concentrations in 1 atm of air. The reactant mixtures were irradiated by ultraviolet fluorescent lamps and simultaneously analyzed by the Fourier transform infrared technique by use of folded light paths of up to 504 m With an excess of NO2 over Cl2, the reaction products included O3, CO, HNO3, N2O5, HCl, and nitryl chloride (CINO2) When chlorine exceeded NO2, the principal product was peroxy nitric acid (HOONO2) Peroxy formyl nitrate, nitrous acid, and chlorine nitrate were not seen. The nitryl chloride was stable even with the ultraviolet lights on. The peroxy nitric acid disappeared from the cell with a half-life of about 10 min. Formyl radicals (HCO), unlike acetyl radicals, did not combine with O2 and NO2 by addition HCO reacted with O2 to yield CO and HO2 The HO2 will then add to NO2 to yield HOONO2 If NO is present, the HO2 will prefer to react with it, oxidizing it to NO2

A78-14199 Plants as indicators of photochemical oxidants in the USA. J S Jacobson (Boyce Thompson Institute for Plant Research, Inc, Yonkers, NY) (Verein Deutscher Ingenieure, Tagung uber Ozon und Begleitsubstanzen im photochemischen Smog, Dusseldorf, West Germany, Sept. 22-24, 1976 ) VDI-Berichte, no 270, 1977, p 191-196 6 refs

The article discusses the use of plants as indicators of photochemical oxidants in terms of land-use planning and the evaluation of air pollution effects on agriculture, forestry, and regional vegetation A historical review of plants used as indicators is presented along with current applications in air pollution problems. Advantages of plant indicators are identified, such as simplicity in use, low cost, and lack of need for electrical power. Limitations in the use of plant indicators are also described, including limited regional zones for their cultivation, the effects of environmental conditions on the susceptibility to oxidants of plant indicators, and the presence of chemical pesticides.

A78-14448 # Ozone sounding correction procedures and their implications A B Pittock (Commonwealth Scientific and Industrial Research Organization, Div of Atmospheric Physics, Aspendale, Victoria, Australia) Royal Meteorological Society, Quarterly Journal, vol 103, Oct 1977, p 809, 810 5 refs

Two methods of correction to obtain agreement between integrated plus extrapolated direct sounding ozone data and the total amount of ozone, as found by the Dobson spectrophotometer, are evaluated. The methods are those of Dutsch et al (1970) and Pittock (1968). It is suggested that the Dutsch correction is better for climatological applications, although large anomalies may be observed between individual flights. In using this method the addition of a small correction to the apparent mean annual cycle of ozone concentrations may yield the true annual cycle. This may be important in validating the photochemical theory by reference to observational data.

A78-14783 # The impact of remote sensing on United States' geography - The past in perspective, present realities, future potentials J E Estes, J R Jensen, and D S Simonett (California, University, Santa Barbara, Calif) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 101-121 61 refs

The history of applying remote sensing to geographical studies in the period 1920-1977 is reviewed with attention given to contributions from the academic, industrial and government sectors and to the roles of publications and research funding A review is presented of the theoretical and practical roles of remote sensing in geography with attention given to cognitive morphometric analysis, cause-and-effect analysis, temporal modes of explanation, and functional and ecological systems analysis

A78-14797 # Remote sensing of air pollutants J A Eckert and R B Evans (US Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Las Vegas, Nev) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 1
Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 353-359 7 refs

The U S program for reducing air pollution is discussed with attention to the air monitoring requirements at different stages in the abatement process. Some remote sensing techniques for detecting air pollutants are surveyed. One technique involves the use of an earth reflected differential absorption system, ozone would be measured on an airborne platform equipped with lasers directed to the earth's surface. The uses of airborne down-looking lidar, compliance monitoring and opacity measurements, and photographic measurements are also described.

A78-14798 # Remote sensing of environmental impact of land use activities. C K Paul (Agency for International Development, Washington, D C) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 363-377 16 refs

Aircraft and spacecraft multispectral scanning sensors are used to monitor land cover for environmental studies. By means of digital image processing the system provides classification, rectification, rapid color rendition of scene data, and computer storage of image data for rapid retrieval and composite overlays with other sources of data. Case studies of the system include the Central Atlantic Regional Ecological Test Site, begun by the U.S. Geological Survey Geography Program and NASA's Office of Applications in 1970, the Association of Bay Area Governments, and the North Dakota Regional Environmental Assessment Program.

A78-14800 # Remote monitoring and Tennessee Valley Authority programs A R Stevens and A W Voss (Tennessee Valley Authority, Mapping Services Branch, Chattanooga, Tenn ) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 385-392

Attention is given to the historical background of the Tennessee Valley Authority noting its three primary tasks power production, flood control, and navigation. The Mapping Services Branch is described in terms of its basic subsections, such as the photogrammetry and remote sensing section, the cartographic and land approvals section, and the map information, records and reprographics section. Research and testing in the field of remote sensing is discussed along with the application of remote sensing techniques to areas such as forestry, geology, water resources, and environmental biology.

A78-14801 # Corps of Engineers applications for remote sensing of the environment M K Kurtz, Jr (U S Army, Engineer Topographic Laboratories, Fort Belvoir, Va) and J W Jarman (U S Army, Office of the Chief of Engineers, Washington, D C) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 1
Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p 393-399

Remote sensing applications developed by the U.S. Army Corps of Engineers are discussed, attention is given to planning for government installations, soil investigations, flood plain analyses, dam safety assessments, and monitoring of navigable waterways Emphasis is placed on the use of a combination of aerial photography and satellite data to provide the environmental impact statements required by the National Environmental Policy Act A digital interactive analysis laboratory capable of producing near real-time interpretations of satellite data is also mentioned. J M B

A78-14802 \* # Atmospheric sounding with passive microwaves - Review and prognosis D H Staelin (MIT, Cambridge, Mass ) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 401-406 14 refs Contracts No NAS5-21980, No NAS5-23677

Global maps of temperature profiles 0-20 km and of total water vapor and liquid water over ocean have been obtained from satellite-borne microwave spectrometers. Future satellites should extend the altitude range above 100 km and permit monitoring of H2O, O3, CO, N2O, and other trace constituents. Operational microwave temperature-sounding spectrometers are scheduled for launch on both military and civilian US satellites, and future improvements can be expected. (Author)

A78-14810 # Influence of ground level SO2 on the diffuse to direct irradiance ratio in the middle ultraviolet K F Klenk and A E S Green (Florida, University, Gainesville, Fla ) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p. 525-533 7 refs NSF Grant No ATM-75-

21962

We examine the dependence of the ratio of the diffuse to direct irradiances at the ground for a wavelength of 315 1 nm and propose a passive remote sensing method based on ratio measurements for obtaining the optical thickness of SO2 in the vertical column. If, in addition to the ratio measurements, the SO2 density at the ground is determined using an appropriate point-sampling technique then some inference on the vertical extent of SO2 can be drawn. We present an analytic representation of the ratio for a wide range of SO2 and aerosol optical thicknesses and solar zenith angles which can be inverted algebraically to give the SO2 optical thickness in terms of the measured ratio, aerosol optical thickness and solar zenith angle. (Author)

A78-14837 # Production of a map of land-use in lowa through manual interpretation of Landsat imagery. R R Anderson (lowa Geological Survey Remote Sensing Laboratory, lowa City, lowa) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 827-836. 6 refs

A land-use map of Iowa has been prepared based on manual photointerpretation of Landsat 1 images. The map, prepared at a scale of 1 250,000 and printed at a scale of 1 500,000, displays nine categories of land use urban residential, urban commercial/industrial, urban open, transportation network, extractive land, agricultural land, forest land, water, and reservoir flood pool Interpretations were verified through the use of Skylab and high altitude aerial photography.

B J

A78-14841 # Landsat digital data for water pollution and water quality studies in southern Scandinavia U Hellden (Lund, Universitet, Lund, Sweden) and I Akersten (Forsvarets Forskningsanstalt, Stockholm, Sweden) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 875-884 11 refs Research supported by the Swedish Environment Protection Board and Statens Naturvetenskapliga Forskningsrad

Spectral diagrams, illustrating the spectral characteristics of different water types, were constructed by means of simple statistical analysis of the various reflectance properties of water areas in southern Scandinavia as registered by Landsat-1. There were indications that water whose spectral reproduction is dominated by chlorophyllous matter (phytoplankton) can be distinguished from water dominated by non-chlorophyllous matter. Differences between lakes, as well as the patchiness of individual lakes, concerning secchi disc transparency could be visualized after classification and reproduction in black and white and in color by means of Line Printer, Calcomp Plotter (CRT) and Ink Jet Plotter respectively. (Author)

A78-14852 # Necessity to adapt land use and land cover classification systems to readily accept radar data. B Drake (Old Dominion University, Norfolk, Va) in International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 993-1000 10 refs

A hierarchial, four level, standardized system for classifying land use/land cover primarily from remote-sensor data (USGS system) has been proposed for national acceptance by Anderson et al. (1976) The USGS system clearly has been developed for non-microwave imaging sensors such as camera systems and line scanners. Studies

have shown that the classification system is compatible with aircraft and spacecraft photography and line-scanner imagery obtained at various altitudes. The USGS system commonly is not compatible with the land use/land cover classifications at different levels that can be made from radar imagery, and particularly from synthetic-aperture radar (SAR) imagery. The lack of compatibility exists because of the special capabilities of radar, particularly SAR, for data gathering that are not duplicated by the imaging optical sensors. The use of radar imagery for classifying land use/land cover at different levels is discussed, and a possible revision of the USGS system to more readily accept land use/land cover classifications from radar imagery is proposed. (Author)

A78-14862 # Remote sensing in operational range management programs in Western Canada M D Thompson (INTERA Environmental Consultants, Ltd., Calgary, Alberta, Canada) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 1101-1110 5 refs Department of Energy, Mines and Resources Contract No DSS-OSZ76-00183

A78-14871 # Land utilization and ecological aspects in the Sylhet-Mymensingh Haor region of Bangladesh - An analysis of Landsat data M I Chowdhury and K M. Elahi (Jahangirnagar University, Dacca, Bangladesh) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 1183-1195 8 refs

A78-14896 # Prototype active scanner for nighttime oil spill mapping and classification. G A Sandness and S B Ailes (Battelle Pacific Northwest Laboratories, Richland, Wash). In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2

43) Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 1445-1452. Research supported by the U.S. Environmental Protection Agency and U.S. Coast Guard

The prototype active aerial scanner system described was developed for nighttime water pollution detection and nighttime multispectral imaging of the ground. Xenon and mercury-xenon arc lamps were used to produce the transmitted light. Four detector channels provided a multispectral measurement capability. In night-time flight tests, a two-gallon slick of motor oil (40 micron thick) was successfully imaged from a height of 300 m. A sequence of three intensity-sliced active images of the oil slick provided information on the spreading of the slick over a period of 20 minutes. Rhodamine B (a fluorescent tracer dye) was imaged from 300 m at a concentration of less than 1 ppm.

A78-14913 \* # Multispectral analysis of ocean dumped materials. R. W. Johnson (NASA, Langley Research Center, Hampton, Va.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 1619-1627 11 refs

Remotely sensed data were collected in conjunction with sea-truth measurements in three experiments in the New York Bight Pollution features of primary interest were ocean dumped materials, such as sewage sludge and acid waste. Sewage-sludge and acid-waste plumes, including plumes from sewage sludge dumped by the 'line-dump' and 'spot-dump' methods, were located, identified, and mapped. Previously developed quantitative analysis techniques for determining quantitative distributions of materials in sewage sludge dumps were evaluated, along with multispectral analysis techniques developed to identify ocean dumped materials. Results of these experiments and the associated data analysis investigations are presented and discussed.

A78-14914 # Detection, identification, and quantification techniques for spills of hazardous chemicals. J. F. Washburn and G. A. Sandness (Battelle Pacific Northwest Laboratories, Richland, Wash.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings. Volume 2. Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 1629-1635. Research supported by the U.S. Coast Guard and U.S. Environmental Protection Agency, U.S. Department of Transportation Contract No CG-543234

In the study described, the first 400 chemicals listed in the Coast Guard's Chemical Hazards Response Information System (CHRIS) handbook were evaluated with respect to their detectability, identifiability, and quantifiability, using currently available pollution sensing instruments. An attempt was made also to identify some of the key areas in the technology of water pollution in which further research and development work is required. The analysis approach employed, made use of generalized sensing system characteristics and of the gross physical, chemical, and optical properties of the CHRIS chemicals to sort out those amenable to investigation by each of 12 sensing methods.

A78-14992 \* # Remote estimation of surface temperature in pollution measurement experiments. S K Gupta and S N. Tiwari (Old Dominion University, Norfolk, Va ) In Conference on Aerospace and Aeronautical Meteorology, 7th, and Symposium on Remote Sensing from Satellites, Melbourne, Fla , November 16-19, 1976, Preprints Boston, Mass , American Meteorological Society, 1977, p. 214-218 13 refs Grant No NsG-1282

The procedure described was developed for inferring the effective brightness temperature (EBT) of the underlying surface (at a given altitude) from the computed value of the radiance corresponding to a known surface temperature A standard temperature correction to EBT (termed 'base correction') is first determined by using a 'base model atmosphere' for computing the upwelling radiance Additional temperature corrections are then determined by considering several variations of the different surface and atmospheric parameters from their 'base model' values Empirical relations are derived between the deviations of various surface and atmospheric parameters (from their base model values) and the additional corrections required for the EBT as a result of these variations. Use of such relations for large-scale data reduction, instead of radiative transfer calculations, is expected to result in drastic cost decrease

VF

A78-15370 Detection of a plume 400 km from the source. M M Millan and Y S. Chung (Department of the Environment, Atmospheric Environment Service, Downsview, Ontario, Canada) Atmospheric Environment, vol. 11, no. 10, 1977, p. 939-944. 15 refs.

An unexpected SO2 reading over the northern edge of Toronto, Canada, by means of a COSPEC remote sensor, and the posterior trajectory analysis of the air parcel over Toronto at the time of the measurement, indicate that the INCO Sudbury plume was observed at 400 km from its source Some estimates of the mass flux in the plume and of its horizontal dimensions are presented (Author)

A78-15890 • The vertical distribution of HCl in the stratosphere O F Raper, C B Farmer, R A Toth, and B D Robbins (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif ) Geophysical Research Letters, vol 4, Nov 1977, p 531-534 7 refs Contract No NAS7-100

The vertical distribution of HCl in the stratosphere has been measured from infrared solar absorption spectra recorded with a balloon-borne interferometer. The flights were made in September, 1975, and May, 1976 at float altitudes of 40 km and 37 km, respectively, near Palestine, Texas. Concentration profiles derived from the data show an increase from 0.6 ppbv at 20 km to 1.7 plus or minus. 5 ppbv in the region of 37 km. Above 37 km, the data permit only the total abundance to be determined, this value is found to be equivalent to 1.6 plus or minus. 6 ppbv if the gas were

uniformly mixed. The results from the two flights are closely similar, and no significant seasonal variation in the HCl concentrations can be discerned. The balloon data are consistent with the profile in the 14-21 km altitude region of the stratosphere reported earlier from U-2 observations. (Author)

A78-16214 Simultaneous measurements of nitrogen dioxide and nitric acid in the lower stratosphere (Mesures simultanées du dioxyde d'azote et de l'acide nitrique dans la basse stratosphère) A Girard, J.-C. Fontanella, R. Giraudet, and N. Louisnard (ONERA, Châtillon-sous-Bagneux, Hauts-de-Seine, France) (Journal de Chimie Physique, vol. 74, no. 7-8, 1977, p. 809-813) ONERA, TP no. 1977-154, 1977 (p. 809-813) 6 p. 17 refs. In French

Simultaneous measurements of nitrogen dioxide and nitric acid were made at various seasons and northern latitudes by means of an airborne infrared spectrometer. At sunset in the lower stratosphere the concentration ratio of NO2 to HNO3 is around 0.1. An estimate of the OH concentration was deduced from this ratio on the basis of reactions in which nitric acid plays a part.

PTH

A78-16506 # An investigation of natural resources from orbital station 'Salyut-4' L A Kashin, lu P Kienko, and P I Klimuk (National Committee of Photogrammetrists, Moscow, USSR) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 11 p

Investigations of tectonic structure, studies of the hydrology and lithology of large areas, and land use surveys based on the analysis of imagery from the Soviet Salyut 4 orbital station are reported. The photographic systems on board the Salyut 4 are briefly described, and problems in data analysis are mentioned. Detection of a drained area of the Aral Sea, evaluation of oil and gas resources, a survey of phytoplankton populations, and the prediction of earthquakes on the basis of Salyut 4 data are considered.

A78-16529 # Description of landform patterns on air photos J G Speight (Commonwealth Scientific and Industrial Research Organization, Div of Land Use Research, Canberra, Australia) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 18 p 15 refs

A technique of landform description from aerial-photographic data was developed that is capable of specifying a considerable range of types of terrain in Papua New Guinea and of discriminating between them with some precision. Some sixty terrain attributes are used to characterize the landform features of a region. These attributes, for example, relate to grain variability, relief variability, connectedness of crest networks, and variability of dimensions of summit surfaces, crests, slopes, plains, streams, rises. In this way, landform classifications can be constructed on the basis of explicit attributes, and the possibility is provided of drawing mapping boundaries that enclose regions that are internally homogeneous with respect to the chosen attributes, but differ from each other in terms of the same attributes.

PT H

A78-16530 # Monitoring of polluted rivers by remote sensing methods (Gewässeruberwachung durch Fernerkundung). S. J. Schneider (Bundesforschungsanstalt für Landeskunde und Raumordnung, Bad Godesberg, West Germany). International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 19 p. In German.

The possibility of using multispectral photography, infrared scanning, and infrared thermography from aircraft for monitoring discharges of polluted and heated water in rivers was investigated in a test program on the narrow Saar river and on the wide Upper Rhine Valley Over the Saar, the helicopter flew along the center of the river bed, while for the much wider Rhine, 38 flights over transverse axes were performed, and the trends of the recorded quantities were plotted along the center of the river and along two lines 15 m from either shore. All important pollutants were detected, although it was

generally necessary to combine the various measurement types to get a complete picture. The size and shape of discharge plumes depended strongly on the flow rate. High sensitivity in the IR region enabled clear distinction between healthy chlorophyll-containing matter and unhealthy growth.

P.T.H.

A78-16539 # Analysis of some models of atmospheric optical properties according to space photo surveys G B Gonin, N V Kravchuk, and P V Stepanov (National Committee of Photogrammetrists, Moscow, USSR) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 9 p 18 refs

A number of transfer functions are given in compact form, characterizing various types of atmospheric influence on optical landscape characteristics. The specific features of different models characterizing the optical properties of the atmosphere are mentioned. Some features of computer programs used to compute different transfer functions are briefly described.

PTH

A78-16550 # Land-use change detection from Landsat and Skylab satellites R Ellefsen and D Peruzzi (San Jose State University, San Jose, Calif) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper, 6 p 5 refs

Data from Skylab and Landsat are used to update existing traditionally drawn land-use maps. Visual photographic imagery returned to earth by Skylab 4 is manually interpreted to detect land-use change. Also, land-use maps are made with the aid of computers employing pattern recognition programs to process. Landsat 1 and 2 digital reflectance data. These maps are compared to manual products to determine land-use change. It is shown that data from manned and unmanned satellites are suitable for monitoring land-use changes and that Skylab can detect type and quantity of land-use change by means of traditional interpretation techniques.

SD

A78-16771 Unique ambient carbon monoxide monitor based on gas filter correlation - Performance and application L W Chaney (Michigan, University, Ann Arbor, Mich.) and W A McClenny (U.S. Environmental Protection Agency, Environmental Sciences Research Laboratory, Research Triangle Park, N.C.) Environmental Science and Technology, vol. 11, Dec. 1977, p. 1186-1190, 20 refs.

A78-17000 \* Quantitative remote measurements of pollutants from stationary sources using Raman lidar S K Poultney (Perkin-Elmer Corp , Norwalk, Conn ), M L Brumfield, and J H Siviter, Jr (NASA, Langley Research Center, Hampton, Va ) Applied Optics, vol 16, Dec 1977, p 3180-3182 8 refs Grant No NsG-1060

The several advantages of Raman lidar for remote measurements of stationary source emissions were quantitatively evaluated using a calibration tank at a distance of 300 m at night. Measurements of approximately 10 to the 3rd ppm SO2 with a 12% accuracy were demonstrated in an observation time of 15 min using a 15-J ruby laser at 30 pulses/min, 6-m range resolution, interference filters, photon counting detection, and a 20-cm receiver. Measurement accuracy was checked by measuring known concentrations of SO2 in the tank, by tuning the interference filters through the SO2 Raman line, and by varying the CO2 concentration to very high levels during the SO2 measurements. Evaluation of the seriousness of induced fluorescence from plume aerosols failed due to the inability to simulate the plume aerosols.

A78-17061 \* # Observation of the development of individual dear air convective cells A Arnold (Johns Hopkins University, Laurel, Md) In Conference on Radar Meteorology, 17th, Seattle, Wash, October 26-29, 1976, Preprints

Mass, American Meteorological Society, 1977, p 338-341 USAF-NASA-supported research, NSF Grant No ATM-75-15791

A series of radar observations has been used to monitor the development of clear air convective cells. It is suggested that an airfield may be a source of such cells. The cells first appear at a distance of about 11 km, and are observed to be produced every four minutes. The emergence of separate cells supports the bubble theory of convection. After reaching maximum height, a typical decrease of 100-200 m occurs. Various methods used to estimate convective cell energy yield values of 10 to the 12th, 4 x 10 to the 11th, and 10 to the 11th J

A78-17197 Radar detection of surface oil slicks S P Kraus, J E Estes, S G Atwater (California, University, Santa Barbara, Calif), J R Jensen (Georgia, University, Athens, Ga), and R R Vollmers (U S Coast Guard, Washington, D C) Photogrammetric Engineering and Remote Sensing, vol 43, Dec 1977, p 1523-1531 10 refs Research supported by the University of California, U S Department of Transportation Contract No CG-63898-A

The United States Coast Guard currently is developing AIREYE, an all-weather, day/night airborne surveillance system, for installation aboard future medium range surveillance (MRS) aircraft. As part of this program, a series of controlled tests was conducted off southern California during May, 1976 in order to evaluate the oil slick and surface target detection capabilities of two Motoroladeveloped side-looking radars. The systems, a real-aperture AN/APS-94D and a synthetic-aperture coherent-on-receive (COR), were flown over the Santa Barbara Channel on May 19, 1976 Targets imaged during the coincident overflights included natural oil seepage, simulated oil spills, oil production platforms, piers, mooring buoys, commercial boats and barges, small pleasure craft, and coastal kelp beds. This paper describes the test program and compares oil and surface target detection results for the two systems. Based on an analysis of imagery from the coincident radar runs, COR provided better detection of natural and man-made oil slicks, whereas the AN/APS-94D consistently exhibited higher surface target detection results (Author)

A78-17574

Benefit assessment of ozone monitoring satellites. F E Gramling, P G Sassone, and R D Wilkins (Georgia Institute of Technology, Atlanta, Ga) In Imaginative engineering thru education and experience, Proceedings of the Southeast Region 3 Conference, Williamsburg, Va, April 4-6, 1977

New York, Institute of Electrical and Electronics Engineers, Inc., 1977, p. 427-429

The reported study emphasizes the methodology of assessing benefits of pollution monitoring satellites and extends some of the findings of the climatic impact assessment program which was organized 1971 to investigate the effects of aircraft engine emission on the chemical composition of the stratosphere. A graph is presented to illustrate the overall procedure for assessing the benefits of an alternative approach to stratospheric ozone monitoring. The first step involves a characterization of the performance of the baseline and alternative monitoring systems. The approach is concerned with a generic performance characterization of the alternate system which may include satellites and ground stations.

G B

A78-17575 Design and operation of an airborne air quality measurement system J B Tommerdahl, R B Strong, J H White (Research Triangle Institute, Research Triangle Park, N C), and J C Mulligan (North Carolina State University, Raleigh, N C) In Imaginative engineering thru education and experience, Proceedings of the Southeast Region 3 Conference, Williamsburg, Va, April 4 6, 1977 New York, Institute of Electrical and Electronics Engineers, Inc., 1977, p. 430-433 U.S. Environmental Protection Agency Contract No. 68-02-2048

An instrumentation system for use in a light, twin-engine aircraft for ambient air quality measurements in the lower troposphere is described. The system includes equipment for the measurement of ozone, oxides of nitrogen, temperature and the collection of grab samples for hydrocarbon analysis. The air sampling system

design, the evaluation of pressure effects on the analyzers, supporting measurements such as altitude and air speed, field operational procedures, and data validation techniques are discussed A brief description of a four-month flight program, conducted during the summer of 1975, which involved around 300 hours of flight time is presented (Author)

A78-17576 \* Aircraft versus spacecraft for remote monitoring of water quality in U.S. coastal zones W. L. Darnell (NASA, Langley Research Center, Hampton, Va.) In Imaginative engineering thru education and experience, Proceedings of the Southeast Region 3 Conference, Williamsburg, Va., April 4-6, 1977

New York, Institute of Electrical and Electronics Engineers, Inc., 1977, p. 435-441, 11 refs

To provide guidance for conducting future water monitoring missions over U S coasts, aircraft and spacecraft approaches were defined and quantitatively compared Sensors, aircraft and spacecraft were selected from current or developmental types for the hardware concepts and monitoring was assumed to begin in 1981-1983. Comparative data are presented on capabilities and costs to monitor both recognized pollution sites and broad shelf areas. For these mission requirements, a large fleet of light aircraft provided better coverage and at lower costs generally than one spacecraft, assuming a single, multi-spectral sensor on each platform. This result could change, however, should additional useful sensors with low cost penalties be found for the spacecraft.

(Author)

A78-18240 Remote sensing of pollutant plumes from Landsat P Brimblecombe, A Armstrong, and T Davies (East Anglia, University, Norwich, England) British Interplanetary Society, Journal (Remote Sensing), vol. 31, Jan. 1978, p. 11-15

The use of computer-compatible tapes from Landsat imagery for the analysis of industrial pollutant smoke plumes is discussed Difficulties may arise in defining contours for the smoke plumes, which often depart from the expected Gaussian distributions because they are products of instantaneous imagery. However, gray scale histograms are found to be effective for mapping probability contours. Techniques for discriminating between clouds and smoke plumes, based on spectral signatures or shadows cast, are also mentioned. Probability contours and intensity gradients of a plume emanating from a power station cooling tower are analyzed in a test of the methodology.

A78-18270 Measurement of atmospheric composition at the Australian baseline atmospheric monitoring station G I Pearman (Commonwealth Scientific and Industrial Research Organization, Melbourne, Australia) In Analytical techniques in the determination of air pollutants, Proceedings of the Symposium, University of Melbourne, Melbourne, Australia, May 1977 Symposium sponsored by the Clean Air Society Melbourne, Commonwealth Scientific and Industrial Research Organization, 1977, p 16-22 55 refs

Baseline or background monitoring of the composition of the atmosphere is an attempt to establish the composition of large sections of the global atmosphere and to observe whether the concentration of selected components is changing with time During the early part of 1976 measurements of baseline atmospheric composition were commenced at Cape Grim, Tasmania The Cape Grim station is to obtain data regarding the composition of southern hemisphere westerly maritime air. The data represent air covering space scales of 1000-10,000 km horizontally and 10 km vertically. The study of atmospheric particulates is considered, taking into account electrical conductivity, particle numbers, particle composition and mass, turbidity, and particle distribution. Attention is also given to investigations related to carbon dioxide, ozone, precipitation chemistry, meteorology, and data selection.

A78-18300 Monitoring air quality from satellites F C Parmenter (NOAA, Applications Group, Washington, D C ) Monthly Weather Review, vol. 105, June 1977, p. 789-792

Imagery from the operational geostationary satellite (GOES-1) provided a means of monitoring a large area of smoke originating in forest fires in Ontario and Quebec and drifting across New York and New England in June, 1976. Due to differential surface heating caused by the haze band, convective clouds were formed at the edge of the smoky region, resulting in conditions hazardous to low-level aircraft operations. The usefulness of the satellite data for forecasting such local summertime convection phenomena is suggested.

A78-18456 Measurement and the law - Monitoring for compliance with the Clean Air Amendments of 1970 S M Blacker, W R Ott, and T W Stanley (US Environmental Protection Agency, Office of Research and Development, Washington, D C) International Journal of Environmental Studies, vol. 11, no. 3, 1977, p. 169-185, 28 refs

Regulatory approaches established by the Clean Air Amendments of 1970 are explained. The approaches include attainment of National Ambient Air Quality Standards (NAAQS) through State Implementation Plans, control of stationary sources, and control of mobile sources. Attention is focused on one regulatory approach control of air pollution through State Implementation Plans - which is depicted as a feedback control system. The NAAQS are inputs to the system, the Plans are the control mechanism, and air monitoring is the 'feedback loop' by which to gauge compliance with the NAAQS. Six component systems within the feedback loop are described monitoring site selection, sampling frequency, measurement methods, reference materials, data acquisition, and data analysis and presentation.

A78-18476 Preliminary results from the Lidar system at the University of L'Aquila A D'Altorio and G Visconti (L'Aquila, Università, L'Aquila, Italy) Rivista Italiana di Geofisica e Scienze Affini, vol 4, Sept-Dec 1977, p 270, 271 Research supported by the Consiglio Nazionale delle Ricerche

The Lidar system of the University of Aquila, Italy, intended primarily for studies of stratospheric aerosols and NO2 fluorescence, is described. Sample analyses of backscattering signals from the 8 to 15 and the 12 to 18 km altitude ranges are presented. In addition, comparison of the sample analyses with data from the U.S. Standard Atmosphere indicates adequate accuracy for the Lidar system up to an altitude of about 25 km.

A78-18508 Mass appearance of marine blue algae in the Baltic Sea detected in satellite images (Massenauftreten mariner Blaualgen in der Ostsee auf Satellitenaufnahmen erkannt) K. A. Ulbricht (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Nachrichtentechnik, Oberpfaffenhofen, West Germany) and D. Schmidt (Deutsches Hydrographisches Institut, Hamburg, West Germany) DFVLR-Nachrichten, Dec. 1977, p. 913-915. In German

Landsat multispectral images of the Baltic Sea were processed by a digital image interpretation system, revealing in the Arkona Basin north and south of the island of Mon certain bright, irregularly broken lines, occasionally several kilometers in length. These lines have been identified with the mass appearance of marine blue algae. Elevated concentrations of phosphate promote the formation of the algae, which accordingly are an indicator of the eutrophication of the water. The spectral regions used (0.4-0.6 microns and 0.6-0.7 microns) have a depth of penetration into the sea water of 2-3 m, and appear to be well-suited to observation of the upper water layer which is irradiated by the sun.

A78-18795 \* # Remote sensing and laboratory techniques for monitoring ocean dumping C W Ohlhorst, R W Johnson (NASA, Langley Research Center, Hampton, Va), and E R Meyer (NOAA, National Ocean Survey, Rockville, Md) American Geophysical Union, Fall Meeting, San Francisco, Calif, Dec 5-9, 1977, Paper 11 p 9 refs

Results of field experiments conducted in the Atlantic Coastal Zone indicate that plumes resulting from ocean dumping of acid waste and sewage sludge have distinguishable spectral characteristics

when the radiance of the pollutant is normalized (ratioed to) background ocean water. Acid waste spectra peak between 550-650 nm while sewage sludge spectra have peak values at wavelengths of about 700 nm or greater. Results indicate that identification of acid waste and sewage sludge plumes may be independent of geographical location in the Atlantic Coastal Zone. Radiance ratio curves obtained in the laboratory qualitatively agree with those obtained from field experiments. Results from the July 25, 1977, Galveston Deep Ocean Dump. Site experiment show the radiance ratio curve of the biodigested industrial waste to be fairly flat and similar to the radiance ratio curves of sewage sludge line dumps and sewage sludge spot dumps that have been in the water for several hours. (Author)

A78-19616 Energy resource development - The monitoring components G B Morgan (U S Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Las Vegas, Nev ) Environmental Science and Technology, vol 12, Jan 1978, p 34-43

In connection with the continuing development of energy resources, it is very important to keep environmental pollutant concentrations at acceptable levels. In order to achieve this objective it is necessary to have information with respect to exposure pollutant effect relations, pollutant sources and the effectiveness of the considered controls. Monitoring systems and techniques for obtaining the needed information are considered, taking into account papers from eight different Federal agencies. Attention is given to aspects of water monitoring, the use of remote sensing data for a detection of SO2-produced vegetation damage, models for the prediction of the radiological impact of releases to the atmosphere from nuclear power, and the tracking of particulate pollutants by Doppler lidar.

A78-20067 Use of lidar to detect oil pollution of the sea surface O I Abramov, V I Eremin, L I Lobov, and V V Polovinko (Vsesoiuznyi Elektrotekhnicheskii Institut, Glavnoe Upravlenie Gidrometeorologicheskoi Sluzhby SSSR, Gosudarst vennyi Okeanograficheskii Institut, Moscow, USSR) (Akademiia Nauk SSSR, Izvestiia, Fizika Atmosfery i Okeana, vol 13, Mar 1977, p 331-334) Academy of Sciences, USSR, Izvestiya, Atmospheric and Oceanic Physics, vol 13, Oct 1977, p 232-234 5 refs Translation

A backscattering lidar technique using a laser emitting at a wavelength of 0 3472 micron was used to study the pollution of the sea surface by oil products. Backscattering spectra were obtained under laboratory conditions and for the Bosphorus region, and used to determine the thickness of oil-product films on the water surfaces.

N78-10526\*# Old Dominion Univ Research Foundation, Norfolk, Va

A MODULAR RADIATIVE TRANSFER PROGRAM FOR GAS FILTER CORRELATION RADIOMETRY

Oct 1977 71 p refs (Grant NsG-1127)

(NASA-CR-2895, PGSTR-AP77-49) Avail NTIS HC AO4/MF AO1 CSCL O4A

The fundamentals of a computer program, simulated monochromatic atmospheric radiative transfer (SMART), which calculates atmospheric path transmission, solar radiation, and thermal radiation in the 4-6 micrometer spectral region, are described. A brief outline of atmospheric absorption properties and line by line transmission calculations is explained in conjunction with an outline of the SMART computational procedures. Program flexibility is demonstrated by simulating the response of a gas filter correlation radiometer as one example of an atmospheric infrared sensor. Program limitations, input data requirements, program listing, and comparison of SMART transmission calculations are presented.

N78-10531\*# Science Applications, Inc. La Jolla, Calif DETERMINATION OF AEROSOL CONTENT IN THE ATMOSPHERE FROM LANDSAT DATA Progress Report, 25 Jul - 28 Oct. 1977

M Griggs, Principal Investigator 28 Oct 1977 8 p ERTS (Contract NAS5-20899) (E78-10004, NASA-CR-155208, SAI-77-911-IJ, PR-11) Avail NTIS HC A02/MF A01 CSCL 04A

N78-10540\*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md

URBAN AREA DELINEATION AND DETECTION OF CHANGE ALONG THE URBAN-RURAL BOUNDARY AS DERIVED FROM LANDSAT DIGITAL DATA

Jerrold W Christenson and Henry M Lachowski (GE, Beltsville, Md.) Oct 1977 10 p refs

(NASA-TM-X-71413 X-923-77-245) Avail NTIS HC A02/MF A01 CSCL 08B

LANDSAT digital multispectral scanner data in conjunction with supporting ground truth, were investigated to determine their utility in delineation of urban-rural boundaries. The digital data for the metropolitan areas of Washington, D. C., Austin, Texas, and Seattle, Washington were processed using an interactive image processing system. Processing focused on identification of major land cover types typical of the zone of transition from urban to rural landscape, and definition of their spectral signatures. Census tract boundaries were input into the interactive image processing system along with the LANDSAT single and overlayed multiple date MSS data. Results of this investigation indicate that satellite collected information has a practical application to the problem of urban area delineation and to change detection.

N78-10608# Coast Guard Research and Development Center, Groton, Conn

FIELD INFRARED METHOD TO DISCRIMINATE NATURAL SEEPS FROM NON-SEEPS, SANTA BARBARA, CALIFOR-NIA AREA Final Report

DeLyle Eastwood and Douglas F Grant Dec 1976 25 p (AD-A042861, CGR/DC-15/76, USCG-D-32-77) Avail NTIS HC A02/MF A01 CSCL 20/6

A field infrared method has been developed to distinguish oil due to natural seepage in the Santa Barhara (California) Channel region from closely similar oils derived from spills at offshore drilling platforms or from shipping accidents Differences between seep and non-seep oils have been found to persist in weathering studies carried out in outdoor tanks for one week. This method involving simple infrared instrumentation and a minimum of sample preparation. It permits rapid on-site analysis without special training. The major differences between seep and non-seep oils appear in the comparison between the 13.8 micrometers and 13.5 micrometers peaks (for both weathered and unweathered oils) and in the carbonyl region at 5.85 micrometers (for unweathered oils only).

N78-10619# Battelle Columbus Labs , Ohio

THE FATE OF NITROGEN OXIDES IN THE ATMOSPHERE Chester W Spicer, James L Gemma, Philip M Schumacher, and Gerald F Ward Aug 1976 122 p refs Sponsored by EPA, Research Triangle Park, N C (PB-267784/7, CRC-APRAC-CAPA-9-71, Rept-2) Avail NTIS HC A06/MF A01 CSCL 07D

The second year of a continuing study to determine the distribution and fate of nitrogen oxides in the atmosphere is described Analytical methods developed in the first year were refined and validated and results from the first year study were reexamined with the aid of additional data collected simultaneously by other research groups. An instrumental technique for nitric acid was refined, tested for interference, and verified against a long-path infra-red technique under simulated smog conditions. The interference by PAN and nitric acid with the chemiluminescent determination of NO2 was studied with a view toward reducing or minimizing the interference. Nitric acid interference was eliminated by the use of a nylon prefilter on the chemiluminescent instrument. The interaction of gaseous nitric acid with alkaline glass-fiber filters was shown to yield artifact particulate nitrate.

N78-10621# California Univ , Riverside Statewide Air Pollution Research Center

FORMATION OF PHOTOCHEMICAL AEROSOLS Final Report

Edgar R Stephens and Monty A Price May 1977 78 p refs (Grant EPA-R-80068)

(PB-268895/0, EPA-600/3-77-044) Avail NTIS HC A05/MF A01 CSCL 07E

Counting of particles by light scattering was the principle physical technique while infrared analyses were the major source of chemical information. A new reflectance spectroscopy technique was also developed. Infrared spectra of ambient aerosols have bands assigned to sulfate, nitrate, ammonium, and water which are completely removed by water washing of the sample but not by benzene. Synthetic aerosols generated by mixing ammonia with sulfuric and nitric acids produce similar spectra. Many ambient aerosol particles are hygroscopic or deliquescent so that they swell as the relative humidity increases and shrink as it decreases. It is concluded that direct control of aerosol emissions will not markedly improve visibility in Southern California.

N78-10623# Environmental Research and Technology, Inc., Concord, Mass

ANALYSIS OF PHOTOCHEMICAL OXIDANT AND PARTIC-ULATE POLLUTION PATTERNS IN NEW ENGLAND USING REMOTE SENSING DATA Final Report

Clinton J Bowley, Joseph L Horowitz, and James C Barnes Jun 1977 52 p refs

(Contract EPA-68-02-2533)

(PB-268996/6 ERT-P-2273, EPA-901/9-77-002) Avail NTIS HC A04/MF A01 CSCL 13B

Imagery from earth surveillance satellites was examined to assess the potential usefulness of satellite data for monitoring air pollutant patterns and defining the associated meteorological conditions in sourthern New England Imagery from various satellite systems were visually interpreted Results indicate a good correlation between certain types of high pollutant load and haze and smoke, with accompanying reductions in visibility Satellite imagery can display differences in reflectance or temperature due to some combination of haze, smoke and atmospheric pollutant load, on a regional basis GRA

N78-11634 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany) Inst fuer Physik der Atmosphaere

CONCEPT FOR AN AIRBORNE MULTIDISCIPLINARY LIDAR SYSTEM [KONZEPT FUER DEN FLUGZEUGEINSATZ EINES MULTIDISZIPLINAEREN LIDAR-SYSTEMS]

W Renger and G H Ruppersberg *In* Deut Wetterdienst Annals of Meteorol No 12 1977 p 234-235 refs In GERMAN ENGLISH summary

Avail Issuing Activity

It is planned to operate a combination of an aerosol and a differential absorption lidar onboard a meteorological research aircraft for different model-missions within the Federal Republic of Germany. These missions which have nearly the same difficulties and solutions as future. Spacelab experiments shall demonstrate to which degree the intended objectives may be met. In cooperation with different groups actual problems shall be treated at the regional scale. Three-dimensional extent of haze and smog and penetrating plumes, detection of fresh air channels mass concentration and mass fluxes of aerosols, detection of increased emission of bad or toxic substances comparison to ground data immission control of different spurious gases, and verification of models for simulation. Author (ESA)

N78-12554\*# National Aeronautics and Space Administration Langley Research Center, Langley Station, Va

LABORATORY MEASUREMENTS OF RADIANCE AND REFLECTANCE SPECTRA OF DILUTE PRIMARY-TREATED SEWAGE SLUDGE

J W Usry, William G Witte Charles H Whitlock, and E A Gurganus Nov 1977 27 p refs (NASA-TP-1038, L-11767) Avail NTIS HC A03/MF A01

The feasibility of remotely monitoring ocean dumping of waste products such as acid and sewage sludge is evaluated

The laboratory arrangement, solar simulator, and test results from three experiments conducted in the laboratory are described Radiance and reflectance spectra are presented for primary-treated sewage sludge mixed with two types of base water Results indicate that upwelled reflectance varies in a near-linear manner with concentration and that the sludge has a practically flat signal response between 420 and 970 nm. Well-defined upwelled reflectance spectra were obtained for the sewage-sludge mixtures at all wavelengths and concentrations. The spectral-reflectance values appeared to be influenced by the type of base water, but this influence was small, especially for the mixtures with low concentrations of sewage sludge

N78-12555\*# National Aeronautics and Space Administration Langley Research Center Langley Station, Va

## LABORATORY MEASUREMENTS OF RADIANCE AND REFLECTANCE SPECTRA OF DILUTE SECONDARY-TREATED SEWAGE SLUDGE

William G Witte J W Usry Charles H Whitlock, and E A Gurganus Dec 1977 23 p refs (NASA-TP-1089 L-11870) Avail NTIS HC A02/MF A01 CSCL 13B

The National Aeronautics and Space Administration (NASA), in cooperation with the Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA), conducted a research program to evaluate the feasibility of remotely monitoring ocean dumping of waste products such as acid and sewage sludge. One aspect of the research program involved the measurements of upwelled spectral signatures for sewage-sludge mixtures of different concentrations in an 11600-liter tank. This paper describes the laboratory arrangement and presents radiance and reflectance spectra in the visible and near-infrared ranges for concentrations ranging from 9.7 to 180 ppm of secondary-treated sewage sludge mixed with two types of base water Results indicate that upwelled radiance varies in a near-linear manner with concentration and that the sludge has a practically flat signal response between 420 and 970 nm Reflectance spectra were obtained for the sewage-sludge mixtures at all wavelengths and concentrations

N78-12645\*# National Aeronautics and Space Administration Langley Research Center, Langley Station, Va

#### LABORATORY MEASUREMENTS OF UPWELLED RADI-ANCE AND REFLECTANCE SPECTRA OF CALVERT, BALL, JORDAN, AND FELDSPAR SOIL SEDIMENTS

Charles H Whitlock J W Usry, William G Witte, and E A Gurganus Dec 1977 36 p refs (NASA-TP-1039, L-11854) Avail NTIS HC A03/MF A01 CSCL 08J

An effort to investigate the potential of remote sensing for monitoring nonpoint source pollution was conducted Spectral reflectance characteristics for four types of soil sediments were measured for mixture concentrations between 4 and 173 ppm For measurements at a spectral resolution of 32 mm, the spectral reflectances of Calvert, Ball, Jordan, and Feldspar soil sediments were distinctly different over the wavelength range from 400 to 980 nm at each concentration tested. At high concentrations, spectral differences between the various sediments could be detected by measurements with a spectral resolution of 160 nm At a low concentration, only small differences were observed between the various sediments when measurements were made with 160 nm spectral resolution. Radiance levels generally varied in a nonlinear manner with sediment concentration, linearity occurred in special cases, depending on sediment type, concentration range, and wavelength Author

N78-13501\*# West Virginia Dept of Natural Resources

CONTRIBUTIONS OF LANDSAT TO NATURAL RESOURCE PROTECTION AND FUTURE RECREATIONAL DEVELOP-MENT IN THE STATE OF WEST VIRGINIA Final Report, Jun 1975 - Oct. 1977

Ira S Latimer, Jr and David C Callaghan, Principal Investigators 31 Oct 1977 116 p refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sloux Falls, S D ERTS

(Contract NAS5-22327) NASA-CR-155246) (F78-10019 HC A06/MF A01 CSCL 08B

Avail

NTIS

N78-13506\*# Mississippi State Univ , Mississippi State APPLICATION OF REMOTE SENSING TO STATE AND REGIONAL PROBLEMS Semiannual Progress Report. 1 May - 31 Oct. 1977

W Frank Miller, Principal Investigator, Bradley D Carter, David E Pettry, Gary K Higgs, James L. Solomon, and Dale A Quattrochi 7 Nov 1977 92 p refs Original contains imagery Original photography maybe purchased from the EROS Data Center, Sioux Falls, S D ERTS (Grant NGL-25-001-054)

(E78-10034, NASA-CR-155261, SAPR-8) Avail NTIS HC A05/MF A01 CSCL 08F

N78-13507\*# Mississippi State Univ , Mississippi State Dent of Geology and Geography

TENNESSEE-TOMBIGBEE INDUSTRIAL SITING PROJECT. A STUDY OF PHYSICAL AND ENVIRONMENTAL FACTORS OF POTENTIAL INDUSTRIAL SITES

Gary K Higgs, Principal Investigator 31 Oct 1977 176 p refs ERTS

(Grant NGL-25-001-054)

(E78-10035, NASA-CR-15 HC A09/MF A01 CSCL 08H NASA-CR-155260)

NTIS Avail

N78-13636# Radian Corp , Austin, Tex

### A QUALITY ASSURANCE PROGRAM FOR MONITORING OZONE AND CARBON MONOXIDE Final Report David C Jones and Louis H Fowler Jun 1977 108 p refs

(Contract EPA-68-02-1383)

(PB-271204/O, RAD-TN-100-044-16, EPA-906/9-77-003) Avail NTIS HC A06/MF A01 CSCL 14B

A quality assurance program for monitoring ozone and carbon monoxide is described, which uses a chemiluminescent ozone monitor and a nondispersive infrared CO monitor Instrument selection criteria and site selection criteria are presented. Step. by step procedures are given discussing routine station operation, instrument multipoint calibrations, and quality assurance audits Record keeping procedures data reduction and data handling are discussed

N78-13670\* National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio

#### GLOBAL SENSING OF GASEOUS AND AEROSOL TRACE SPECIES USING AUTOMATED INSTRUMENTATION ON 747 AIRLINERS

Porter J Perkins and Leonidas C Papathakos refs Presented at 4th Joint Conf on Sensing of Environmental Pollutants, New Orleans, La, 6-11 Nov 1977 (NASA-TM-73810, E-9396) Avail NTIS HC A02/MF A01 CSCL 04A

The Global Atmospheric Sampling Program (GASP) by NASA is collecting and analyzing data on gaseous and aerosol trace species in the upper troposphere and lower stratosphere Measurements are obtained from automated systems installed on four 747 airliners flying global air routes. Advances were made in airborne sampling instrumentation. Improved instruments and analysis techniques are providing an expanding data base for trace species including ozone, carbon monoxide, water vapor, condensation nuclei and mass concentrations of sulfates and nitrates. Simultaneous measurements of several trace species. obtained frequently can be used to uniquely identify the source of the air mass as being typically tropospheric or stratospheric A quantitative understanding of the tropospheric-stratospheric exchange processes leads to better knowledge of the atmospheric impact of pollution through the development of improved simulation models of the atmosphere Author

N78-14489\*# Environmental Protection Agency, Las Vegas, Environmental Monitoring and Support Lab REMOTE SENSING OF AIR POLLUTANTS

J A Eckert and R B Evans In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 353-359 refs

Avail NTIS HC A99/MF A01 CSCL 13B

Monitoring of pollutants within the troposphere is discussed Selected specific techniques were investigated and it was shown how the use of these techniques fits into the overall national strategy for air pollution abatement.

N78-14490\*# Agency for International Development, Washington, D C

### REMOTE SENSING OF ENVIRONMENTAL IMPACT OF LAND USE ACTIVITIES

C K Paul In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 363-377 refs

Avail NTIS HC A99/MF A01 CSCL 08B

The capability to monitor land cover, associated in the past with aerial film cameras and radar systems, was discussed in regard to aircraft and spacecraft multispectral scanning sensors. A proposed thematic mapper with greater spectral and spatial resolutions for the fourth LANDSAT is expected to usher in new environmental monitoring capability. In addition continuing improvements in image clasification by supervised and unsupervised computer techniques are being operationally verified for discriminating environmental impacts of human activities on the land. The benefits of employing remote sensing for this discrimination was shown to far outweigh the incremental costs of converting to an aircraft-satellite multistage system.

N78-14493\*# Army Engineer Topographic Labs , Fort Belvoir

### CORPS OF ENGINEERS APPLICATIONS FOR REMOTE SENSING OF THE ENVIRONMENT

Maurice K Kurtz Jr and John W Jarman In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 393-399

Avail NTIS HC A99/MF A01 CSCL 13B

An objective overview is presented of the application of remote sensing technology in the Corps of Engineers Examples are given of attempts to use the current state of the art to achieve particular disciplinary or mission oriented goals. The Corps, presently engaged in both research and development and technology transfer has encountered some interesting situations Practical operational utilization depends not only on technology, but also economic benefit/cost factors and some unprecedented legal, political and social issues. Yet, at a time when increased agency commitment to operational usage is being sought, an assessment of the state of the art reveals that sensor technology, data processing and analysis and models still require further development. There is a challenge in synchronizing technology push with the demand pull of dimly perceived user needs. They should complement each other rather than oppose. The goal is to use the combined push-pull effect to lead to increased productivity and responsiveness by the Corps Author

N78-14502\*# Florida Univ., Gainesville Dept of Physics and Astronomy

#### INFLUENCE OF GROUND LEVEL SO2 ON THE DIFFUSE TO DIRECT IRRADIANCE RATIO IN THE MIDDLE ULTRA-VIOLET

K F Klenk and A E S Green In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 525-533 refs

(Grant NSF ATM-75-21962)

Avail NTIS HC A99/MF A01 CSCL 04A

The dependence of the ratio of the diffuse to direct irradiances at the ground were examined for a wavelength of 315 1 nm. A passive remote sensing method based on ratio measurements for obtaining the optical thickness of SO2 in the vertical column was proposed if in addition to the ratio measurements, the SO2 density at the ground is determining using an appropriate point-sampling technique then some inference on the vertical extent of SO2 can be drawn. An analytic representation is presented of the ratio for a wide range of SO2 and aerosol optical thicknesses and solar zenith angles which can be inverted.

algebraically to give the SO2 optical thickness in terms of the measured ratio aerosol optical thickness and solar zenith angle

Author

N78-14504\*# Hoser Univ , Tokyo (Japan) Dept of Civil Engineering

### MULTI-SEASONAL DATA ANALYSIS AND SOME EXTENSIONS FOR ENVIRONMENTAL MONITORING

Sotaro Tanaka (Remote Sensing Technol Center of Japan, Tokyo), Yasushi Muranaka (Remote Sensing Technol Center of Japan, Tokyo) Hiroshi Miyazawa (Tokyo Aero Surv Co, Ltd Tokyo), and Yuzo Suga In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 545-561 refs

Avail NTIS HC A99/MF A01 CSCL 04A

Multispectral data analysis was incorporated with multiseasonal data analysis based on a spectral radiance data-set Concepts include comparing data types, exploring relationships between periodicity of LANDSAT and the seasonal sense of the Orientals, and derivation of a method to register the acquired data Examples include a quality investigation of a paddy field by seasonal LANDSAT data, a progress check of the field in harvest season, and a detailed survey of the vegetational environment by summer and winter LANDSAT data

Author

## N78-14511\*# Fairey Surveys Ltd , Maidenhead (England) TESTING THE ACCURACY OF REMOTE SENSING LAND USE MAPS

J L VanGenderen, B F Lock (Salisbury College, Australia), and P A Vass *In* ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 615-623 refs

Avail NTIS HC A99/MF A01 CSCL 08B

Some of the main aspects that need to be considered in a remote sensing sampling design are (1) the frequency that any one land use type (on the ground) is erroneously attributed to another class by the interpreter, (2) the frequency that the wrong land use (as observed on the ground) is erroneously included in any one class by the remote sensing interpreter, (3) the proportion of all land (as determined in the field) that is mistakenly attributed by the interpreter, and (4) the determination of whether the mistakes are random (so that the overall proportions are approximately correct) or subject to a persistent bias. A sampling and statistical testing procedure is presented which allows an approximate answer to each of these aspects. The concept developed and described incorporates the probability of making incorrect interpretations at particular prescribed accuracy levels, for a certain number of errors for a particular sample size. It is considered that this approach offers a meaningful explanation of the interpretation accuracy level of an entire remote sensing land use survey Author

N78-14534\*# Lund Univ (Sweden) Dept of Physical Geography

## LANDSAT DIGITAL DATA FOR WATER POLLUTION AND WATER QUALITY STUDIES IN SOUTHERN SCANDINA-

Ulf Hellden and Ingvar Akersten (Natl Defence Res Inst., Stockholm Sweden) In ERIM Proc of the 11th Intern Sympon Remote Sensing of Environment Vol 2 1977 p 875-884 refs

Avail NTIS HC A99/MF A01 CSCL 08H

Spectral diagrams, illustrating the spectral characteristics of different water types, were constructed by means of simple statistical analysis of the various reflectance properties of water areas in Southern Scandinavia as registered by LANDSAT-1 There were indications that water whose spectral reproduction is dominated by chlorophyllous matter (phytoplankton) can be distinguished from water dominated by nonchlorophyllous matter Differences between lakes as well as the patchiness of individual lakes, concerning secchi disc transparency could be visualized after classification and reproduction in black and white and in color by means of line printer calcomp plotter (CRT) and ink jet plotter respectively

N78-14546\*# Old Dominion Univ , Norfolk, Va Remote Sensing Lab

## NECESSITY TO ADAPT LAND USE AND LAND COVER CLASSIFICATION SYSTEMS TO READILY ACCEPT RADAR

Ben Drake In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 993-1000 refs

#### Avail NTIS HC A99/MF A01 CSCL 08B

A hierarchial four level, standardized system for classifying land use/land cover primarily from remote-sensor data (USGS system) is described. The USGS system was developed for nonmicrowave imaging sensors such as camera systems and line scanners. The USGS system is not compatible with the land use/land cover classifications at different levels that can be made from radar imagery, and particularly from synthetic-aperture radar (SAR) imagery. The use of radar imagery for classifying land use/land cover at different levels is discussed, and a possible revision of the USGS system to more readily accept land use/land cover classifications from radar imagery is proposed.

N78-14556\*# INTERA Environmental Consultants Ltd., Calgary (Alberta)

#### REMOTE SENSING IN OPERATIONAL RANGE MANAGE-MENT PROGRAMS IN WESTERN CANADA

M D Thompson In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol. 2 1977 p 1101-1110 refs

Avail NTIS HC A99/MF A01 CSCL 05A

A pilot program carried out in Western Canada to test remote sensing under semi-operational conditions and display its applicability to operational range management programs was described. Four agencies were involved in the program two in Alberta and two in Manitoba. Each had different objectives and needs for remote sensing within its range management programs, and each was generally unfamiliar with remote sensing techniques and their applications. Personnel with experience and expertise in the remote sensing and range management fields worked with the agency personnel through every phase of the pilot program. Results indicate that these agencies have found remote sensing to be a cost effective tool and will begin to utilize remote sensing in their operational work during ensuing seasons.

N78-14565\*# Janangirnagar Univ , Dacca (Bangladesh) Dept of Geography

#### LAND UTILIZATION AND ECOLOGICAL ASPECTS IN THE SYLHET-MYMENSINGH HAOR REGION OF BANGLADESH AN ANALYSIS OF LANDSAT DATA

M I Chowdhury and K Maudood Elahi In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1183-1195 refs

Avail NTIS HC A99/MF A01 CSCL 08B

The use of remote sensing data from LANDSAT (ERTS) imageries in identifying, evaluating and mapping land use patterns of the Haor area in Bangladesh was investigated. Selected cloud free imageries of the area for the period 1972-75 were studied imageries in bands 4, 5 and 7 were mostly used. The method of analysis involved utilization of both human and computer services of information from ground aerial photographs taken during this period and space imageries.

N78-14584\* # Toledo Metropolitan Area Council of Governments Ohio

### DEVELOPMENT OF AN INTEGRATED DATA BASE FOR LAND USE AND WATER QUALITY PLANNING

John Adams Chris VanSchayk, and Laurence B Istvan (ERIM) In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1381-1386

Avail NTIS HC A99/MF A01 CSCL 08B

To help understand the role played by different land resources in water quality management a computer based data system was created The Land Resource Information System (LRIS) allows data to be readily retrieved or statistically analyzed for a variety of purposes. It is specifically formatted to perform coordination of water quality data with logy etc. New understanding of the

region gained through the use of LRIS has gone well beyond the initial purpose of assessing water quality conditions. The land use and natural features information has provided a well defined starting point for a systematic evaluation of proposed land uses, transportation, housing, and other public investments it has laid the foundation for a comprehensive and integrated approach to many different planning and investment programs presently underway.

#### N78-14587\*# Wisconsin Univ , Madison

#### LAKE WATER QUALITY MAPPING FROM LANDSAT

James P Scherz *In* ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1417-1425 refs

(Contract NAS5-20942, Grant NGL-50-002-127) Avail NTIS HC A99/MF A01 CSCL 08H

The lakes in three LANDSAT scenes were mapped by the Bendix MDAS multispectral analysis system. Field checking the maps by three separate individuals revealed approximately 90-95% correct classification for the lake categories selected. Variations between observers was about 5% From the MDAS color coded maps the lake with the worst algae problem was easily located. This lake was closely checked and a pollution source of 100 cows was found in the springs which fed this lake. The theory, lab work and field work which made it possible for this demonstration project to be a practical lake classification procedure are presented.

## N78-14590\*# Battelle Pacific Northwest Labs Richland, Wash PROTOTYPE ACTIVE SCANNER FOR NIGHTTIME OIL SPILL MAPPING AND CLASSIFICATION

G A Sandness and S B Ailes In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1445-1452 Sponsored in part by EPA and Coast Guard

Avail NTIS HC A99/MF A01 CSCL 13B

A prototype active aerial scanner system was constructed for nighttime water pollution detection and nighttime multispectral imaging of the ground. An arc lamp was used to produce the transmitted light and four detector channels provided a multispectral measurement capability. The feasibility of the design concept was demonstrated by laboratory and flight tests of the prototype system.

## N78-14607\*# National Aeronautics and Space Administration Langley Research Center, Langley Station Va MULTISPECTRAL ANALYSIS OF OCEAN DUMPED MATERI-

Robert W Johnson In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1619-1627

Avail NTIS HC A99/MF A01 CSCL 14E

AIR

Experiments conducted in the Atlantic coastal zone indicated that plumes resulting from ocean dumping of acid wastes and sewage sludge have unique spectral characteristics. Pemotely sensed wide area synoptic coverage provided information on these pollution features that was not readily available from other sources. Aircraft remotely sensed photographic and multispectral scanner data were interpreted by two methods. First, qualitative analyses in which pollution features were located mapped, and identified without concurrent sea truth and second, quantitative analyses in which concurrently collected sea truth was used to calibrate the remotely sensed data and to determine quantitative distributions of one or more parameters in a plume.

# N78-14608\*# Battelle Pacific Northwest Labs , Richland, Wash DETECTION, 'IDENTIFICATION, AND QUANTIFICATION TECHNIQUES FOR SPILLS OF HAZARDOUS CHEMICALS JF Washburn and G A Sandness In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1629-1635

(Contract DOT-CG-54323-A)

Avail NTIS HC A99/MF A01 CSCL 13B

The first 400 chemicals listed in the Coast Guard's Chemical Hazards Response Information System were evaluated with respect to their detectability, identifiability, and quantifiability by

12 generalized remote and in situ sensing techniques Identification was also attempted for some key areas in water pollution sensing technology

N78-14700# Environmental Protection Agency Washington, D. C. Office of Monitoring and Technical Support

QUALITY ASSURANCE RESEARCH PLAN, FISCAL YEAR 1978 - 1982

NTIS

Thomas W Stanley Jul 1977 70 p

EPA-600/8-77-008) (PB-272421/9 Avail HC A04/MF A01 CSCL 13B

The Office of Research and Development (ORD) is responsible for developing a quality assurance program to enable the U S Environmental Protection Agency to implement its regulatory mission and associated monitoring functions. The resources required by ORD to develop the quality assurance tools techniques, and services needed by other program offices, the Regions, and the States to generate valid data are identified and justified. The quality assurance program is described in terms of goals objectives, and functional elements, the current status of ORD's ongoing quality assurance efforts is summarized, and Agency and program needs are discussed

N78-14732# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt Oberpfaffenhofen (West Germany) fuer Physik der Atmosphaere

ATMOSPHERIC PHYSICS AS A MEANS OF ENVIRONMEN-TAL RESEARCH |DIE PHYSIK DER ATMOSPHAERE ALS MITTEL DER UMWELTFORSCHUNG]

D Paffrath Apr 1975 31 p ref In GERMAN (DLR-IB-553-75/7) Avail NTIS HC A03/MF A01

The activities at the Institute for Atmospheric Physics are reported. The topics covered are atmospheric measurement techniques, atmospheric effects on traffic systems, anthropogenic effects on the atmospheric environment, and atmospheric radiation and cloud physics

N78-15549\*# National Aeronautics and Space Administration Lyndon B Johnson Space Center, Houston Tex

PROCEDURES FOR GATHERING GROUND TRUTH INFORMATION FOR A SUPERVISED APPROACH TO A COMPUTER-IMPLEMENTED LAND COVER CLASSIFICA-TION OF LANDSAT-ACQUIRED MULTISPECTRAL SCAN-NER DATA

Armond T Joyce 1978 48 p refs

(NASA-RP-1015, JSC-12910, S-478) NTIS HC A03/MF A01 CSCL 08F Procedures for gathering ground truth information for a supervised approach to a computer-implemented land cover classification of LANDSAT acquired multispectral scanner data are provided in a step by step manner Criteria for determining

size, number, uniformity and predominant land cover of training sample sites are established. Suggestions are made for the organization and orientation of field team personnel, the procedures used in the field, and the format of the forms to be used Estimates are made of the probable expenditures in time and costs Examples of ground truth forms and definitions and criteria of major land cover categories are provided in appen-

N78-15553# Fish and Wildlife Service Ft Collins, Colo Western Energy and Land Use Team

INTERIM HIERARCHICAL REGIONAL CLASSIFICATION SCHEME FOR COASTAL ECOSYSTEMS OF THE UNITED STATES AND ITS TERRITORIES

Terry T Terrell Sep 1977 44 p refs

(PB-272691/7, FWS/OBS-77/48) NTIS Avail

HC A03/MF A01 CSCL 13B

The literature on coastal classifications is reviewed. Those existing classifications classify coastal areas on functional structural, or regional (geographical) attributes. The problem of predicting impacts on coastal ecosystems by various types of perturbations, such as offshore mineral development or reduced freshwater inflow into estuaries, at various levels of resolution is posed. A hierarchical regional classification scheme for coastal ecosystems of the United States and its territories, based on the physical hydrological, chemical, biological, geological, and structural characteristics of those areas is presented

N78-15592 Drexel Univ., Philadelphia, Pa.

THE USE OF CANONICAL CORRELATION ANALYSIS FOR MEASURING URBAN ENVIRONMENTAL HEALTH QUALITY Ph.D. Thesis

Edward Joseph Duckett 1977 300 p

Avail Univ Microfilms Order No 77-22527

An improved method is demonstrated for analyzing relationships among environmental and health variables and for indexing the severity of urban environmental conditions related to health. The principal analytic tool employed was canonical correlation analysis which identifies associations between two groups of variables. Linear combinations of each of two groups were formed so as to maximize the correlation between each pair of linear combinations. With environmental variables in one group and health variables in the other, the results suggested environmental health relationships. Also, each linear combination of environmental variables provided an index of environmental conditions weighted according to their relationships with selected morbidity and mortality rates Dissert Abstr

### N78-15593 Virginia Polytechnic Inst. and State Univ., Blacksburg AIR POLLUTANT MONITOR NETWORK DESIGN USING MATHEMATICAL PROGRAMMING Ph D Thesis

Erik Somers Hougland 1977 365 p

Avail Univ Microfilms Order No 77-22070

A mathematical programming model for the design of multipollutant air quality monitoring networks was developed The model assigns monitors to a subset of a large set of potential monitor sites so as to maximize a measure of monitoring capability. An heuristic solution technique was developed to design multiple pollutant monitoring networks. An analysis of the model's sensitivity to input parameters was performed and the application of the model to an actual design problem was demonstrated Resulting network designs are presented. The network design model was shown to be a valuable addition to the tools available to those concerned with the design of air quality monitoring networks. Needs for further research are discussed

### N78-15601# New Orleans Univ , La Dept of Chemistry A STUDY OF GAS SOLID REACTIONS AND AIR POLLUTION DETECTORS Final Report, 1 Mar 1974 - 30 Aug 1977 George G Guilbault 31 Oct 1977 12 p refs

(Contract DAHC04-74-G-0119)

(AD-A046646 ARO-11753 9-C) HC A02/MF A01 CSCL 13/2

Avail NTIS

A basic research study was made for specific adsorbents which could be used for the detection of various air pollutants The most promising adsorbents for various compounds were placed as coatings on a piezoelectric crystal detector, and the device was evaluated as a possible detector for the identification and analysis of these compounds. The nature of the basic reaction of the chemical compounds (solids) with these pollutants was studied using infrared spectroscopy and oscillating crystals, and the interaction parameters were studied Quadrol and triethanolamine were good adsorbents for SO2 Co-isonitrolo benzoyl acetone provided an excellent coating for organophosphorus compounds, ascorbic acid AgNO3 was used for assay of NH3, as were Ucon-75-H-90,000 and -Ucon-LB-300X, which were excellent for NH3 and NOx, latex and nujol with trans-IrCl (CO)(PPh3)2 were good coatings for aromatic hydrocarbons, an acetone extract of a CCI4 soot was excellent for the detection of H2S, and HCl was detected using trimethylamine

Author (GRA)

# Page intentionally left blank

Page intentionally left blank

## 03

## **GEODESY AND CARTOGRAPHY**

Includes mapping and topography

A78-11099 Remote sensing as a tool in assessing the impact of topographical alterations on the microclimate. R. A Sutherland and J F Bartholic (Florida, University, Gainesville, Fla ) In Energy crisis An evaluation of our resource potential, Proceedings of the Third Annual UMR-MEC Conference on Energy, Rolla, Mo, October 12-14, 1976.

North Hollywood, Calif, Western Periodicals Co., 1977, p. 165-169

Results and analyses of remotely sensed data taken from a NASA aircraft are reported. The study uses continuous data taken in the 8 - 14 micron region of the infrared spectrum which is directly related to surface temperature. The analysis is concentrated on the micrometeorological effects of lakes and hills during near-freezing conditions. The impetus for the study is an economic one since proper selection of a site for certain freeze-susceptible crops, such as citrus, can result in huge savings of energy and resources. (Author)

A78-13760 Correlated errors in satellite altimetry geoids R J Anderle and R L. Hoskin (U S Navy, Naval Surface Weapons Center, Dahlgren, Va) Geophysical Research Letters, vol 4, Oct 1977, p 421-423

The vertical component of position of the Geos-3 satellite has been computed to an accuracy of 2 m by analysis of Doppler observations. Comparison of altimetry data from the satellite at the intersections of ground traces of the orbital path yielded corrections to the satellite position such that the contribution of the orbit error to the error in the geoid computed from the altimetry data would be as low as 20 to 30 cm if the original orbit errors were uncorrelated. However, simulations of the effects of uncertainties in the gravity field have shown that the orbit errors are correlated over a distance of about 500 km normal to the direction of the satellite track. As a consequence, the geoid based on the Geos-3 altimetry will have correlated errors which are estimated to be 50 cm with a wave length of 2500 km. The results imply that the geoid based on Seasat-A altimetry data will have correlated errors over similar distance.

(Author)

A78-13766 \* Monitoring surface albedo change with Landsat. J Otterman (NASA, Goddard Space Flight Center, Greenbelt, Md, Tel Aviv University, Tel Aviv, Israel) Geophysical Research Letters, vol 4, Oct 1977, p 441-444 11 refs Research supported by the United States-Israel Binational Science Foundation

A pronounced decrease of the surface albedo (reflectivity) has been observed in an area in the Northern Sinai, fenced-in in the summer of 1974. Analysis of the Landsat Multispectral Scanner System digital data from an April 1977 pass indicates a reduction in the albedo in the exclosure by 13%, as compared to the outside, which continues to be subjected to overgrazing and anthropogenic pressures. The reduction of reflectivity is approximately the same in all the spectral bands, and is therefore attributable to accumulation of dead plants and plant debris, and not directly to live vegetation.

(Author)

A78-14815 # Landsat detection of hydrothermal alteration in the Nogal Canyon Cauldron, New Mexico R K Vincent (GeoSpectra Corp., Ann Arbor, Mich.) and G Rouse (Earth Sciences, Inc., Golden, Colo.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 579-590

The use of Landsat imagery to detect zones of hydrothermal alteration in cauldrons, calderas and other volcanic features is

discussed In particular, an iron-oxide anomaly detected in a Cenozoic cauldron in New Mexico was found to correlate with a hydrothermal alteration. However, further analysis of Landsat imagery indicated that on a purely spectral basis the secondary iron oxides of the hydrothermal alteration could usually not be distinguished from unimportant primary ferric oxides. It is suggested that spectral data and geologic information employed in coordination may provide a means of identifying some hydrothermal activity.

J M B

A78-14833 \* # Alteration mapping at Goldfield, Nevada, by cluster and discriminant analysis of Landsat digital data G Ballew (Stanford University, Stanford, Calif) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 783-790 6 refs Grant No NsG-5050

The ability of Landsat multispectral digital data to differentiate among 62 combinations of rock and alteration types at the Goldfield mining district of Western Nevada was investigated by using statistical techniques of cluster and discriminant analysis. Multivariate discriminant analysis was not effective in classifying each of the 62 groups, with classification results essentially the same whether data of four channels alone or combined with six ratios of channels were used. Bivariate plots of group means revealed a cluster of three groups including mill tailings, basalt and all other rock and alteration types Automatic hierarchical clustering based on the fourth dimensional Mahalanobis distance between group means of 30 groups having five or more samples was performed using Johnson's HICLUS program The results of the cluster analysis revealed hierarchies of mill tailings vs natural materials, basalt vs non-basalt, highly reflectant rocks vs other rocks and exclusively unaltered rocks vs predominantly altered rocks. The hierarchies were used to determine the order in which sets of multiple discriminant analyses were to be performed and the resulting discriminant functions were used to produce a map of geology and alteration which has an overall accuracy of 70 percent for discriminating exclusively altered rocks from predominantly altered rocks (Author)

A78-14849 # Remote infrared spectroscopy of the earth. C R Steinmann (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Cologne, West Germany) in International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 957-967 Research supported by the Bundesministerium für Forschung und Technologie.

An experimental remote-sensing system using an infrared laser spectrometer for geological and petrological investigations of the earth surface has been developed, and lab simulations and the first flight tests have demonstrated its feasibility. It was found feasible to use laser differential measurements for the detection of most rock-forming minerals and clay-minerals. The laser system, whose resolution is about 10 at an altitude of about 10,000 ft, was found to be well suited to light aircraft.

A78-14850 # Image analysis techniques with special reference to analysis and interpretation of geological features from Landsat imagery D S Kamat, K L. Majumder, S D Naik, and V L Swaminathan (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 969-978 6 refs.

A78-14868 # Evaluation of algorithms for geological thermal-inertia mapping S H Miller and K Watson (U.S. Geological Survey, Denver, Colo.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich.

Environmental Research Institute of Michigan, 1977, p 1147-1160 13 refs

Three surface temperature algorithms used in the production of thermal inertia maps (linear Fourier series, finite difference and Laplace transform techniques) are compared Errors in measurement introduced by multispectral scanning systems, as well as errors related to transient effects, topography and surface coating effects, are examined For satellites, the uncertainty in thermal inertia is found to be 150 thermal inertia units (TIU) Uncertainties due to the algorithms range from 260 TIU (for the Laplace transform method) to 460 TIU (for the linear Fourier series technique) A sample problem involving the thermal inertia mapping of a river topography is given.

A78-15424 # Radar measurement of stratified earth surface covers (Radiolokatsiia sloistykh zemnykh pokrovov) M I Finkel'shtein, V L Mendel'son, and V A Kutev Moscow, Izdatel'stvo Sovetskoe Radio, 1977 176 p 167 refs In Russian

Data are presented on the general electrical parameters of various stratified earth surface layers. Basic electrodynamic models of these media are given. It is shown that airborne radar equipment may be used for measurements of the thickness of ocean and freshwater ice. It is also suggested that airborne radar equipment may be used for the subsurface measurement of ground water and frozen soil. Measurements of the electrical characteristics of various stratified media over a large area are presented.

A78-15589 GDM/GPS receiver hardware implementation.
G L Bjornsen and W M Hutchinson (Rockwell International Corp., Collins Avionics Div., Cedar Rapids, Iowa) In NAECON '77, Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, May 17-19, 1977 New York, Institute of Electrical and Electronics Engineers, Inc., 1977, p 303-309

This paper describes the receiver hardware implementation for the AFAL GDM/GPS equipment. Included are descriptions of the RF receiver, frequency synthesizer, and signal channel processor. Specific items discussed include receiver bandwidth, wide-band AGC performance, pseudonoise (PN) mixers, code correlation, PN code generator, and digital vco's Various system issues, as they relate to the GDM/GPS equipment are also addressed. The GDM/GPS hardware has been partitioned such that it can be configured (under processor control) to represent various GPS equipment configurations for performance evaluation. Also included in this paper is a brief description of an internally generated test signal and its use for system calibration. (Author)

A78-15730 The Gestalt Photomapping System. R E Kelly, P R H McConnell, and S J Mildenberger (Gestalt International, Stittsville, Ontario, Canada) Photogrammetric Engineering and Remote Sensing, vol 43, Nov 1977, p. 1407-1417

The Gestalt Photomapping System is made up of the GPM II and the GPM Plotting System The GPM II is a computer-controlled, auto-correlating, analytical photomapper it is composed of two scanners, an automatic image correlator, a control computer, an operator's console, and one or two printers. A typical stereomodel is completed automatically in less than an hour and a half after a 10 minute operator-assisted analytical orientation. Principal topographic output consists of a 700,000-point digital terrain model (DTM) on magnetic tape planimetric output consists of an orthophoto on 20 x 25 cm stable-base film The GPM Plotting System is an off-line automatic DTM processing system. It consists of a disk-based minicomputer and plotter. Smoothed contours and slope maps may be plotted at map scale with annotation in less than an hour and a half A GPM III orthophoto and GPM Plotting System contours may be combined without editing by using conventional photographic techniques to produce a reproduction-quality contoured orthophoto map in less than a day (Author)

A78-16510 Applications of the ERTS 1 Satellite to traditional cartography (Applications du Satellite ERTS 1 à la cartographie traditionnelle) C Cazabat (Institut Geographique

National, Paris, France) (Institut Géographique National, Bulletin d'Information, no 31, 1976) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 7 p. In French

The types of data obtained by Landsat 1 (ERTS 1) are described, and the use of Landsat data is considered with reference to France Photographs at a scale of 1 1,000,000 can be used to update traditional maps, photographs at a scale of 1 500,000 provide more detail than generalized traditional maps. Traditional and satellite photograph maps are compared Satellite cartography can be limited by a lack of clear weather. In France, clear weather is more common in winter than in other seasons but the absence of leaves makes difficult the detection of some wooded areas.

A78-16534 # Recent crustal movements registered by the aid of airphoto interpretation O Radai (Hungarian Geodetic and Cartographic Society, Budapest, Hungary) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 11 p

Some concepts of global tectonics are reviewed, and procedures for monitoring crustal movements are examined. The use of aerial photography to measure horizontal displacements is discussed with reference to the geology of Hungary, and the organization of a network of observation reference points is considered. An inexpensive technique for detecting the tilt of rock masses is proposed. Aerial photographs would be used to analyze drainage and overthrust patterns for the purpose of locating appropriate places for the installation of 'upturned' pendulums. These devices would be moored on a liquid surface in boreholes, the data they supply could be applied to earthquake prediction.

A78-16543 # Objective terrain description and classification for digital terrain models O Ayeni (Ohio State University, Columbus, Ohio) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 9 p 9 refs

Various quantitative methods for describing a terrain were investigated, these include gradient, curvature, vector strength, vector dispersion, bump frequency, direction cosine, surface area, harmonic vector magnitude, two-dimensional power spectrum, breaklines, and autocorrelation. Based on these terrain characteristics four major classes of terrain which span the whole spectrum of terrain types were identified, using techniques of objective classification theory derived from multivariate statistical cluster analysis. Suggestions are made as to how the reactions of various interpolation techniques can be properly evaluated in relation to the four major classes of terrain with a view to achieving automation. (Author)

A78-16546 # A system of remote sensing and mapping for developing countries S Baker (North Carolina State University, Raleigh, N.C.) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 12 p 20 refs

It is suggested that developing countries require medium and large-scale topographic maps for economic development studies. Black and white orthophotographs with overprinted names and symbols may be used for the production of orthophotomaps, suitable for such applications. The aerial photographs used in the production of orthophotomaps may be used for resource projects by combining field work with photointerpretation. Completed orthophotomaps have applications in remote sensing systems.

A78-16552 # The use of satellite photography in the National Topographic Mapping Program of Canada E A Fleming (Department of Energy, Mines and Resources, Ottawa, Canada) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 14 n

Consideration is given to Landsat imagery in Canadian topographic mapping programs. Particular applications are described, such as (1) map revisions noting new roads, reservoirs, and transmission.

lines, (2) the analysis of landscape physiography over large areas, (3) the compilation of photomaps, and (4) photogrammetric monitoring of offshore shoals

A78-17195 Temporal and dynamic observations from satellites G A Rabchevsky (Rainbow Systems, Inc., Alexandria, Va.) Photogrammetric Engineering and Remote Sensing, vol. 43, Dec. 1977, p. 1515-1518. 10 refs.

The sampling of terrestrial features or environmental phenomena by an airborne or satellite sensor is especially significant when repetitive surveys are required. Dynamic and short-lived natural events need to be detected rapidly and repeatedly for meaningful results. A series of satellites now provide a hitherto unavailable capability for detecting and mapping dynamic terrestrial features and environmental events on a global, repetitive, and temporal basis. The paper summarizes briefly some of the satellite missions and in a tabular form classifies the time-scale requirements for observing some of the dynamic events. (Author)

A78-18102 Environmental mapping of the French coastal zone by remote sensing J M Monget, D Sarrat (Paris, Ecole Nationale Superieure des Mines, Paris, France), and F Verger (Ecole Normale Superieure, Paris, France) In Space research XVII, Proceedings of the Open Meetings of Working Groups on Physical Sciences, June 8 19, 1976 and Symposium on Minor Constituents and Excited Species, Philadelphia, Pa, June 9, 10, 1976

Oxford and New York, Pergamon Press, 1977, p 13-18 6 refs Research supported by the Centre National d'Etudes Spatiales, Centre National de la Recherche Scientifique Contract No RCP 353

Coastal turbidity dynamics, the nature and mineralogy of tidal flats, and coastal land use and vegetation were studied using Landsat data for the French Atlantic littoral. The coastal turbidity dynamics deduced from the Landsat imagery were correlated with thermal imagery from NOAA satellites, the resultant composite assessment may be useful in designing nuclear power plants. The investigation of tidal flats provided automatic cartography of the flats as a function of flooding frequency. Damage to beaches and coastal recreational areas due to human influence may also be monitored with the aid of the satellite data.

A78-18108 Intercosmos laser ranging stations A G Masevich (Akademiia Nauk SSSR, Astronomicheskii Sovet, Moscow, USSR) and K Hamal (Ceske Vysoke Uceni Technicke, Prague, Czechoslovakia) In Space research XVII, Proceedings of the Open Meetings of Working Groups on Physical Sciences, June 8-19, 1976 Methoday on Minor Constituents and Excited Species, Philadelphia, Pa, June 9, 10, 1976 Oxford and New York, Pergamon Press, 1977, p. 73.76.7 refs

Laser ranging stations of the Intercosmos network, designed to provide satellite tracking data for geodesy and geophysics, are described. The Intercosmos network presently includes stations in Bolivia, Poland, Egypt, the German Democratic Republic and the Soviet Union. The transportable Q-switched ruby laser transmitters employed by the ranging system have an accuracy of + or 1.5 m. Laser observations within an Arctic-to Antarctic satellite tracking program are also reported.

A78-18183 The use of balloons for geodetic research J Kakkuri (Finnish Geodetic Institute, Helsinki, Finland) In Space research XVII, Proceedings of the Open Meetings of Working Groups on Physical Sciences, June 8-19, 1976 and Symposium on Minor Constituents and Excited Species, Philadelphia, Pa, June 9, 10, 1976 Oxford and New York, Pergamon Press, 1977, p. 795-800 6 refs

The article discusses using balloons for various areas of geodetic research. It is suggested that balloons may be employed in conjunction with classical and satellite triangulations in order to establish a geodetic network which may be used to assess terrestrial first-order triangulation, and to test satellite techniques. Geodetic

networks may also be used by developing countries for mapping and construction projects

A78-18992 # Method of obtaining and analyzing the spectral characteristics of natural formations (Metod polucheniia i analiza spektral'nykh kharakteristik prirodnykh obrazovanii) | A Petrakovskii and R G Khlebopros (Akademiia Nauk SSSR, Institut Lesa i Drevesiny, Krasnoyarsk, USSR) Akademiia Nauk SSSR, Sibirskoe Otdelenie, Izvestiia, Seriia Tekhnicheskikh Nauk, June 1977, p 126-131 10 refs In Russian

The variability of the spectral characteristics of an underlying surface due to the height of the sun is investigated. A method is proposed for recording reflected radiation, thereby reducing noise caused by the change in the reflection coefficient of a natural formation as the sun's position changes, and also reducing the noise caused by a redistribution of areas which are illuminated by the direct beam and those which are shadowed Ideas are put forward on how to resolve the components when the spectral characteristics of multicomponent formations are being analyzed.

A78-19236 # A mathematical theory of equivalent transformations during the equalizing of geodesic networks (Matematicheskaia teoriia ekvivalentnykh preobrazovanii pri uravnivanii geodezicheskikh setei) N D Drozdov (Moskovskii Institut Inzhenerov Geodezii, Aerofotos'emki i Kartografii, Moscow, USSR) and I A Liseev Geodeziia i Aerofotos'emka, no 4, 1977, p 26 34 5 refs In Russian

A78-19243 # Models for the identification of topographic objects during the deciphering of aerial photographs (Modeli raspoznavaniia topograficheskikh ob'ektov pri vizual'nom deshifrirovanii aerosnimkov) A N Zhivichin Geodeziia i Aerofotos'emka, no 4, 1977, p 95-101 In Russian

The article discusses various processes involved in the visual deciphering of simple natural and artificial topographic objects as recorded by aerial photographs. Mathematical expressions, describing the statistical probabilities of decipherment, are derived on the basis of model and actual photographs. The data necessary for such calculations are discussed.

N78-10543# Stanford Research Inst , Menlo Park, Calif INTERACTIVE AIDS FOR CARTOGRAPHY AND PHOTO INTERPRETATION Semiannual Technical Report 12 Nov 1976 - 12 May 1977 Harry G Barrow May 1977 37 p refs

Harry G Barrow May 1977 37 p refs (Contract DAAG29-76-C-0057 ARPA Order 2894 SRI Proj 5300)

(AD-A043418) Avail NTIS HC A03/MF A01 CSCL 08/2 This report describes the status of the SRI Image Understanding project at the end of twelve months. The central scientific goal of the research program is to investigate and develop ways in which diverse sources of knowledge may be brought to bear on the problem of interpreting images. The research is focused on the specific problems entailed in interpreting aerial photographs for cartographic or intelligence purposes. A key concept is the use of a generalized digital map to guide the process of image interpretation.

N78-10544# Army Engineer Topographic Labs, Fort Belvoir, Va

AN ANALYSIS OF LANDSAT SYSTEMS FOR CARTO-GRAPHIC AND TERRAIN INFORMATION Report No 9 in ETL Series on Remote Sensing Technical Report, Aug - Dec 1978

Theodore C Vogel Jun 1977 62 p

(DA Proj. 4A7-62707-A-855)

(AD-A044431, ETL-0103) Avail NTIS HC A04/MF A01 CSCL 15/4

The scientific and technical literature is reviewed to analyze the capabilities of LANDSAT Systems 1, 2, 3 and 4 for hydrographic, topographic, planimetric, and thematic map compilation. The systems capabilities were analyzed according

to the following qualitative code for a selected list of map and chart requirements. O Not detectable, the map element cannot be discerned or located from either type of LANDSAT data. 1 Detectable, map element can be detected but not identified from the type of LANDSAT data indicated, 2 - Identifiable, map element can be detected and recognized as a particular type of feature from the LANDSAT data indicated, E.G. road, canal, etc., collateral information may be required to reach this analysis level, 3 - Classifiable LANDSAT data, with the use of all available collateral information can provide the information required for the map element including all required measurements, e.g. width, length and areas it was concluded that LANDSAT.1, 2, 3 MSS data is compatible with National Map Accuracy Standards and can be used to update the map elements on map scales 1/1,000,000 through 1/250,000, although many of the cultural, hydrographic and botanical elements may be unclassifiable.

N78-11452°# National Aeronautics and Space Administration Goddard Space Flight Center Greenbelt, Md A METMOD OF INVERSION OF SATELLITE MAGNETIC ANOMALY DATA

M A Mayhew Oct 1977 19 p refs Presented at IAGA Meeting, Seattle Aug 1976 Submitted for publication (NASA-TM-78039 X-922-77-260) Avail NTIS HC A02/MF A01 CSCL 05B

A method of finding a first approximation to a crustal magnetization distribution from inversion of satellite magnetic anomaly data is described Magnetization is expressed as a Fourier Series in a segment of spherical shell Input to this procedure is an equivalent source representation of the observed anomaly field Instability of the inversion occurs when high frequency noise is present in the input data, or when the series is carried to an excessively high wave number Preliminary results are given for the United States and adjacent areas

N78-11498# Central Intelligence Agency Washington D C Office of Geographic and Cartographic Research CAM-CARTOGRAPHIC AUTOMATIC MAPPING PROGRAM DOCUMENTATION, 5TH EDITION

Jun 1977 138 p Supersedes BGI-D-75-1 (PB-270304/9, GC-77-10126 CIA/DF-77/006A BGI-D-75-1) Avail NTIS HC A07/MF A01 CSCL 08B

CAM is an IBM System/360 Fortran level H or G and Assembly Language Code (ALC) program that performs a wide variety of cartographic functions Included are 16 map projections, the Universal Transverse Mercator (UTM) grid system, and an XY (One for One) data display routine CAM connects points with straight lines or circles and draws line grids range rings, ellipses, cones symbols azimuths and elevation rings Included is a World Coastline file of 8200 points, but CAM is also used in conjunction with World Data Bank I, a 100 000 point file separately contained on Accession No PB-223 178 A significant new feature of CAM-5th Edition also allows its use in conjunction with World Data Bank II which contains approximately 6 million points

N78-11550\*# National Aeronautics and Space Administration Goddard Space Flight Center Greenbelt Md NATIONAL GEODÉTIC SATELLITE PROGRAM, PART 1 J H Berbert J Brownd T Felsentreger D Harris T S Johnson, M A Khan F Lerch J Marsh J Murphy, B Putney et al In Its Natl Geodetic Satellite Program Pt 1 refs

Avail NTIS MF A01 SOD HC CSCL 04A

The contribution of the Goddard Space Flight Center to the National Geodetic Satellite Program is reported All of the major types of tracking systems including those employing optical electronic, range-and-range-rate and laser technologies which were developed and operated by Goddard are described The MINITRACK data were used to derive geodetic results. The methods used for the analysis of these data are presented.

GDH

N78-11556\*# California Univ Los Angeles
NATIONAL GEODETIC SATELLITE PROGRAM, PART 2
W M Kaula In NASA Washington Natl Geodetic Satellite

Program, Pt 2 1977 p 943-948

(Contract NSR-05-007-060) Avail NTIS MF A01 SOD HC CSCL 08F

Satellite orbit analyses are presented which were undertaken for (1) reasons of insight and economy (2) obtaining geophysically interesting tesseral harmonics, (3) comparing effects of tracking station location error drag radiation pressure and luni-solar attraction to tesseral harmonic effects, and (4) combination of satellite and terrestrial data. The analyses were divided into the following phases (1) MINITRACK interferometry early Baker-Nunn camera directions (2) late Baker-Nunn camera directions and (3) combined Baker-Nunn camera and TRANET Doppler data.

N78-12503°# Geological Survey, Malaysia
GEOLOGICAL AND WYDROGEOLOGICAL INVESTIGATIONS
IN WEST MALAYSIA Tochnicol Report, Apr 1973 - Fob
1977

Jaafar Bin Ahmad, Principal Investigator and Shu Yeoh Khoon Jun 1977 30 p refs Sponsored by NASA Original contains color imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D ERTS

(E78-10027, NASA-CR-155252, MP KB/E/038/RS) Avail NTIS HC A03/MF A01 CSCL 08G

The author has identified the following significant results Large structures along the east coast of the peninsula were discovered. Of particular significance were the circular structures which were believed to be associated with mineralization and whose existence was unknown. The distribution of the younger sediments along the east coast appeared to be more widespread than previously indicated. Along the Pahang coast on the southern end, small traces of raised beach lines were noted up to six miles inland. The existence of these beach lines was unknown due to their isolation in large coastal swamps.

N78-12510°# Battelle Columbus Labs. Ohio IMPROVED GROUND TRUTH GEOID FOR THE GEOS-3 CALIBRATION AREA

A George Mourad, S Gopalapıllaı, M Kuhner, and D M Fubara Nov 1977 76 p refs

(Contract NAS6-2451)

(NASA-CR-141431) Avail NTIS HC A05/MF A01 CSCL 08B

The purpose of this investigation is to develop methods and procedures are reported for computing a detailed geoid to be used as geodetic ground truth for the calibration and verification of GEOS-3 altimeter data. The technique developed is based on rectifying the best available detailed goold so that the rectified geoid will have correct scale, orientation, shape and position with respect to the geocenter. The approach involved the development of a mathematical model based on a second degree polynomial, in rectangular Cartesian coordinates, describing the geoid undulations at the control stations. A generalized least squares solution was obtained for the polynomial which describes the variation of the undulation differences between the control stations geoid and the gravimetric geoid. Three rectified geoids were determined. These geoids correspond to three sets of tracking station data (1) WFC/C-band data, (2) GSFC/C-band data, and (3) OSU-275 data The absolute accuracy of these rectified geoids is linearly correlated with the uncertainties of the tracking station coordinates and, to a certain extent with those of the detailed geoid being rectified Author

ର୍ଗୀଞ-12553° # National Aeronautics and Space Administration, Washington, D C

LOCALIZATION OF AN EXPERIMENTAL ECOLOGICAL UNIT IN THE MARADI REGION OF NIGERIA

M Mainguet, L. Canon, and A M Chapelle Nov 1977 325 p refs Transl into ENGLI\$H of "Localization d'une Unite Ecologique Experiments dans la Region de Maradi (Niger)", Reims Univ. France, Jun 1977 p 1-300 Transl by Kanner (Leo) Associates, Redwood City, Calif

(Contract NASw-2790)

(NASA-TM-75085) Avail NTIS HC A14/MF A01 CSCL 13B

A detailed topographical and geomorphological description of a specific ecological unit in the Maradi region of the Sahel in the Niger Republic is presented. Sandy structures are classified into active dunes and covered dunes and an extensive vocabulary is developed to describe sub-categories. The descriptions are based on meteorological data (anemometric and rainfall) from local weather stations, ground observations, aerial photographs and LANDSAT picturers. The problem of dune reactivation and desertification is discussed both from the standpoint of causes and possible counter measures

N78-13514# Air Force Systems Command Wright-Patterson AFB, Ohio Foreign Technology Div

UPDATED SYSTEM FOR CALCULATIONS OF COORDI-NATES FOR LOCATING POINTS ON COMPUTER GEO 2 W Gedymin 12 May 1977 10 p Transl into ENGLISH from Przeglad Geodezyjny (Poland), v 47, no 12, 1975 p 499-500 (AD-A045434, FTD-ID(RS)I-0667-77) Avail NTIS MF A01 CSCL 09/2

In the majority of Geodesy Information Centers in Poland, the machine GEO 2 is a basic computer. This computer, relatively well programmed for Geodesy is used for various typical calculations and in particular to Geodetic workout of detailed plans for utilizing the terrain land survey and ensuing work Programs enabling one to carry out this type of calculations are incorporated in two systems system PG 4 and system MAPA 1, as well as different versions of them modified by the

## N78-14453 British Library Lending Div Boston Spa (England) THE TRANSFER OF THE CONTENTS OF SATELLITE PICTURES ONTO GEOGRAPHIC MAPS

K A Zvonarev [1977] 11 p Transl into ENGLISH from Vestnik Ser Geol Geog (Leningrad), v 1, no 6 1976 p 104-114

(BLLD-M-24900-(5828 4F) BLLD-Trans-1287) Avail Library Lending Div Boston Spa Engl

Techniques in using cartographic grids to transfer satellite photographs onto meteorology Mercator projections were studied Formulae were derived for use in stereographic, azimuthal equiangular conical and central projections. Relative accuracies were discussed for each map type Author

#### N78-14503\*# South Australian Inst of Technology, Ingle Farm THE VECTOR CLASSIFIER

K R McCloy In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 535-543

Avail NTIS HC A99/MF A01 CSCL 12A

A linear classifier is developed. The classifier algorithm derives from the picture element (pixel) response values, the response values for a point (called footpoint) consisting of determined proportions of distinct and operator defined land surfaces. The algorithm decides whether the pixel contains the content of the defined surfaces by testing the footpoint to pixelpoint distance against an operator specified threshold value. The test can be either of statistical or geometric form. Those pixels which give a positive result to the test are subclassified according to the proportions of the distinct land surfaces. The practical characteristics of the classifier are discussed and the classification results achieved, in a number of test areas, are described. The artificial nature of the classifier assumptions relate to certain land surface conditions. Testing the suitability of the classifier for other conditions is discussed Author

N78-13516# Army Engineer Waterways Experiment Station,

ACQUISITION OF TERRAIN INFORMATION USING LANDSAT MULTISPECTRAL DATA REPORT 2. AN INTERACTIVE PROCEDURE FOR CLASSIFYING TERRAIN TYPES BY SPECTRAL CHARACTERISTICS

Horton Struve, Warren E Grabau, and Harold W West Sep 1977 142 p refs

WES-TR-M-77-2-2) NTIS (AD-A045871 Avail HC A07/MF A01 CSCL 15/4

Developed in the study reported herein was a semiautomated procedure for classifying LANDSAT radiance data in terms of preselected land-use categories. The procedure is an interim solution to the problem of mapping very large areas in terms of relatively crude categories in very short periods of time. Operation of the procedure requires an analyst to direct a computer by means of interactive instructions to search for all the 3 by 3 pixel arrays exhibiting spectral signatures that conform to a selected criterion of homogeneity. The computer then retrieves these signatures from within the array of LANDSAT radiance values and groups them into spectrally similar clusters. The clusters are then displayed on a color coded map overlay from which the analyst must provide the final interpretation and classification The area selected for study is centered approximately 40 km northeast of Vicksburg, Mississippi. The area includes a representative section of loess hills, forming the eastern wall of the Mississippi floodplain and a section of the floodplain, including an oxbow lake and a number of other floodplain features

Author (GRA)

### N78-15622 Cornell Univ Ithaca, N Y RECENT VERTICAL CRUSTAL MOVEMENTS FROM GEODETIC MEASUREMENTS ALASKA AND THE EASTERN UNITED STATES Ph D Thesis

Larry Douglas Brown 1976 194 p

Avail Univ Microfilms Order No 77-19988

Precise leveling and tide gauge measurements were used to estimate rates of recent vertical crustal movement along a number of profiles across the eastern United States and along one profile in south-central Alaska These rates were analyzed in order to determine if they reflect neotectonic activity in these very different tectonic regions and if so to discover the cause of such activity. Examination of the data along the east coast of the United States shows that leveling and tide gauge results yield significantly different estimates of vertical crustal movement and suggest that one or both of the methods contain systematic error It was found that the movements indicated by leveling can be correlated with geologic structure in the eastern United States strongly suggesting that the vertical motions derived from leveling reflect neotectonic activity Dissert Abstr

# Page intentionally left blank

Page intentionally left blank

#### 04

## GEOLOGY AND MINERAL RESOURCES

Includes mineral deposits, petroleum deposits spectral properties of rocks, geological exploration, and lithology

A78-12934 # Application of the 'DIBIAS' image processing system on Landsat pictures of central Morocco and Southern Germany K A Ulbricht (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Luft- und Raumfahrt, Institut für Luft- und Raumfahrt, Oberpfaffenhofen, West Germany) In International Electronics Congress, 24th, Rome, Italy, March 28-30, 1977, Proceedings Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1977, p. 81-89

The configuration of 'DIBIAS', an interactive digital image processing system, is explained. Application of processing programs on a mountainous testing site in central Morocco as well as the Lake of Constance in Southern Germany shows formerly hidden contents to geologists and limnologists. A few examples of the work are presented. (Author)

A78-13069 Seasonal color-infrared photographs for mapping inland wetlands on U.S. Geological survey 7.5-minute quadrangles V. Carter (U.S. Geological Survey, National Center, Reston, Va.). In Color aerial photography in the plant sciences and related fields, Proceedings of the Fifth Biennial Workshop, Sioux Falls, S. Dak., August 19-21, 1975 Falls Church, Va., American Society of Photogrammetry, 1977, p. 143-161. 18 refs.

A78-13082 Pulsating aurora - Local and global morphology O Royrvik and T N Davis (Alaska, University, Fairbanks, Alaska) Journal of Geophysical Research, vol 82, Oct 1, 1977, p 4720-4740 30 refs NSF Grant No GP-5246

Extensive observations with all-sky TV cameras supplemented by observations with narrow-field TV cameras, conventional all-sky cameras and images from DMSP satellites have shown that pulsating auroras are broadly distributed along the auroral oval throughout much of the auroral substorm. Intensity variations in pulsating auroras may be repetitive, quasi-periodic or occasionally periodic with a time scale ranging from less than 1 sec to several tens of seconds. Pulsations occur in auroral arcs, arc segments and patches of fixed and variable area. The temporal and spatial characteristics are highly variable over a broad and continuous spectrum, rapid changes from one set of characteristics to another frequently occur, as do reversible changes from pulsating to nonpulsating auroras.

A78-13492 A comparative study of the amount and types of geologic information received from visually interpreted U-2 and Landsat imagery J V Gardner (Indiana University, Fort Wayne, Ind.) and V C Miller (Indiana State University, Terre Haute, Ind.) ITC Journal, no. 3, 1977, p. 384-405. Research supported by Indiana State University and Purdue University

Standard refraction and nonmagnifying mirror stereoscopes were used in a comparative study of stereoscopic black and white U-2 photographs, and multispectral scanner (MSS) and color-composite Landsat imagery of the Grand Canyon area. The study was aimed at assessing the amount of geologic information that could be obtained from the various types of imagery through use of inexpensive visual interpretation. It was concluded that when general rock unit differentiation and distribution are sought, Landsat MSS imagery suffices, when more detailed geologic mapping is desired, stereoscopic photography, supplemented by the color-composite Landsat imagery, may be preferable.

A78-13932 Analysis of infrared reflectivity in the presence of asymmetrical phonon lines. J L Servoin and F Gervais (Orléans, Université, CNRS, Centre de Recherches sur la Physique des Hautes Températures, Orléans, France) Applied Optics, vol 16, Nov 1977, p 2952-2956 15 refs

The temperature dependence of the ir reflection spectrum (A1-type modes) of LiTaO3 is reported from room temperature up to about 1300 K, that is 400 K above the ferroelectric-paraelectric phase transition. Results for the isomorphic compound LiNbO3 are also presented. Certain phonon resonance lines are found asymmetric. Several dielectric function models are discussed. Certain advantages of ir reflectivity spectroscopy are emphasized. (Author)

A78-14787 # Industrial use of geological remote sensing from space F B Henderson, III (Geosat Committee, Inc., San Francisco, Calif.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 183-187

The utilization of satellite remote sensing of geological resources by the oil, gas and mineral industries is discussed. It is noted that present and planned NASA systems, as well as geologically dedicated supplemental systems, can materially improve the process of making requisite maps for geological industries efficiently and economically

A78-14825 # Remote sensing exploration for metallic mineral resources in central Baja California R N Baker (General Electric Co., Reltsville, Md.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p 683-691 17 refs

A78-14867 # Integration of remote sensing and surface geophysics in the detection of faults P L Jackson, R A Shuchman, H Wagner (Michigan, Environmental Research Institute, Ann Arbor, Mich), and F Ruskey (US Bureau of Mines, Denver Mining Research Center, Denver, Colo) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 1137-1146

Possible faults indicated by remote sensing can be quickly confirmed by resistivity surveys. Anomalous resistivity values occur within the fault crush zone. In a sedimentary region in Rio Blanca County, northwest Colorado, a fault zone was inferred from Landsat imagery. Subsequent resistivity surveys indicated substantial resistivity highs associated with the faults. Seismic data and the drilling of an observation well confirmed the main fault. (Author)

A78-14887 # Application of Landsat satellite imagery for iron ore prospecting in the western desert of Egypt E M El Shazly, M A Abdel Hady, M A El Ghawaby, and S M Khawasik (Academy of Scientific Research and Technology, Remote Sensing Centre, Atomic Energy Establishment, Cairo, Egypt) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p. 1355-1364, 8 refs

A78-16502 # Image data application, obtained from space, to geological investigations in the USSR V K Eremin, S I Strelnikov, B N Moshaev, and V G Trifonov (National Committee of Photogrammetrists, Moscow, USSR) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 8 p

The paper discusses various types of geological information that can be gathered from satellite imagery. For example, in the Tien Shan region, two types of neotectonic structures have been distinguished. (1) the folded uplift in blocks and zones of sinking, which form ranges and intermountain depressions, and (2) lineaments of

different length and direction. From preliminary data obtained over Kazakhstan and Central Asia, four series of faults can be distinquished, which can be combined into two systems (1) series of meridional and latitudinal faults, and (2) series of northwest and northeast faults

A78-16503 # Engineering geological interpretation of black and white, color and false color air photos L K Kauranne (Geological Survey of Finland, Otaniemi, Finland) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 17 p.

The results of engineering geological interpretation of black and white (1 6000), color and false color (1 8500) stereo air photos from a 3 sq km area glaciated terrain in South Finland were compared with the results of field observations and with each other. The constant error in repeated measurements of areas of formations was plus or minus 5%, and difference (error) in repeated interpretation about 8%, except for silt, for which it was greater. The reliability of the geological interpretation for black and white air photos controlled by field observations was from 67 to 86%, that for color air photos from 69 to 89% and that for false color air photos from 70 to 88%, depending on drift formation. Errors in drift mapping mean that mistakes are made in planning and these may lead to a considerable increase in the cost of foundations. An index for the orientation of formations was developed. This may be used both for characterizing the terrain as well as for planning follow up investigations (Author)

A78-16511 ERTS topology of France /First results/ (Topologie ertsienne de la France /Premiers résultats/) C Cazabat (Institut Geographique National, Paris, France) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 17 p 12 refs In French

Linear and circular geological features on the land surface of France are detected in Landsat photographs whose scale is 1 1,000,000 Straight lines several kilometers in length result from hydrologic or orogenic influences. The number, dimension, frequency, and orientation of these lines are considered Circular features, whose diameters might be several kilometers in length, are divided into three categories on the basis of size, and their distribution is examined. The scale 1,1,000,000 was selected because the overlap in satellite photographs of this scale permits the use of stereoscopic and pseudo-stereoscopic techniques for analyzing the data. The satellite photographs can also be correlated with other maps of the same scale, and the work of analysis is far less than it would be if the scale were 1 500,000

Analysis of Landsat-1 data for mapping of surficial deposits - Test area in Alta commune, Finnmark county, Norway B A Follestad (Norges Geologiske Undersokelse, Trondheim, Norway) and D W Levandowski (Purdue University, West Lafayette, Ind ) (Kart og Plan, no 2, 1976, p 66-74) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper. 10 p 9 refs Research sponsored by the Norges Geologiske Undersokelse and Norges Teknisk-Naturvitenskapelige Forskningsrad

There is an urgent need in North Norway for obtaining geologic data for resource policy and planning. Landsat data analyzed using the LARSYS computer software system can provide such data corrected to a scale of 1 50,000. The results of this study show that the spectral-reflectivity of the vegetative canopies for different surficial deposits can be used to distinguish between coarse grained (marginal) stratified deposits and finer grained (proglacial and fluvial) stratified deposits

A78 20097 \* Rare earth and trace element geochemistry of metabasalts from the Point Sal ophiolite, California M. Menzies (California, University, Davis, Calif.), D. Blanchard (NASA, Johnson Space Center, Houston, Tex.), and J. Jacobs (Lockheed Electronics Co , Inc , Houston, Tex ) Earth and Planetary Science Letters, vol 37, no 2, Dec 1977, p 203-215 43 refs

N78-10537\*# Helsinki Univ (Finland) Dept of Geology INVESTIGATION OF LANDSAT IMAGERY ON CORRELA-TIONS BETWEEN ORE DEPOSITS AND MAJOR SHIELD STRUCTURES IN FINLAND Final Report, Jun. 1975 - Sep. 1977

Heikki V Tuominen, Principal Investigator and Viljo Kuosmanen Sep 1977 59 p refs Sponsored by NASA Original contains Original photography may be purchased from color imagery the EROS Data Center, Sioux Falls S D ERTS (E78-10012,

NASA-CR-155216) HC A04/MF A01 CSCL 08G

The author has identified the following significant results Several regional lineaments appear to correlate with the distribution of ore deposits and showings. Combined study of LANDSAT summer and winter mosaics and color composites of geological, geomorphological, and geophysical maps makes the correlation more perceptible. The revealed pattern of significant lineaments in northern Finland is fairly regular. The most significant lineaments seen in LANDSAT mosaics are not detectable in single images

N78-10545# Netherland, Sewell and Associates Inc Dallas,

PRELIMINARY STUDY OF THE PRESENT AND POSSIBLE FUTURE OIL AND GAS DEVELOPMENT OF AREAS IMMEDIATELY SURROUNDING THE INTERIOR SALT DOMES UPPER GULF COAST SALT DOME BASINS OF EAST TEXAS, NORTH LOUISIANA, AND MISSISSIPPI

17 Dec 1975 48 p refs (Contract W-7405-eng-26)

(ORNL/Sub-75/87988) Avail NTIS HC A03/MF A01

Present and possible future oil and gas development was investigated for the purpose of locating those salt domes where such oil and gas development would not interfere with the possible storage of radioactive waste material in the core of the salt dome Preliminary findings indicate that several of the salt domes in each of the three basins under study are hydrocarbon barren and that the present and/or possible future oil and gas development on or in the areas immediately surrounding the salt domes should not interfere with the possible storage of radioactive waste material in the core of these salt domes. ERA

N78-10992\*# Hawaii Univ , Honolulu ASTEROID SURFACE MATERIALS MINERALOGICAL CHARACTERIZATIONS FROM REFLECTANCE SPECTRA Michael J Gaffey and Thomas B McCord 1977 147 p refs Submitted for publication

(Grant NsG-7310)

(NASA-CR-154510, Publ-151) Avail NTIS HC A07/MF A01 CSCL 03B

Mineral assemblages analogous to most meteorite types, with the exception of ordinary chondritic assemblages, have been found as surface materials of Main Belt asteroids C1- and C2-like assemblages (unleached, oxidized meteoritic clay minerals plus opaques such as carbon) dominate the population throughout the Belt, especially in the outer Belt. A smaller population of asteroids exhibit surface materials similar to C3 (CO CV) meteoritic assemblages (olivine plus opaque probably carbon) and are also distributed throughout the Belt. The majority of remaining studied asteroids (20) of 65 asteroids exhibit spectral reflectance curves dominated by the presence of metallic nickel-iron in their surface materials. The C2-like materials which dominate the main asteroid belt population appear to be relatively rare on earth-approaching asteroids

Mississippi State Univ Mississippi State N78-11454\*# Mechanical Engineering Dept

NUCLEONIC COAL DETECTOR WITH INDEPENDENT, HYDROPNEUMATIC SUSPENSION Final Report

E William Jones and Kim Handy 10 Jun 1977 49 p refs (Contract NAS8-32214)

(NASA-CR-150465) Avail NTIS HC A03/MF A01 CSCL 081 The design of a nucleonic coal interface detector which measures the depth of coal on the roof and floor of a coal

mine is presented. The nucleonic source and the nucleonic detector are on independent hydropneumatic suspensions to reduce the measurement errors due to air gap Author N78-12494\* # Geological Survey, Reston, Va PREPARATION OF A GEOLOGIC PHOTO MAP AND HYDROLOGIC STUDY OF THE YEMEN ARAB REPUBLIC Final Report

M J Grolier Principal Investigator W C Overstreet, G C Tibbitts, Jr. D F Davidson and M M Ibrahim (Mineral and Petroleum Authority, Yemen) 30 Sep 1977 20 p refs ERTS (NASA Order G-21990)

NTIS

NTIS

(E78-10008, NASA-CR-15 HC A02/MF A01 CSCL 08H NASA-CR-155212) Avail

N78-12506\* Tennessee Univ Space Inst , Tullahoma Remote

THE APPLICATION OF LANDSAT-1 IMAGERY FOR MONITORING STRIP MINES IN THE NEW RIVER WATER-SHED IN NORTHEAST TENNESSEE, PART 2 Final Report F Shahrokhi, Principal Investigator and Leslie A Sharber [1977] 80 p refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D ERTS

(Contract NAS8-31980)

(E78-10032, NASA-CR-150423) Avail

HC A05/MF A01 CSCL 081

The author has identified the following significant results LANDSAT imagery and supplementary aircraft photography of the New River drainage basin were subjected to a multilevel analysis using conventional photointerpretation methods, densitometric techniques, multispectral analysis, and statistical tests to determine the accuracy of LANDSAT-1 imagery for measuring strip mines of common size The LANDSAT areas were compared with low altitude measurements. The average accuracy over all the mined land sample areas mapped from LANDSAT-1 was 90% The discrimination of strip mine subcategories is somewhat limited on LANDSAT imagery A mine site, whether active or inactive, can be inferred by lack of vegetation, by shape, or image texture. Mine ponds are difficult or impossible to detect because of their small size and turbidity. Unless bordered and contrasted with vegetation, haulage roads are impossible to delineate Preparation plants and refuge areas are not detectable Density slicing of LANDSAT band 7 proved most useful in the detection of reclamation progress within the mined areas For most state requirements for year-round monitoring of surface mined land, LANDSAT is of limited value. However, for periodic updating of regional surface maps, LANDSAT may provide sufficient accuracies for some users

N78-13508\*# Stanford Univ, Calif Dept of Applied Earthsciences

APPLICATION OF HCMM SATELLITE DATA TO MINERAL EXPLORATION Progress Report, 1 Jul. - 31 Oct. 1977

R J P Lyon, Principal Investigator 1 Nov 1977 5 p ERTS (Contract NAS5-24106)

NASA-CR-155258) NTIS (E78-10036 Avail

HC A02/MF A01 CSCL 08G

N78-13517# Texas Instruments, Inc., Dallas

AERIAL GÄMMA-RAY AND MAGNETIC SURVEY OF THE RED RIVER AREA, BLOCK C. TEXAS AND OKLAHOMA, VOLUME 2

Mar 1977 198 p (Contract EY-76-C-13-1664)

(GJBX-17(77)-Vol-2) Avail NTIS HC A09/MF A01

Aerial gamma and magnetic survey maps are presented for Block C of the Red River area of Texas and Oklahoma Histograms of U, Th, and K deposits are included

N78-13622# Utah Univ , Salt Lake City **GEOPHYSICS APPLIED TO DETECTION AND DELINEATION** OF NON-ENERGY NON-RENEWABLE RESOURCES: WORKSHOP ON MINING GEOPHYSICS

S H Ward, R Campbell (US Steel Corp Pittsburgh), J D Corbett (Cities Serv Minerals Corp.) G. W. Hohmann (Kennecott Exploration, Inc.), C. K. Moss (ASARCO, Inc.), and P. M. Wright (Bear Creek Mining Co.) Mar 1977 314 p refs Workshop held at Salt Lake City, 6-8 Dec 1976 (Grant NSF AER-76-80802)

(PB-271952/4 NSF/RA-770173) NTIS HC A14/MF A01 CSCL 081

The needs for research in mining geophysics related to nonenergy, nonrenewable resources were explored Participants included mining geophysicists who were concerned with exploration of base metals. State of the art reports were presented in the areas of induced polarization, resistivity, and self-potential methods, electromagnetic methods, remote sensing methods,

N78-13688# Sandia Labs , Albuquerque, N Mex Geomechanics Research Div

COMPRESSION WAVE STUDIES IN SOLENHOFEN LIMESTONE

K W Schuler and D E Grady May 1977 56 p refs (Contract EY-76-C-04-0789) (SAND-76-0279) Avail NTIS HC A04/MF A01

Dynamic compression wave studies were conducted on Solenhofen limestone in the stress range of 0 to 3 0 GPa Plate impact techniques were used to provide a transient stress input and diffuse reflector laser interferometry was used to study the evolution of these pulses through various thicknesses of limestone Both the loading and unloading stress-strain response was determined from the measured particle velocity profiles. A dynamic yield stress of 0.67 plus or minus 05 GPa was observed which is consistent with static failure envelope data. However, there is a marked difference between the dynamic and hydrostatic stress-strain curves at stress levels where the calcite I yields II yields III phase transitions occur It appears that the phase transitions which occur during shock wave loading do not take the material fully into the high pressure phase but instead reach a metastable mixed phase condition

N78-14452\* National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio IN-SITU LASER RETORTING OF OIL SHALE Patent Harvey S Bloomfield, inventor (to NASA) Issued 6 Dec 1977 5 p Filed 28 Jan 1977

(NASA-Case-LEW-12217-1, US-Patent-4,061,190, US-Patent-Appl-SN-762753 US-Patent-Class-166-259

US-Patent-Class-166-248) Avail US Patent Office CSCL 08I Oil shale formations are retorted in situ and gaseous hydrocarbon products are recovered by drilling two or more wells into an oil shale formation underneath the surface of the ground A high energy laser beam is directed into the well and fractures the region of the shale formation. A compressed gas is forced into the well that supports combustion in the flame front ignited by the laser beam thereby retorting the oil shale Gaseous hydrocarbon products which permeate through the fractured region are recovered from one of the wells that were not exposed to Official Gazette of the U.S. Patent Office the laser system

N78-14474\*# Geosat Committee, Inc San Francisco, Calif INDUSTRIAL USE OF GEOLOGICAL REMOTE SENSING FROM SPACE

Frederick B Henderson III In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment\_Vol 1 1977 p 183-187

Avail NTIS HC A99/MF A01 CSCL 08G

NASA's remote sensing technology as exemplified by ERTS-1 and LANDSAT 2 developed far more rapidly than they could have been reasonably absorbed with proved results by geological industries. This under-utilization of available technology is due to the ingrown infrastructure of exploration and engineering programs and techniques, and the inherent indirectness and long term effectiveness of the application of remote sensing to geological needs. The value of four dimensional geologic maps and the capabilities of various sensors are discussed

N78-14507\*# GeoSpectra Corp Ann Arbor, Mich LANDSAT DETECTION OF HYDROTHERMAL ALTERATION IN THE NOGAL CANYON CAULDRON, NEW MEXICO Robert K Vincent and George Rouse (Earth Sci., Inc. Golden Colo) In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 579-590 refs

Avail NTIS HC A99/MF A01 CSCL 08H

In 1974 a circular-shaped iron oxide anomaly was observed in an image of a LANDSAT frame centered near Truth or Consequences, New Mexico Field examination of the anomaly has shown that it coincides with a zone of hydrothermal alteration on the northern edge of the Nogal Canyon Cauldron. The altered area contains clay minerals ranging in colors from white to vivid red, the latter presumably resulting from hematite staining in situ gas measurements showed no evidence of active hydrogen sulfide seepage. Preliminary geochemical analyses of grab samples have detected no significant amounts of mineralization. Whereas this area does not at present appear to be economically important, it provides an example of how LANDSAT can be utilized in reconnaissance mapping for cauldrons calderas, and other volcanic features which display hydrothermal alteration.

### N78-14517\*# General Electric Co., Beltsville Md REMOTE SENSING EXPLORATION FOR METALLIC MIN-ERAL RESOURCES IN CENTRAL BAJA CALIFORNIA

Ralph N Baker In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 683-691 refs

Avail NTIS HC A99/MF A01 CSCL 08G

Remote sensor data (primarily LANDSAT) was analyzed by photogeologic and computer-assisted enhancement techniques to evaluate the metallic mineral potential of Baja California Overlays were prepared at 1 1,000 000 and 1 500,000 and included known geologic relationships and mineral occurrences lineament, drainage and structural patterns tonal anomalies, and enhancement results. Computer-assisted enhancement and classification of the test sites was performed using the IMAGE 100 system to identify subtle tonal anomalies thought related to mineralization using known sites as analysis guides Mineral potential maps of Baja California were generated from these analyses and the ten highest priority targets visited Preliminary assay results (atomic absorption analysis) for the samples recovered showed moderate to high geochemical anomalies for Copper (10 of 12 samples) Zinc (3 of 12 samples) and Lead (4 of 12 samples)

#### N78-14525\*# Stanford Univ Calif Remote Sensing Lab ALTERATION MAPPING AT GOLDFIELD, NEVADA, BY CLUSTER AND DISCRIMINANT ANALYSIS OF LANDSAT DIGITAL DATA

Gary Ballew In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 783-790

Avail NTIS HC A99/MF A01 CSCL 08B

The ability of Landsat multispectral digital data to differentiate among 62 combinations of rock and alteration types at the Goldfield mining district of Western Nevada was investigated by using statistical techniques of cluster and discriminant analysis Multivariate discriminant analysis was not effective in classifying each of the 62 groups, with classification results essentially the same whether data of four channels alone or combined with six ratios of channels were used Bivariate plots of group means revealed a cluster of three groups including mill tailings, basalt and all other rock and alteration types. Automatic hierarchical clustering based on the fourth dimensional Mahalanobis distance between group means of 30 groups having five or more samples was performed. The results of the cluster analysis revealed hierarchies of mill tailings vs natural materials basalt vs non-basalt, highly reflectant rocks vs other rocks and exclusively unaltered rocks vs predominantly altered rocks. The hierarchies were used to determine the order in which sets of multiple discriminant analyses were to be performed and the resulting discriminant functions were used to produce a map of geology and alteration which has an overall accuracy of 70 percent for discriminating exclusively altered rocks from predominantly altered rocks Author

N78-14526\*# Minnesota Univ St Paul QUATERNARY GEOLOGIC MAP OF MINNESOTA J E Goebel In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 791-794

Avail NTIS HC A99/MF A01 CSCL 08G

The Quaternary Geologic Map of Minnesota is a compilation based both on the unique characteristics of satellite imagery and on the results of previous field investigations, both published and unpublished. The use of satellite imagery has made possible the timely and economical construction of this map LANDSAT imagery interpretation proved more useful than expected. Most of the geologic units could be identified by extrapolating from specific sites where the geology had been investigated into areas where little was known. The excellent geographic registry coupled with the multi-spectral record of these images served to identify places where the geologic materials responded to their ecological environment and where the ecology responded to the geologic materials. Units were well located on the map at the scale selected for the study Contacts between till units could be placed with reasonable accuracy. The reference points that were used to project delineations between units (rivers, lakes, hills, roads and other features), which had not been accurately located on early maps could be accurately located with the help of the imagery. The tonal and color contrasts, the patterns reflecting geologic change and the resolution of the images permitted focusing attention on features which could be represented at the final scale of the map without distraction by other interesting but site-specific details

N78-14543\*# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt Cologne (West Germany)

REMOTE INFRARED SPECTROSCOPY OF THE EARTH

C R Steinmann In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 957-967 refs

Avail NTIS HC A99/MF A01 CSCL 08G

The infrared reflexion-spectra of minerals and rocks are used for remote sensing of targets. The reflexion-spectra of silicate rocks vary quite significantly from mineral to mineral in the wave length region from 8 to 12 micrometers. The rock forming minerals like quartz feldspar mica and the clay minerals show very different spectral shapes and positions of their maximum of the spectral reflexion. The presence of a good atmospherical window in that spectral region makes the method of differential-reflexion measurement feasible for remote sensing application. A tunable CO2-laser was used as transmitter for infrared radiation Laboratory tests showed the feasibility of the method under different simulated environmental conditions. Because of the very narrow bandwidth of the laser-emission lines, reflexion-spectra with extremely high spectral resolution were obtained.

N78-14544\*# Indian Space Research Organization Admedabad Remote Sensing Area

IMAGE ANALYSIS TECHNIQUES WITH SPECIAL REFERENCE TO ANALYSIS AND INTERPRETATION OF GEOLOGICAL FEATURES FROM LANDSAT IMAGERY

D S Kamat K L Majumder S D Naik and V L Swaminathan In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 969-978 refs

Avail NTIS HC A99/MF A01 CSCL 08G

The principal component analysis enhances the contrast existing between the different cover types present in an imagery A procedure is presented with regards to the determination of the principal components. The method is tested for a portion of the LANDSAT imagery pertaining to Anantapur region. Another technique using the concept of non-linear contrast stretching is defined and developed and carried out on the same imagery. The results are presented as photographs. An interpretation of the geology of the region is derived from these photographs.

Author

N78-14561\*# Environmental Research Inst. of Michigan Ann Arbor

INTEGRATION OF REMOTE SENSING AND SURFACE GEOPHYSICS IN THE DETECTION OF FAULTS

P L Jackson, R A Shuchman, H Wagner and F Ruskey (Bureau of Mines, Denver) In its Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1137-1146

#### Ayail NTIS HC A99/MF A01 CSCL 08G

Remote sensing was included in a comprehensive investigation of the use of geophysical techniques to aid in underground mine placement. The primary objective was to detect faults and slumping features which due to structural weakness and excess water, cause construction difficulties and safety hazards in mine construction. Preliminary geologic reconnaissance was performed on a potential site for an underground oil shale mine in the Piceance Creek Basin of Colorado LANDSAT data black and white aerial photography and 3 cm radar imagery were obtained LANDSAT data were primarily used in optical imagery and digital tape forms, both of which were analyzed and enhanced by computer techniques. The aerial photography and radar data offered supplemental information. Surface linears in the test area were located and mapped principally from LANDSAT data A specific relatively wide, linear pointed directly toward the test site but did not extend into it. Density slicing, ratioing, and edge enhancement of the LANDSAT data all indicated the existence of this linear Radar imagery marginally confirmed the linear while aerial photography did not confirm it Author

#### N78-14562\*# Geological Survey, Denver Colo EVALUATION OF ALGORITHMS FOR GEOLOGICAL THERMAL-INERTIA MAPPING

S H Miller and Kenneth Watson In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1147-1160 refs

Avail NTIS HC A99/MF A01 CSCL 08B

The errors incurred in producing a thermal inertia map are of three general types measurement analysis and model simplification. To emphasize the geophysical relevance of these errors, they were expressed in terms of uncertainty in thermal inertia and compared with the thermal inertia values of geologic materials. Thus the applications and practical limitations of the technique were illustrated. All errors were calculated using the parameter values appropriate to a site at the Raft River, Id Although these error values serve to illustrate the magnitudes that can be expected from the three general types of errors, extrapolation to other sites should be done using parameter values particular to the area. Three surface temperature algorithms were evaluated linear Fourier series finite difference and Laplace transform In terms of resulting errors in thermal inertia the Laplace transform method is the most accurate (260 TIU) the forward finite difference method is intermediate (300 TIU) and the linear Fourier series method the least accurate (460 TIU)

Author

N78-14581\*# Atomic Energy Establishment Cairo (Egypt) Remote Sensing Center

## APPLICATION OF LANDSAT SATELLITE IMAGERY FOR IRON ORE PROSPECTING IN THE WESTERN DESERT OF EGYPT

E M EIShaziy M A AbdelHady M A EiGhawaby and S M Khawasik In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1355-1364 refs

## Avail NTIS HC A99/MF A01 CSCL 08G

Prospecting for iron ore occurrences was conducted by the Remote Sensing Center in Bahariya Oasis-El Faryum area covering some 100 000 km squared in the Western Desert of Egypt LANDSAT-1 satellite images were utilized as the main tool in the regional prospecting of the iron ores. The delineation of the geological units and geological structure through the interpretation of the images corroborated by field observations and structural analysis led to the discovery of new iron ore occurrences in the area of investigation.

N78-14610# Instituto de Pesquisas Espaciais Sao Jose dos Campos (Brazil)

APPLICATION OF REMOTE SENSING TO GEOTHERMAL ANOMALY MAPPING IN THE CALDAS NOVAS COUNTY, GO:AS MS Thesis [APLICACAO DE SENSORIAMENTO

## REMOTO NO ESTUDO DE ANOMALIA GEOTERMAL NO MUNICIPIO DE CALDAS NOVAS, GOIAS]

Celio Eustaquio Dos Anjos Oct 1977 173 p refs In PORTUGUESE ENGLISH summary

(INPE-1129-TPT/070) Avail NTIS HC A08/MF A01

The geothermal anomaly of Caldas Novas county in the state of Goias was mapped Systematic research was carried out combining geological mapping with surface and subsurface temperature measurements LANDSAT-1 images of the region were studied allowing the placement of the area in regional geological context. The origins and evolution of the geothermal anomaly were also considered. Geological mapping was done to the scale of 1.60 using USAF aerial photography. Regional temperature mapping was done using trend surface analysis. Through the correlation of these data four different areas were localized which have a high potential for hot water prospecting.

N78-14611# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil)

APPLICATION OF REMOTE SENSING TO GEOLOGICAL AND MINERAL DEPOSITS SURVEYS OF THE NORTHERN MINAS GERAIS STATE, UTILIZING IMAGES FROM LANDSAT [APLICACAO DE SENSORES REMOTOS PARA LEVANTAMENTOS GEOLOGICOS E DE RECURSOS MINERAIS COM BASE NAS IMAGENS LANDSAT NO NORTE DE MINAS GERAIS]

Roberto Pereira DaCunha and Juercio Tavares DeMattos Aug 1977 70 p refs In PORTUGUESE ENGLISH summary Presented at the 7th Simp Brasil de Mineracao Porto Alegre Brazil 31 Jul - 5 Aug 1977

(INPE-1096-PE/073) Avail NTIS HC A04/MF A01

Results are presented from a study of application of remote sensing to the survey of regional geology of the northern Minas Gerais state and part of the state of Goias Images from LANDSAT RADAR aerophotographs magnetometric maps and automatic interpretation of computer compatible tapes (CCTs) of the LANDSAT were used Regional geology mineral resources of a 143 000 sq km area, and results obtained with the help of different sensors are presented for the area under the study

Author

N78-14615# California Univ Berkeley Lawrence Berkeley Lab

## **GEOLOGICAL REMOTE SENSING FROM SPACE** F B Henderson III and G A Swann 1976 74 p

(Contract W-7405-eng-48)

(TID-27689) Avail NTIS HC A04/MF A01

Remote sensing from space, offering many advantages to assist in the geological and geophysical mapping of the earth was investigated Geological parameters, including structural interpretation, rock mineral, soil and vegetation discrimination and identification and alteration studies were considered Present or potential space sensing capabilities were compared to these parameters for maximum geological utilization Application capabilities were differentiated from experimental capabilities Geological parameters for oil, gas and mineral exploration and for engineering and environmental geology were delineated Major potential applications not available from current or past space technology were recognized while geological parameters and corresponding potential GEOSAT capabilities were summarized

RA

# N78-14622# Earth Satellite Corp., Washington D C DEVELOPMENT OF AIRBORNE ELECTROMAGNETIC SURVEY INSTRUMENTATION AND APPLICATION TO THE SEARCH FOR BURIED SAND AND GRAVEL, A SUMMARY REPORT

O R Russell, J R Everett and J A Uncapher Jan 1977 27 p refs

(Contract DOT-FH-11-9144)

(PB-271331/1 FHWA-RD-77-35) Avail NTIS HC A03/MF A01 CSCL 08I

Airborne electromagnetic survey systems, developed 30 years ago in Canada, have mostly been used in exploration for metallic mineral deposits. In the last 10 years there has been some use of the systems for looking at surface material types and exploring for sand and gravel. The results of this work are extremely

## 04 GEOLOGY AND MINERAL RESOURCES

encouraging however the body of experience is as yet limited. The three systems which appear to have the greatest potential in exploration for sand and gravel are E-Phase INPUT, and Dighem All of these rely on radio frequencies in the very low frequency range. Each has been used to locate sand and gravel under specific sets of conditions.

N78-15552# Watkins and Associates, Lexington, Ky
ONSITE CONTROL OF SEDIMENTATION UTILIZING THE
MODIFIED BLOCK-CUT METHOD OF SURFACE MINING
Feasibility Study, Dec. 1974 - Apr. 1976

Feasibility Study, Dec 1974 - Apr 1976

Jul 1977 103 p refs Prepared in cooperation with Ky Dept of Natural Resources and Environ Protection, Frankfort (Grant EPA-S-802681)

(PB-272244/5, EPA-600/7-77-068) Avail NTIS HC A06/MF A01 CSCL 08I

The feasibility of a demonstration project for onsite control of sedimentation was determined using the modified block-cut method of surface mining. A project-site on Lower Lick Fork in Perry and Letcher Counties in Kentucky was selected. Based on certain assumptions, a comparison of costs involved in the modified block-cut method of mining and in a method using the minimum acceptable requirements as set forth in the present regulations was prepared.

## 05

## OCEANOGRAPHY AND MARINE RESOURCES

Includes sea-surface temperature ocean bottom surveying imagery drift rates sea ice and icebergs sea state fish location

A78-10027 Satellite observations of mesoscale eddy dynamics in the eastern tropical Pacific Ocean, H. G. Stumpf and R. V. Legeckis (NOAA, National Environmental Satellite Service, Washington, D.C.) Journal of Physical Oceanography, vol. 7, Sept. 1977, p. 648-658, 25 refs

Active mesoscale (300 km diameter) eddy formation off the Pacific coast of Central America was observed during February 1976 by a thermal infrared sensor aboard the NOAA 4 satellite. These anticyclonic eddies, closely associated with wind-induced upwellings, propagate westward at an average speed of 13 km/day, which is approximately the speed of nondispersive baroclinic Rossby waves at latitude 12 deg N. (Author)

A78-10161 \* One-parameter characterization of the ocean's inherent optical properties for remote sensing H R Gordon (Miami, University, Coral Gables, Fla ) Applied Optics, vol 16, Oct 1977, p 2627 6 refs Contract No NAS5-22963

A78-10344 Ocean surface currents mapped by radar D E Barrick, M W Evans, and B L Weber (NOAA, Wave Propagation Laboratories, Boulder, Colo ) Science, vol 198, Oct 14, 1977, p 138-144 13 refs

The design of a coastally-located high-frequency radar remote-sensing system for the measurement and mapping of near-surface currents to ranges covering over 2000 sq km out to a distance of approximately 70 km from the shore is presented. Wave-scattered echoes are used to determine current velocity, and a minicomputer is used to control and process the radar signals. From the data a current-vector map may be plotted after one half hour of operation. A transportable prototype version has been constructed and tested. The system utilizes two units powered by a portable power supply, and has average radiated power of 50 watts. Estimates of the precision of current-velocity measurements are better than 30 cm/sec. Applications of the system include current monitoring for offshore accidents, and the determination of the actual linear horizontal drift of particles such as oil.

A78-10388 Monitoring open water and sea ice in the Bering Strait by radar W L Flock (Colorado, University, Boulder, Colo) IEEE Transactions on Geoscience Electronics, vol GE-15, Oct 1977, p 196-202 33 refs Research supported by the U S Fish and Wildlife Service

Observations made at the Bering Strait show the utility of employing radar systems providing both moving-target-identification (MTI) and short-time-constant video signals for monitoring seasurface areas containing open water and sea ice. MTI video signals tend to emphasize returns from areas of open water and loose pack ice Short-time-constant or differentiated video signals tend to emphasize returns from boundaries between water and ice and record echoes from stationary as well as moving targets. Large polynyas (area of open water) south of projecting points and islands in the Bering Strait area in May are vividly displayed by the combination of MTI and short-time-constant signals. The use of the two types of signals constitutes a simple form of processing in the Doppler frequency domain. The results indicate that the use of MTI systems, or more sophisticated pulse-Doppler systems, could be advantageous for monitoring restricted areas of water in which ice may occur and present a limitation or hazard to navigation by boats and ships

(Author)

A78-10389 Techniques for ocean bottom measurements of magnetic fields with a superconducting magnetometer R J Dinger, J R Davis, J A Goldstein (U S Navy, Naval Research Laboratory, Washington, D C), W D Meyers, S A Wolf, and M Cates (U S Naval Ocean Systems Center, San Diego, Calif.) IEEE Transactions on Geoscience Electronics, vol. GE-15, Oct. 1977, p. 228-231. 6 refs.

A superconducting quantum interference device (SQUID) magnetometer cooled by liquid helium was placed on the ocean floor at a depth of 100 m in order to receive extremely low frequency radio transmissions. A nonmagnetic concrete and fiberglass platform anchored a fiberglass pressure vessel containing the magnetometer firmly to the ocean bottom. The helium gas evolved from the boiling liquid helium was vented through a hose to the surface. Details of the apparatus and the techniques used to install and recover the SQUID magnetometer are given.

A78-12615 \* Active microwave measurement from space of sea-surface winds J D Young (General Dynamics Corp., Fort Worth, Tex.) and R K Moore (University of Kansas Center For Research, Inc., Lawrence, Kan.) IEEE Journal of Oceanic Engineering, vol. OE-2, Oct. 1977, p. 309-317. 26 refs. Research supported by the University of Kansas, Contract No. NAS9-13642

Radar backscatter measurements from the ocean were made at 13.9 GHz from Skylab The radar signal increased rapidly with wind speed over the entire range of winds encountered, and for angles of incidence of 30 deg larger. Signals observed were normalized to a nominal incidence angle and to a nominal upwind observation direction, using a theoretical model that has been verified as approximately true with aircraft experiments. Observations during the summer and winter Skylab missions were treated separately because of possible differences caused by an accident to the antenna between the two sets of observations. The results are in general agreement with the theory in all cases. The objective analysis method used for determining surface-truth winds in the Skylab experiment was tested by comparing results obtained at weather ships with the observations made by the weather ships themselves. In most cases, the variance about the regression line between objective analysis and weather-ship data actually exceeded that about the regression line between objective analysis and backscatter data (Author)

A78-12827 Oceans '76, Proceedings of the Second Annual Combined Conference, Washington, D.C., September 13-15, 1976 Conference sponsored by the Marine Technology Society and Institute of Electrical and Electronics Engineers New York, Institute of Electrical and Electronics Engineers, Inc., Washington, D.C., Marine Technology Society, 1976 762 p \$34

Attention is given to sea law, marine mining, undersea cables, sea navigation, the economic potential of the oceans, marine information transfer and education, deep water mapping, and water quality and pollution control Consideration is also given to the applications of the Seasat A satellite, marine biology and fisheries, buoys, remote sensing of the sea, ocean acoustics, a study of the outer continental shelf, oceanographic instrumentation, offshore facilities, undersea vehicles, salvage, and coastal zone management

ВЛ

A78-12828 \* Computer image processing in marine resource exploration P R Paluzzi (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif), W R Normark, G R Hess, H D Hess, and M J Cruickshank (U S Geological Survey, Menlo Park, Calif) In Oceans '76, Proceedings of the Second Annual Combined Conference, Washington, D C, September 13-15, 1976

New York, Institute of Electrical and Electronics

Engineers, Inc., Washington, D.C., Marine Technology Society, 1976, p. 4D-1 to 4D-10 15 refs. Contract No. NAS7-100

Pictographic data or imagery is commonly used in marine exploration. Pre-existing image processing techniques (software) similar to those used on imagery obtained from unmanned planetary exploration were used to improve marine photography and side-scan sonar imagery. Features and details not visible by conventional photo

processing methods were enhanced by filtering and noise removal on selected deep-sea photographs. Information gained near the periphery of photographs allows improved interpretation and facilitates construction of bottom mosaics where overlapping frames are available. Similar processing techniques were applied to side-scan sonar imagery, including corrections for slant range distortion, and along-track scale changes. The use of digital data processing and storage techniques greatly extends the quantity of information that can be handled, stored, and processed. (Author)

A78-12829 \* The Seasat-A project - An overview J A Dunne (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif ) In Oceans '76, Proceedings of the Second Annual Combined Conference, Washington, D C, September 13-15, 1976 New York, Institute of Electrical and Electronics Engineers, Inc., Washington, D C, Marine Technology Society, 1976, p. 10A-1 to 10A-5. 11 refs. Contract No. NAS7-100.

Scheduled for launch in the second quarter of calendar year 1978, the Seasat-A satellite is designed to provide all-weather global monitoring of sea surface temperature, significant wave height, surface wind speed and direction and departures from the marine geoid corresponding to ocean dynamic processes. These data will be obtained from an array of microwave instruments, two active ones (short pulse radar altimeter and wind field scatterometer) and one passive (scanning multichannel microwave radiometer). An experimental L-band synthetic aperture radar, operated on a selected basis for approximately four percent of the time, will provide land and ocean images with a resolution of 25 meters and a swath width close to 100 km for the study of coastal processes, sea ice and ocean wave characteristics. The mission objectives focus on an evaluation of the performance of the instruments in terms of their capabilities to characterize the desired geophysical quantities and the utility of such measurements to the study and exploitation of the world's oceans

(Author)

A78-12834 \* The Seasat surface truth experiments O H Shemdin (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif ) In Oceans '76, Proceedings of the Second Annual Combined Conference, Washington, D C, September 13-15, 1976 New York, Institute of Electrical and Electronics Engineers, Inc., Washington, D C, Marine Technology Society, 1976, p. 10F-1 to 10F-5

A surface truth program for Seasat A is formulated in two phases pre- and post-launch. The pre-launch phase (which includes the Marineland experiments, the JONSWAP-75 experiment, the West Coast experiment, and the altimeter experiment) is designed to provide data from aircraft over instrumented ocean sites during desirable geophysical events. The objective is to gather sufficient data for the development of algorithms which transfer space data into geophysical variables useful for applications. In the post-launch phase, the surface truth program is designed to verify and improve the algorithms developed in the pre-launch phase and also to evaluate the performance of spaceborne sensors.

A78-12837 Oceanic morphogenesis C L Kober and T K Chamberlain (Colorado State University, Fort Collins, Colo ) In Oceans '76, Proceedings of the Second Annual Combined Conference, Washington, D C, September 13-15, 1976

New York, Institute of Electrical and Electronics Engineers, Inc., Washington, D.C., Marine Technology Society, 1976, p. 15D-1 to 15D-4 6 refs

A catastrophe-theory approach, using surface observables as indications of boundary values, is employed to study ocean-current patterns (oceanic morphogenesis), Landsat observations of the Mediterranean Sea are the data used in the study. It is shown that for low seastate at large scales (of the order of 100 sq miles), meaningful oceanographic data are derivable from satellite observations, indicatings stable (for the time of observation) boundaries of different water masses. The fine structure of the amplitude of reflected light allows interpretation as to relative flow directions, submergence and interactions.

B J

A78-12838 \* Remote sensing of chlorophyll concentration from high altitude K C Leung (Computer Sciences Corp., Silver Spring, Md.) and W A Hovis (NASA, Goddard Space Flight Center, Greenbelt, Md.) In Oceans '76, Proceedings of the Second Annual Combined Conference, Washington, D.C., September 13-15, 1976

New York, Institute of Electrical and Electronics

Engineers, Inc., Washington, D.C., Marine Technology Society, 1976, p. 15E-1 to 15E-4 13 refs

A series of remote sensing experiments, using an airborne Ocean Color Scanner (OCS), has been carried out to demonstrate the feasibility of detecting surface chlorophyll concentrations in coastal water from high altitude. Upwelling radiance from the sea surface was recorded by 10 narrow bandwidth wavelength channels of the OCS, at an altitude of 19.8 km. Measurements were made over areas with vastly different biological activities. A strong correlation between the OCS radiance measurements and the surface chlorophyll measurements was found. The extracted chlorophyll signature agreed qualitatively with results from low altitude observations, except in the blue region. In addition, it was found that a simple algorithm could be used to estimate reliable chlorophyll distributions from OCS measurements. (Author)

A78-12839 \* Hydrographic charting from Landsat satellite-A comparison with aircraft imagery E M Middleton (Computer Sciences Corp., Silver Spring, Md.) and J L Barker (NASA, Goddard Space Flight Center, Greenbelt, Md.) In Oceans '76, Proceedings of the Second Annual Combined Conference, Washington, D.C., September 13-15, 1976 New York, Institute of Electrical and Electronics Engineers, Inc., Washington, D.C., Marine Technology Society, 1976, p. 15F-1 to 15F-6, 12 refs

The relative capabilities of two remote-sensing systems in measuring depth and, consequently, bottom contours in sandybottomed and sediment-laden coastal waters were determined quantitatively The Multispectral Scanner (MSS), orbited on the Landsat-2 satellite, and the Ocean Color Scanner (OCS), flown on U-2 aircraft, were used for this evaluation. Analysis of imagery taken simultaneously indicates a potential for hydrographic charting of marine coastal and shallow shelf areas, even when water turbidity is a factor Several of the eight optical channels examined on the OCS were found to be sensitive to depth or depth-related information. The greatest sensitivity was in OCS-4 (0 544 plus or minus 0 012 micron) from which contours corresponding to depths up to 12 m were determined The sharpness of these contours and their spatial stability through time suggests that upwelling radiance is a measure of bottom reflectance and not of water turbidity. The two visible channels on Landsat's MSS were less sensitive in the discrimination of contours, with depths up to 8 m in the high-gain mode (3 X) determined in MSS-4 (0.5 to 0.6 micron)

A78-12840 Accuracy of moored current measurements in shallow-water D Halpern (NOAA, Pacific Marine Environmental Laboratory, Seattle, Wash) In Oceans '76, Proceedings of the Second Annual Combined Conference, Washington, D C, September 13-15, 1976 New York, Institute of Electrical and Electronics Engineers, Inc., Washington, D C, Marine Technology Society, 1976, p 20B-1 to 20B-5 12 refs NOAA-NSF-supported research

The Aanderaa current meter is widely used with a variety of platforms in different oceanographic and limnologic environments. It was not intended to be used in regions where surface wave motions would influence the measurements. Several examples are described to show the effect of surface waves upon Aanderaa current measurements made near the surface and near the bottom in shallow-water environments. (Author)

A78-12842 Temperature measurement array for internal wave observations L M Occhiello and R Pinkel (California, University, San Diego, Calif) In Oceans '76, Proceedings of the Second Annual Combined Conference, Washington, D C, September 13-15, 1976 New York, Institute of Electrical and Electronics Engineers, Inc., Washington, D C, Marine Tech-

nology Society, 1976, p 20E-1 to 20E-7 Contract No N00014-75-C-1023

During the last six years the Marine Physical Laboratory has been engaged in a study of the internal wavefield in the upper ocean linasmuch as internal waves propagate horizontally, vertically, and in time, a four-dimensional (space-time) measurement was desired. To meet these requirements, a three-element temperature sensor system in an array 40 meters on a side, was created by mounting 3 booms on the research platform FLIP (floating laboratory instrument platform). Repeated temperature profiles were made from each of these booms. The system consists of temperature and depth profile sensors, winches to raise and lower the sensors, a computer to manage the data, and a central control unit. (Author)

A78-12845 OCS environmental research technology in ice-covered water G Weller (NOAA, Fairbanks, Alaska) In Oceans '76, Proceedings of the Second Annual Combined Conference, Washington, D.C., September 13-15, 1976 New York, Institute of Electrical and Electronics Engineers, Inc., Washington, D.C., Marine Technology Society, 1976, p. 23D-1 to 23D-3

The presence of ice for nine to ten months each year over the continental shelves in the Arctic requires new methods and technology in environmental assessment programs. As part of the Bureau of Land Management/National Oceanic and Atmospheric Administration Outer Continental Shelf Environmental Assessment Program in Alaska, biological and physical research is now carried out routinely throughout the year, by landing helicopters on the pack ice and lowering equipment through holes cut in the ice. Moored current meters have been designed for use under perennial ice, from which data can be transmitted acoustically on command. A number of ice buoys have been developed which are routinely interrogated by the Nimbus-6 satellite. These and other new developments have made it possible to conduct research in the coastal arctic marine environment year round, in the past, practically all existing environmental data were taken there during the brief summer only (Author)

A78-12941 # Proposal for an extension of the CAMAC standard suitable to low power data acquisition systems for oceanographic stations on marine platforms and buoys G Aprilesi, L Balestri, M Menziani, M R Rivasi, R Salgari, and R Santangelo (Osservatorio Geofisico, Modena, Università, Modena, Italy) In International Electronics Congress, 24th, Rome, Italy, March 28-30, 1977, Proceedings Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1977, p 167-175 5 refs

A lower-power data acquisition system intended to operate on marine platforms or buoys is described, the system relies on complementary metal oxide semiconductor components instead of transistor-transistor logic Characteristics of the microprocessor which controls the system, as well as the autonomous crate controller and the accompanying software, are considered The data acquisition system is designed to conform to the computer-aided measurement and control standard.

A78-13108 The summertime stratus over the offshore waters of California R L Simon (San Jose State University, San Jose, Calif ) *Monthly Weather Review*, vol 105, Oct 1977, p 1310-1314 13 refs NSF Grant No DES-71-00632-A01

The distribution of stratus clouds over the Pacific Ocean near California is studied via satellite photographs during the summer A line of minimum cloudiness, north-south oriented, is found off the northern and central coast. This line is particularly well defined during July, and it may be caused by a strong surface wind divergence. Clouds to the west of the line are primarily stratocumulus, forming in air streaming southward over warmer water, while those to the east are mainly smooth-topped stratus, forming in air cooled by the upwelled water near the coast. A strong diurnal variation in low cloudiness is noted, with maximum cloud cover near surrise and minimum in late afternoon. These findings suggest that the variation is caused by the clouds' net radiative flux. Upper-level synoptic-scale flow patterns seem to be poorly related to the low-cloud patterns over the ocean except in extreme cases.

A78-13116 Winter intrusions of the Loop Current R L Molinari, D W Behringer, G A Maul (NOAA, Atlantic Oceanographic and Meteorological Laboratories, Miami, Fla), S Baig (NOAA, National Environmental Satellite Service, Miami, Fla), and R Legeckis (NOAA, National Environmental Satellite Service, Suitland, Md) Science, vol 198, Nov 4, 1977, p 505-507 6 refs U S Bureau of Land Management Grant No D85-50-IA5-26

The circulation in the eastern Gulf of Mexico is dominated by the so-called Loop Current, which enters the Gulf through the Yucatan Straits and exits through the Straits of Florida A description is presented of recent observations, made between November 1974 and April 1977, which show the northern most intrusions of the Loop Current during the winter months. The considered data include sea-surface temperature data derived from satellite measurements and subsurface temperature data.

A78-13312 A model for sea backscatter intermittency at extreme grazing angles L B Wetzel (U.S. Navy, Naval Research Laboratory, Washington, D.C.) Radio Science, vol. 12, Sept.-Oct 1977, p. 749-756 21 refs

It is suggested that during radar backscatter at extreme grazing angles (0-1 deg) from the sea surface, most of the surface is in shadow and only an occasional peak is visible to the radar. The conventional shadowing function is taken to define a scattering threshold whose height above the mean surface is a function of grazing angle and average surface slope. The surface is found to be pockmarked by scattering islands of relatively constant size, but whose density is a sensitive function of grazing angle and sea state. The model leads to the definition of a backscatter intermittency index, which describes the number of localized scattering regions within a given surface area as a function of wind speed and grazing angle, and to a modified shadowing function for grazing angles less than 1 deg.

B J

A78-13651 Satellite applications to marine technology, Conference, New Orleans, La , November 15-17, 1977, Collection of Technical Papers Conference sponsored by AIAA, AMS, AGU, IEEE, MTS, and SEG New York, American Institute of Aeronautics and Astronautics, Inc , 1977 298 p Members, \$30 , nonmembers, \$40

Papers are presented which describe various satellite applications to marine operations such as advanced navigation techniques using multiple systems, data collection using satellites, and satellite-based maritime search and rescue. Attention is given to monitoring various oceanic features via satellite, including water parameters in coastal zones, ocean temperature fluctuations, and sea ice forecasting Applications of the Seasat satellite for observations of offshore oil, gas, and mining industries are described along with prospects for using DMSP satellites for imagery of the marine environment and NOAA satellites for observations of ocean features. Low cost reception, processing, and distribution of line-scan data from environmental satellites is reviewed and note is made of various space instruments used in oceanography applications.

A78-13656 # 1978 - A space focus for oceanology J A Ernst and J W Sherman, III (NOAA, National Environmental Satellite Service, Washington, D C ) In Satellite applications to marine technology, Conference, New Orleans, La, November 15-17, 1977, Collection of Technical Papers New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p 34-38 5 refs (AIAA 77-1564)

Remote sensing from space platforms for operational purposes began in 1960 with TIROS-1, the first full-time meteorological satellite Global cloud cover data never before available strongly intimated at the role of ocean-earth in effecting both large and small scale changes in man's environment. The majority of earth-oriented sensors however, have been multi-discipline sensors. With the launch of three new satellites in 1978, Seasat-A, Nimbus-G, and TIROS-N, sensors dedicated solely to obtaining oceanic measurements from space will be in earth orbit. The six ocean-specific sensors that will be

on Seasat-A and Nimbus-G are described along with details of the on-going effort to develop techniques and applications designed to further understanding of air-sea interactions and processes. The success of these instruments to adequately characterize sea surface wind speed and direction, shallow and deep ocean waves and spectra, sea surface temperature and geodesy, in the presence of clouds, will create a sharp focus on the potential of the space view in meeting specific oceanic data needs. (Author)

A78-13657 \* # A multispectral analysis of algal bloom in the Gulf of Mexico. W R Johnson (Lockheed Electronics Co , Inc , Houston, Tex ) and D R Norris (Florida Institute of Technology, Melbourne, Fla ) In Satellite applications to marine technology, Conference, New Orleans, La , November 15-17, 1977, Collection of Technical Papers New York, American Institute of Aeronautics and Astronautics, Inc , 1977, p 39-42 NASA-supported research (AIAA 77-1565)

Skylab multispectral scanner data acquired on January 21, 1974, were used to study the spectral characteristics of an algal bloom in the Gulf of Mexico west of Fort Myers, Florida Radiance profiles of the water and algae were prepared with data from ten bands of the S192 scanner covering the spectral range from 42 to 2 35 micrometers. The high spectral response in the near-infrared spectral bands implies a possible classification and discrimination parameter for detection of blooms of phytoplankton concentrations such as the so-called red tides of Florida (Author)

A78-13658 \* # Ocean current surface measurement using dynamic elevations obtained by the GEOS-3 radar altimeter. C D Leitao, N E Huang (NASA, Wallops Flight Center, Wallops Island, Va), and C G Parra (Washington Analytical Services Center, Inc., Pocomoke City, Md) In Satellite applications to marine technology, Conference, New Orleans, La, November 15-17, 1977, Collection of Technical Papers New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p 43-49 7 refs (AIAA 77-1566)

Remote Sensing of the ocean surface from the GEOS-3 satellite using radar altimeter data has confirmed that the altimeter can detect the dynamic ocean topographic elevations relative to an equipotential surface, thus resulting in a reliable direct measurement of the ocean surface. Maps of the ocean dynamic topography calculated over a one month period and with 20 cm contour interval are prepared for the last half of 1975. The Gulf Stream is observed by the rapid slope change shown by the crowding of contours. Cold eddies associated with the current are seen as roughly circular depressions.

(Author)

A78-13660 # An overview of oceanic features and air-sea interaction processes as viewed from the NOAA operational satellites F C Parmenter (NOAA, National Environmental Satellite Service, Washington, D C) In Satellite applications to marine technology, Conference, New Orleans, La, November 15-17, 1977, Collection of Technical Papers New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p 62-69 11 refs (AIAA 77-1569)

Geostationary and polar-orbiting satellites operated by the National Oceanic and Atmospheric Administration (NOAA) provide continuous monitoring of ocean surface temperatures and marine weather Changes in thermal patterns along the Gulf Stream and in the Gulf of Mexico Loop Current are operationally analyzed Likewise, the boundaries of cold upwelled waters along the equator and off the western coasts of Mexico and the United States can be monitored Local cloud cover, its formation, intensification, and dissipation are affected by the variations in underlying sea surface temperatures. Thus, knowledge of detailed sea surface temperature fields can be important to those involved in marine activities.

(Author)

A78-13662 # The computation of ocean wave heights from GEOS-3 satellite radar altimeter data J F R Gower (Institute of Ocean Sciences, Sidney, British Columbia, Canada) In Satellite applications to marine technology, Conference, New Orleans, La,

November 15-17, 1977, Collection of Technical Papers
New York, American Institute of Aeronautics and
Astronautics, Inc., 1977, p. 79-87, 13 refs. (AIAA 77-1571)

The GEOS-3 satellite carrying a short pulse radar altimeter was launched into orbit around the earth in April 1975. The paper is concerned with methods of determining waveheights from the shape of the GEOS-3 radar return pulse and the corrections that have to be taken into account. The effects of timing variations on the shape of the average return pulse shape are discussed in detail. Accurate calibration of the sampling gates that measure this shape is found to be particularly critical. The waveheights deduced are compared with ground truth derived from ship reports on waveheights in the N E Pacific Ocean and routine measurements made at Ocean Weather Station PAPA It is found that with suitable calibration adjustments, the satellite measurements agree with surface observations to about 5 meters in H 1/3 Coverage from a single satellite is limited, but could still greatly increase the amount of data available for wave forecasting if it were available within a short time (less than 4 hours) of the satellite overpass

A78-13663 # Determination of design and operational criteria for offshore facilities. F W Rose (Continental Oil Co., Houston, Tex.) In Satellite applications to marine technology, Conference, New Orleans, La., November 15-17, 1977, Collection of Technical Papers New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p. 122-125 (AIAA 77-1577)

Environmental data acquisition has become an important factor for the oil and gas industries in terms of offshore exploration, development, and production. Oceanographic-meteorological data requirements and measurement techniques are discussed, noting both real time and historical requirements. The application of satellite remote sensing to offshore design and operational criteria determination is suggested. It is proposed that an operational remote sensing satellite system employing a few conventional measurement stations for ground truth verification may provide global oceanographic-meteorological climatology monitoring which would facilitate more precise forecasting capability.

A78-13664 # Satellite application to data buoy requirements J G McCall, E G Kerut (NOAA, Data Buoy Office, Bay St Louis, Miss), and G Haas (Sperry Rand Corp., Sperry Support Services, Bay St Louis, Miss) In Satellite applications to marine technology, Conference, New Orleans, La., November 15-17, 1977, Collection of Technical Papers New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p 135-144 (AIAA 77-1580)

Satellites have been applied to data buoy projects by the NOAA Data Buoy Office (NDBO) using both geostationary and orbiting satellites for such applications. Among the procedures carried out by such systems are actual data telemetry for drifting buoys and position determination for both moored and drifting buoys. Various types of payloads are currently being operated by NDBO, including prototype environmental buoy payloads, Phase I-II payloads, and the CSBP payload. Communications requirements for the NDBO programs are identified for various weather forecasting groups and for the needs of the scientific community. Generally, conventional HF or satellite communications techniques are used for the NDBO satellites having over-the-horizon link requirements. It is found that the GOES series adequately serves the needs of the general public, and that the NIMBUS-6/Tiros-N series is adequate for the scientific community.

A78-13665 # Ocean mining requirements B J Livesay, A Steen, and R L. DeMott (Kennecott Exploration, Inc., San Diego, Calif.) In Satellite applications to marine technology, Conference, New Orleans, La., November 15-17, 1977, Collection of Technical Papers

New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p. 145-148 (AIAA 77-1581)

Deep ocean mining is discussed in terms of procedures to determine potential mine site locations, deep ocean mining equipment, nodule and plow-type collectors, lift systems, and port and

processing facilities. Satellite support of deep ocean mining projects is presented, noting that such support may be developed in three areas navigation, weather observations and predictions, and communication. The integration of satellite technology and deep ocean mining may have significant applications to global supplies of mineral resources.

A78-13666 \* # Applications of Seasat to the offshore oil, gas and mining industries. A G Mourad and A C. Robinson (Battelle Columbus Laboratories, Columbus, Ohio) In Satellite applications to marine technology, Conference, New Orleans, La, November 15-17, 1977, Collection of Technical Papers

New York, American Institute of Aeronautics and Astronautics, Inc , 1977, p 149-156 12 refs Contract No NASw-2800 (AIAA 77-1583)

The NASA satellite Seasat-A (to be launched in 1978) has applications to the offshore oil, gas, and mining industries including (1) improvements in weather and wave forecasting, (2) studies of past wind and wave statistics for planning design requirements, and (3) monitoring ice formation, breakup, and movement in arctic regions. The primary geographic areas which will be monitored by Seasat-A include the Beaufort Sea, the Labrador Sea, the Gulf of Mexico, the U.S. east coast, West Africa, Equatorial East Pacific, the Gulf of Alaska, and the North Sea Seasat-A instrumentation used in ocean monitoring consists of a radar altimeter, a radar scatterometer, a synthetic aperture radar, a microwave radiometer, and a visible and infrared radiometer. The future outlook of the Seasat program is planned in three phases measurement feasibility demonstration (1978-1980), data accessibility/utility demonstration (1980-1983), and operational system demonstration (1983-1985).

S.C.S.

A78-13669 \* # On the hysteresis of the sea surface and its applicability to wave height predictions C L Parsons (NASA, Wallops Flight Center, Wallops Island, Va ) In Satellite applications to marine technology; Conference, New Orleans, La , November 15-17, 1977, Collection of Technical Papers

New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p. 174-181 8 refs. (AIAA 77-1588)

Because of the low dissipation rate of wave energy on the ocean's surface, the wave height at some location and time must be dependent upon wind fields in existence there at previous times and upon swell propagated there from other regions. To study these relationships, significant wave height (SWH) measurements from the Geos-3 radar altimeter are used in conjunction with anemometer windspeed measurements from weather ships, L, C, and R. During the passage of large cyclonic disturbances near the fixed locations of these vessels in the North Atlantic in February 1976, distinct hysteresis profiles that characterize the sea's memory during generation and dissipation conditions are observed. Examples are given that demonstrate the influences of cyclone intensity, movement, velocity, and shape on the configuration of these profiles. (Author)

A78-13670 # Some aspects of the mixed layer of the upper ocean J M Bergin (U.S. Navy, Naval Research Laboratory, Washington, D.C.) In Satellite applications to marine technology, Conference, New Orleans, La., November 15-17, 1977, Collection of Technical Papers New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p. 182-186. 8 refs (AIAA 77-1590)

The main problem of satellite oceanography is to deduce from measurements of properties at the sea surface characteristics of the ocean below. The near surface mixed layer is a prime candidate for study. Data indicate that models of the mixed layer must include thermohaline forcing as well as wind forcing. As an example of the conditions, wherein these forces appear to control the spatial variation of the mixed layer depth, we consider a model of the mixed layer in the trade wind zone of the North Pacific during the summer heating period. (Author)

A78-13671 # Analysis of the marine environment in DMSP imagery focusing on island barrier effects R W Fett (U S Naval

Environmental Prediction Research Facility, Monterey, Calif ) In Satellite applications to marine technology, Conference, New Orleans, La, November 15-17, 1977, Collection of Technical Papers New York, American Institute of Aeronautics

and Astronautics, Inc., 1977, p. 188-192, 12 refs. (AIAA 77-1596) Analysis of Defense Meteorological Satellite Program (DMSP) visible data over oceanic areas reveals that many important features of the marine planetary boundary layer can often be directly determined or inferred from these data. Low level moisture in hazy marine areas is well-revealed in DMSP visible data, although generally poorly revealed in data from other systems such as the NOAA and GOES series Island barrier effects, creating dry lee wakes are directly observed, as are dry areas in the other regions of pronounced subsidence. In enhanced infrared imagery, the dry areas yield a warmer response than adjacent moist areas due to reduced cooling effects of water vapor absorption. The island wake patterns have, in many recent papers, been ascribed to reduced sea state rather than decreased moisture. This paper presents evidence that the sea state effect extends only a short distance to the lee of the island barrier and that the major portion of the wake effect is atmospheric in nature

A78-13672 \* # The use of Landsat for monitoring water parameters in the coastal zone D E Bowker and W G Witte (NASA, Langley Research Center, Hampton, Va ) In Satellite applications to marine technology, Conference, New Orleans, La , November 15-17, 1977, Collection of Technical Papers

New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p. 193-198 5 refs. (AIAA 77-1597)

Landsats 1 and 2 have been successful in detecting and quantifying suspended sediment and several other important parameters in the coastal zone, including chlorophyll, particles, alpha (light transmission), tidal conditions, acid and sewage dumps, and in some instances oil spills. When chlorophyll a is present in detectable quantities, however, it is shown to interfere with the measurement of sediment. The Landsat banding problem impairs the instrument resolution and places a requirement on the sampling program to collect surface data from a sufficiently large area. A sampling method which satisfies this condition is demonstrated. (Author)

A78-13673 # A low-cost system for reception, processing and distribution of line-scan data from environmental satellites. D W Seymour, D S Sloan, and N W Bowker (MacDonald, Dettwiler and Associates, Ltd, Vancouver, Canada) In Satellite applications to marine technology, Conference, New Orleans, La, November 15-17, 1977, Collection of Technical Papers

New York, American Institute of Aeronautics and Astronautics, Inc,

New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p. 199-208 (AIAA 77-1598)

A small self-contained readout station for earth observation satellites has been developed for weather forecasting, oceanographic research and monitoring of Arctic ice conditions. The system was designed to receive, digitize, store, process and distribute image data from a variety of sources, including the NOAA/VHRR series, and future environmental satellites, e.g., Meteosat, GMS and Tiros-N/AVHRR Under the control of a single operator, it produces black and white images and computer-compatible tapes (CCT's) of all relevant data at real-time rates. Processing facilities include electronic enlargement, geometric linearization and interactive radiometric enhancement, with distribution of data to remote users via standard 120 lpm facsimile output.

A78-13674 # Remote sensing of ocean temperature. E P McClain and P G Abel (NOAA, National Environmental Satellite Service, Washington, D C) In Satellite applications to marine technology, Conference, New Orleans, La, November 15-17, 1977, Collection of Technical Papers New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p. 209-217, 26 refs. (AIAA 77-1599)

Operational environmental satellites take infrared measurements of ocean surface temperatures of two types hemispherically or globally mapped temperature fields of low spatial and temporal

resolution, and regionally or locally mapped temperature fields of high resolution in space and time Current NOAA sea-surface temperature products include Gulf Stream analysis, GOES image sectors, and Great Lakes surface temperature charts. Future developments in satellite-derived sea-surface temperatures are identified, such as a polar-orbiting operational environmental satellite, the prototype of which is Tiros-N. This satellite will carry an advanced very high resolution radiometer designed for ocean surface temperature mapping.

A78-13675 # Real time satellite imagery for sea ice forecasting E G Morrissey (Department of the Environment, Atmospheric Environment Service, Downsview, Ontario, Canada) In Satellite applications to marine technology, Conference, New Orleans, La, November 15-17, 1977, Collection of Technical Papers

New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p. 218-223 (AIAA 77-1601)

The Atmospheric Environment Service has developed a flexible HRPT direct read-out/processing system to satisfy some of the satellite imagery requirements of weather and ice forecasting services and research programs. The system digitizes the analogue HRPT signal and uses mini-computers to process the data and to convert it into a form suitable for land line transmissions. The paper concentrates on the development of that part of the system which provides specially enhanced imagery to the Canadian Ice Central where the data are used in the production of sea ice analyses and forecasts.

(Author)

A78-13676 # Sea surface temperature gradient analysis from digital meteorological satellite data M P Waters, III (NOAA, National Environmental Satellite Service, Washington, D C) and S R Baig (NOAA, National Environmental Satellite Service, Miami, Fla) In Satellite applications to marine technology, Conference, New Orleans, La, November 15-17, 1977, Collection of Technical Papers

New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p 226-229 5 refs (AIAA 77-1604)

The two geostationary meteorological satellites operated by the National Environmental Satellite Service (NESS) view the earth's disk through Visible and Infrared Spin Scan Radiometer (VISSR) instruments. The digital data from the VISSR on the Eastern and Western satellites (GOES-2 at 75 deg W longitude and SMS-2 at 135 deg W longitude both over the equator) are processed into an experimental VISSR digital Data Base (VDB). Data from the VDB are time-composited to produce a computer-formatted sea surface thermal display at 7-km resolution. The product is produced on the National Oceanic and Atmospheric Administration (NOAA) computer in Maryland and printed at the Satellite Field Service Stations (SFSS) where the data are being evaluated for realtime application. The technique of time compositing, samples of the gradient analysis, and results of its field use are presented.

A78-13679 # Space instruments for oceanography. J J Horan (General Electric Co , Philadelphia, Pa ) In Satellite applications to marine technology, Conference, New Orleans, La , November 15-17, 1977, Collection of Technical Papers

New York, American Institute of Aeronautics and Astronautics, Inc ,

1977, p. 239-248 (AIAA 77-1612)

A number of major space programs (including Tiros, Nimbus, Seasat, and to a somewhat lesser extent GOES and Landsat) have earth observatory sensors on board that have been used to measure oceanographic parameters. Some of the more recent sensors are specifically designed for the measurement of certain oceanographic parameters while other earlier instruments have, by the nature of the radiation that they measure, been able to be used in oceanographic studies. This paper briefly describes each instrument, dwelling more heavily on the newer instruments as an introduction to the detailed paper in this and the next session. A brief overview is also presented in this paper on the oceanographic parameters versus the measurable quantity (radiation) and some of the problems of radiometric calibration at the spacecraft level and the impact on the parameter of interest.

A78-13681 # Future onshore and offshore exploration by remote sensing from space F B Henderson, III (Geosat Committee, Inc., San Francisco, Calif ) In Satellite applications to marine technology, Conference, New Orleans, La , November 15-17, 1977, Collection of Technical Papers New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p 264-275 (AIAA 77-1550)

Geological remote sensing from satellites is discussed in terms of its advantages such as synoptic perspective, global coverage, regional mapping, and improved efficiency. The limitations of such programs are identified, including insufficient resolution, limited stereoscopic capability, and restricted number of available spectral bands. Future additions to geological remote sensing programs are expected to consist of a Stereosat system, the inclusion of the 2.2 micron band, a large format camera, and synthetic aperture and side looking radars. Other satellite systems under development by NASA include Lageos, Seasat-A and B, SIR A and B, Heat Capacity Mapping Missions, Magsat, SMIRR, and a Global Positioning Satellite.

A78-13682 \* # Seasat-A and the commercial ocean community D R Montgomery (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif) and P Wolff (Ocean Data Systems, Inc., Monterey, Calif) In Satellite applications to marine technology, Conference, New Orleans, La., November 15-17, 1977, Collection of Technical Papers

American Institute of Aeronautics and Astronautics, Inc., 1977, p 276-284 (AIAA 77-1591)

The Seasat-A program has been initiated as a 'proof-of-concept' mission to evaluate the effectiveness of remotely sensing oceanology and related meteorological phenomena from a satellite platform in space utilizing sensors developed on previous space and aircraft test programs. The sensors include three active microwave sensors, a radar altimeter, a windfield scatterometer, and a synthetic aperture radar A passive scanning multifrequency microwave radiometer, visual and infrared radiometer are also included. All weather, day-night measurements of sea surface temperature, surface wind speed/direction and sea state and directional wave spectra will be made. Two key programs are planned for data utilization with users during the mission. Foremost is a program with the commercial ocean community to test the utility of Seasat-A data and to begin the transfer of ocean remote sensing technology to the civil sector. A second program is a solicitation of investigations, led by NOAA, to involve the ocean science community in a series of scientific investigations (Author)

A78-13683 \* # Marine decision aids from space R G Nagler, R Durstenfeld (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif), and S W McCandless (NASA, Office of Applications, Washington, D C) In Satellite applications to marine technology, Conference, New Orleans, La, November 15-17, 1977, Collection of Technical Papers

American Institute of Aeronautics and Astronautics, Inc, 1977, p 285-294 5 refs Contract No NAS7-100 (AIAA 77-1611)

The article discusses satellite observation of marine environments via microwave sensors and visible/infrared measurements. Specific applications include the monitoring of physical oceanography, weather and climate, coastal processes, ice processes, and resource use management. Four types of information delivery systems are identified direct-to-user, regional/local user, global modeling user, and research user modes. Current developments in the marine information system include onboard correlation of synthetic aperture radar images at 10 to 100 m resolutions, and the extraction of wave, ship, iceberg or areal feature information from the image or signal before correlation.

A78-13687 # Application of satellite-borne synthetic aperture radar to marine operations W T Eaton and A C Munster (Lockheed Missiles and Space Co, Inc, Sunnyvale, Calif) In Satellite applications to marine technology, Conference, New Orleans, La, November 15-17, 1977, Collection of Technical Papers Conference sponsored by AIAA, AMS, AGU, IEEE, MTS, and SEG

New York, American Institute of Aeronautics and Astronautics, Inc., 1977 9 p. 10 refs. (AIAA 77-1610)

Synthetic Aperture Radar (SAR) is Seasat-A's most demanding, yet promising sensor providing all weather, high resolution images SAR differs from more conventional imaging sensors (operating in the visible/infrared spectra). It is an active microwave radar. The data processing and image assembly is complex and differs from current imagers. The ocean's dynamics and needs of the oceans' users require rapid data processing and dissemination. Applications of SAR data for marine users are discussed. The principles of SAR and the challenges of SAR processing are described. Planned Seasat A. SAR optical data processing plans are described and compared with digital data correlation techniques. Real-time SAR image processing on the ground, at the user's facility or even on-board satellites for direct image transmission will be required in the future to satisfy the real needs of the marine using community. (Author)

A78-13803 \* Atmospheric transformation of solar radiation reflected from the ocean M S Malkevich, L G Istomina, and W A Hovis, Jr (NASA, Goddard Space Flight Center, Greenbelt, Md, Akademia Nauk SSSR, Institut Fiziki Atmosfery, Moscow, USSR) (Akademia Nauk SSSR, Izvestiia, Fizika Atmosfery i Okeana, vol 13, Jan 1977, p 21-34) Academy of Sciences, USSR, Izvestiya, Atmospheric and Oceanic Physics, vol 13, Aug 1977, p 13-21 9 refs Translation

Airborne measurements of the brightness spectrum of the Atlantic Ocean in the wavelength region from 0.4 to 0.7 micron are analyzed. These measurements were made over a tropical region of the Atlantic from an aircraft at heights of 0.3 and 10.5 km during the TROPEX-72 experiment. The results are used to estimate the contribution of the atmosphere to the overall brightness of the ocean-atmosphere system. It is concluded that (1) the atmosphere decreases the absolute brightness of the ocean by a factor of 5 to 10 and also strongly affects the spectral behavior of solar radiation reflected from the ocean surface, (2) the atmospheric contribution to overall brightness may vary considerably under real conditions, (3) finely dispersed particles and Rayleigh scattering affect the spectral distribution of solar radiation, and (4) the spectral composition of ocean-atmosphere brightness may be completely governed by the atmosphere FGM

A78-13899 # The floor structure of the southwest Pacific Ocean (Stroenie dna morei lugo-Zapadnoi chasti Tikhogo Okeana)
A E Suziumov Moscow, Izdatel'stvo Nauka, 1977 76 p 135 refs In Russian

Research on island arc crustal structures and marginal seas in the southwestern part of the Pacific Ocean is summarized. The distribution of geophysical field anomalies and regional deep structure and tectonics are described. Geophysical data on deep-sea trenches are presented, and these trenches are classified. Areas considered include New Guinea, New Zealand, the Tasman and Coral Seas, New Hebrides and South Fiji basins, and New Guinea structures and Solomon sea basin. Mesocenozoic tectogenesis of the region is discussed, it was found that this later tectogenesis overlaps and destroys, on the outer side, the paleozoic pattern.

A78-14126 \* Ocean wave patterns under Hurricane Gloria - Observation with an airborne synthetic-aperture radar C Elachi, T W Thompson, and D King (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif) Science, vol 198, Nov 11, 1977, p 609, 610 11 refs Contract No NAS7-100

Surface imagery of ocean waves under Hurricane Gloria (September 1976) has been obtained with an airborne synthetic-aperture imaging radar. Observations were obtained over most of the area within a radius of 150 kilometers around the center of the eye. These direct observations made it possible to derive the wave patterns in the region around a hurricane eye. (Author)

A78-14793 # Current and future satellites for oceanic monitoring J W Sherman, III (NOAA, National Environmental Satellite Service, Washington, D C) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977,

Proceedings Volume 1 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 279-297 17

The remote sensing characteristics of current satellites used for oceanic monitoring are described, and the missions of future satellites, including Seasat-A, Nimbus-G, and Tiros-N are explained Availability of their data is considered Some oceanic monitoring instruments and the applications of their data are discussed, these instruments include the radar altimeter, scatterometer, radar imager, microwave radiometer, and colorimeter. A survey of the goals of oceanic monitoring is presented.

A78-14820 # Present and future operational NOAA satellite oceanographic products - An introduction J K Kalinowski, T L Signore, W G Pichel, C C Walton, R L Brower, S R Brown, and K G Bennekamper (NOAA, National Environmental Satellite Service, Surtland, Md) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 625-633 21 refs

A review of operational satellite-derived NOAA/NESS oceanographic products is presented and some current applications of these products are noted. Recent improvements to procedures used in deriving sea surface temperature observations and fields are described. Changes to data reduction techniques and products which will be incorporated with the advent of Tiros-N are outlined and some potential future developments are mentioned. (Author)

A78-14821 # Polarimeter measures sea state characteristics using emitted infrared radiation W G Egan and T Hilgeman (Grumman Aerospace Corp., Bethpage, N.Y.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1

Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p. 635-644, 12 refs

An infrared polarimeter, capable of operating between 1 and 12 micrometers wavelength has been used to measure the polarization of emitted radiation from the sea. The observed polarization at 10.6 micrometers from a smooth sea was found to be positive, indicating the dominance of reflected infrared sky radiation over the emitted. With the appearance of waves, the percent polarization increased, as expected, for a zenith angle well above the Brewster angle for water. This is qualitatively in accordance with a model presented to explain the behavior. Initial analyses indicate that the polarized components of the sea's emitted and reflected radiation are affected by type and direction of waves, angle of viewing, and foam. The effects of variations in these parameters require further delineation. The infrared polarimetric technique appears to be a novel new passive method for remote monitoring of waves.

(Author)

A78-14822 # Scatterometer results from shorefast and floating sea ice L Gray, J Cihlar, S Parashar (Department of Energy, Mines and Resources, Canada Centre for Remote Sensing, Ottawa, Canada), and R Worsfold (Centre for Cold Ocean Resources Engineering, St John's, Canada) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 645-657 19 refs

A78-14840 # Study of the Brazil and Falkland currents using THIR images of Nimbus V and oceanographic data in 1972 to 1973. Y C Tseng, H M Inostroza, and R Kumar (Instituto de Pesquisas Espaciais, São José dos Campos, São Paulo, Brazil) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 859-871 25 refs

A78-14855 # Remote sensing of ocean color and detection of chlorophyll content P Y Deschamps, P Lecomte, and M Viollier (Lille I, Université, Villeneuve-d'Ascq, Nord, France) in International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 1021-1033 18 refs Translation Research supported by the Centre National pour l'Exploitation des Océans

The chlorophyll enrichment of the water in an equatorial upwelling was surveyed and described during two one month periods in 1975 and 1976 with the aid of a radiometer specially designed for the airborne measurement of ocean color Based upon the results of this experiment and some theoretical considerations, a relation is proposed between airborne measurement of difference of albedos at two wavelengths in the blue and green, and the concentration of cholorophyll in the ocean (Author)

A78-14875 \* # Evaluation of change detection techniques for monitoring coastal zone environments R A Weismiller, S J Kristof, D K Scholz, P E Anuta, and S M Momin (Purdue University, West Lafayette, Ind.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p 1229-1238 11 refs Contract No NAS9-14016

Procedures for detecting changes in Landsat multispectral scanning imagery of coastal zone environments are discussed. Four detection procedures are examined a comparison of independently produced spectral classifications, a classification of a multispectral difference data set, a single analysis of a multidate data set, and a maximum likelihood classification using multistage decision logic. The relatively complex maximum likelihood classification technique was found to yield results closest to those obtained with the comparison of independently produced spectral classifications, the chosen standard.

A78-14878 \* # Airborne Oceanographic Lidar System C Bressel, I Itzkan, J E Nunes (Avco Everett Research Laboratory, Inc, Everett, Mass), and F Hoge (NASA, Wallops Flight Center, Wallops Island, Va) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 1259-1268

The Airborne Oceanographic Lidar (AOL), a spatially scanning range-gated device installed on board a NASA C-54 aircraft, is described. The AOL system is capable of measuring topographical relief or water depth (bathymetry) with a range resolution of plus or minus 0.3 m in the vertical dimension. The system may also be used to measure fluorescent spectral signatures from 3500 to 8000 A with a resolution of 100 A. Potential applications of the AOL, including sea state measurements, water transparency assessments, oil spill identification, effluent identification and crop cover assessment are also mentioned.

A78-14912 # Surface temperatures and temperature gradient features of the U.S. Gulf coast waters. O. K. Huh, L. J. Rouse, Jr., and G. W. Smith (Louisiana State University, Baton Rouge, La.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings. Volume 2 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 1609-1618. Navy-supported research.

Satellite thermal infrared data on the Gulf of Mexico show that a seasonal cycle exists in the horizontal surface temperature structure. In the fall, the surface temperatures of both coastal and deep waters are nearly uniform. With the onset of winter, atmospheric cold fronts, which are accompanied by dry, low-temperature air and strong winds, draw heat from the sea. Penetrative convection and wind-driven mixing lower temperatures, first in the shallowest waters and then, as the winter season progresses, in deeper and

deeper portions of the Gulf A band of cooler water forming on the inner shelf expands, until a thermal front develops seaward along the shelf break between the cold shelf waters and the warmer deep waters of the Gulf Digital analysis of the satellite data has been carried out in an interactive mode using a minicomputer and software developed at the Coastal Studies Institute A time series of temperature profiles illustrates the temporal and spatial changes in the sea-surface temperature field (Author)

A78-17198 \* Change detection in coastal zone environments R A Weismiller, S J Kristof, D K Scholz, P E Anuta, and S A Momin (Purdue University, West Lafayette, Ind.) \*Photogrammetric Engineering and Remote Sensing, vol. 43, Dec. 1977, p. 1533-1539, 11 refs. Contract No. NAS9-14016

A study was conducted with the objective to develop and evaluate various change detection techniques based upon computer-aided analysis of Landsat multispectral scanner (MSS) data to monitor coastal zone environments. The study site selected includes a portion of the Matagorda Bay estuarine system located along the Texas Coast. The principal data sources for the study were MSS data collected on November, 27, 1972 and February 25, 1975. The MSS data were processed and a multidata eight-channel data set at a scale of 1.24,000 was obtained. A description is presented of four change detection techniques which were designed and implented for evaluation, taking into account postclassification comparison change detection, delta data change detection, spectral/temporal change classification, and layered spectral/temporal approach. The results of the investigation are discussed.

A78-17326 Synoptic observations of the oceanic frontal system east of Japan R E Cheney (U.S. Naval Oceanographic Office, Washington, D.C.) Journal of Geophysical Research, vol. 82, Nov. 20, 1977, p. 5459-5468. 14 refs

A78-17648

Norwegian marine geodetic projects J C
Blankenburgh, B A Fossum, P A Osterholt, and H O Torsen
(Continental Shelf Institute, Trondheim, Norway) Marine Geodesy, vol 1, no 2, 1977, p 125-145 11 refs

The hitherto promising finds of oil and gas on the Norwegian continental shelf have increased the general activity in this area considerably. Consequently, the need for better charts and more precise navigational systems have become more pertinent. During the past few years a number of marine geodetic projects have either been planned or embarked upon by various organizations within both the public and private sectors. The article gives a brief review of the Norwegian projects which have special relevance to marine geodesy, this includes the following areas: recommendations, requirements, precision navigation, satellite positioning, reference systems, bound ary problems, bathymetry, geological mapping, marine geoid deter mination, and data base developments.

A78-17650 Preliminary differences in mean water level between tide gauges along the South American Pacific coast J A Bray (U S Defense Mapping Agency, Topographic Center, Washington, D C) Marine Geodesy, vol 1, no 2, 1977, p 177-197

A78-17982 Objective analysis and classification of oceanographic data J B Jalickee (NOAA, Center for Experiment Design and Data Analysis, Washington, D C) and D R Hamilton (NOAA, National Oceanographic Data Center, Washington, D C) Tellus, vol 29, Dec 1977, p 545-560 7 refs

A new approach to the analysis and classification of oceanographic data is presented. The technique is an empirical one, based on the singular decomposition theorem, for characterizing temperature-salinity-depth profiles as in water mass analysis. Complementary to the profiles are station or cast-dependent coefficients, which show similarities and differences according to the space-time distributions of the individual stations in the data set. These coefficients are used for classifying the individual stations into groups having similar profiles. Results of applying the new method to a set of data from ocean stations off the coast of Oregon are given. (Author)

A78-18246 \* A multispectral analysis of the interface between the Brazil and Falkland currents from Skylab W R Johnson (Lockheed Electronics Co , Inc , Houston, Tex ) and D R Norris (NASA, Johnson Space Center, Houston, Tex ) Remote Sensing of Environment, vol 6, no 4, 1977, p 271-288 15 refs NASA-supported research

Skylab multispectral scanner data acquired on September 2, 1973, were used to study the spectral signature of the water at the confluence of the Falkland and the Brazil currents off the east coast of Argentina. The boundary between the two currents is sharply defined in the thermal band (10 2-12 5 microns), a gradient of 1 C per 67 m exists locally at the boundary. Using the visible bands centered at 0 485 and 0 54 micron, this study establishes that water color analysis of boundary waters must first confirm that the sea states on both sides of the boundary do not contaminate the data with sun glitter. (Author)

A78-19850 # Soviet studies of the Arctic and Southern Oceans in the current stage (Sovetskie issledovanija Severnogo Ledovitogo i luzhnogo okeanov na sovremennom etape) A F Treshnikov (Glavnoe Upravlenie Gidrometeorologicheskoi Sluzhby SSSR, Arkticheskii i Antarkticheskii Nauchno-Issledovatel'skii Institut, Leningrad, USSR) Meteorologija i Gidrologija, Nov 1977, p 91-99 12 refs in Russian

Attention is given to Soviet oceanographic research in polar regions. The first stage of research, 1920-1950, consisted of investigating the Arctic Basin, drifting masses of ice, and the hydrometeorological cycle of the Arctic Ocean and adjacent seas. The second stage, 1951-1970, concentrated on the structure of water masses, the basic features or Arctic relief, the regularities in the formation, dynamics, and breakage of the ocean ice cover, ice drifts in the Arctic Basin, and the regularities and variations of thermal flow.

A78-20055 \* Spectral structure of the solar radiation field reflected by the ocean-atmosphere system M S Malkevich, L G Istomina (Akademiia Nauk SSSR, Institut Fiziki Atmosfery, Moscow, USSR), and W A Hovis, Jr (NASA, Goddard Space Flight Center, Greenbelt, Md ) (Akademiia Nauk SSSR, Izvestiia, Fizika Atmosfery i Okeana, vol 13, Feb 1977, p 153-162) Academy of Sciences, USSR, Izvestiya, Atmospheric and Oceanic Physics, vol 13, Sept\_1977, p 107-113 6 refs Translation

The statistical characteristics of the spectral structure of the brightness field of the ocean/atmosphere system are determined from the spectra of incident radiation and the radiation reflected from the ocean, obtained from aircraft (Conveyor 990) at heights of 0.3 and 10 km above the Atlantic Ocean Analysis of the spectral structure reveals a weak correlation between atmospheric brightness variations in the 0.4 to 0.5 micron and 0.55 to 0.70 micron regions of the spectrum. This is attributed to the possible influence of variations of the scattering coefficient or optical thickness on the brightness variations (whose sign depends on the predominance of damping or multiple scattering in a given spectral region).

A78-20169 # Systems approach to ice reconnaissance - A study J W Patchell (Computing Devices Co., Ottawa, Canada) and H G Hengeveld (Department of Fisheries and the Environment, Atmospheric Environment Service, Downsview, Ontario, Canada) (Canadian Remote Sensing Society, Remote Sensing Science and Technology Symposium, Ottawa, Canada, Feb. 21.23, 1977.) Canadian Journal of Remote Sensing, vol. 3, Dec. 1977, p. 28-39, Discussion, p. 39, 40

Sensors used in ice reconnaissance aircraft are considered, and the assimilation of the data into an effective format for both real time applications in ship support as well as long-term ice information is discussed SLAR is thought to be the principal sensor because of its wide swath and all weather capability. A simulation study of the integrated approach to lice map compilation is reported with attention to data compression techniques, data enhancement, and display integration. Three systems, a digital television ice mapping

system, a hybrid ice mapping system, and an analog ice mapping system, are compared. The hybrid system, which provides both digital display technology and hard copy dry silver processed techniques, is regarded as the best approach.

A78-20485 Use of radio-controlled miniature aircraft for marine atmosphere sampling F R Hess (Woods Hole Oceanographic Institution, Woods Hole, Mass.) Marine Chemistry, vol. 5, July 1977, p. 297-302 NSF Grant No. OCE-76-15627, Contract No. E(11-1)-3563

The use of Radio-Controlled Miniature aircraft by the Woods Hole Oceanographic Institution for obtaining marine air samples is discussed. The particular requirements for gaseous as well as large-volume particulate sampling are discussed and at-sea tests performed from the R/V 'Knorr' are described. Handling and logistics of use as well as aircraft characteristics are discussed.

(Author)

N78-10344\*# Kansas Univ , Lawrence Remote Sensing Lab

## RADAR SYSTEMS FOR A POLAR MISSION, VOLUME 1 Final Report

R K Moore, J P Claassen, R L Erickson, R K T Fong, M J Komen, J McCauley, S B McMillan, and S K Parashar Feb 1977 88 p refs (Contract NAS5-22325)

(NASA-CR-156640, RSL-TR-291-2-Vol-1) Avail NTIS HC A05/MF A01 CSCL 17I

Use of radar is indicated for observation of phenomena in the polar regions. The present status is reviewed of radar observation of sea ice (quasi-operational from aircraft), glaciers (little known), and icebergs (feasible but little research, and problems in discriminating icebergs from ships) Techniques for satellite observation are presented, with emphasis on use of a Scanning Synthetic-Aperture Radar (SCANSAR) of modest resolution to achieve the wide swathwidth required for frequently repeated coverage Methods for processing SCANSAR data onboard the satellite were investigated and some 5 methods appear feasible at the present time although more research is needed Use of CCD and SAW devices appears particularly promising in the achievement of low-power-consumption processors but the rapid advancement of the digital art means that sampled-data analog processors using CCD and MOS devices must continually be compared with their digital competitors to determine which is best at the time a design decision must be

# N78-10527 Texas A&M Univ , College Station MONITORING AQUATIC PLANTS IN TEXAS Ph D Thesis Arthur Robert Benton, Jr 1976 331 p Avail Univ Microfilms Order No 77-12526

Tandem 70mm aerial photography, using color and color infrared film was tested extensively Emersed aquatic plant species were found to be readily differentiable on color infrared film, the submersed species somewhat less so Areal spread of emersed species was easily delineated on color infrared imagery Equivalent results were obtained with submersed species delineation by using high-speed color film coupled with a 500mm filter for improved water penetration. Color infrared photography was found to be particularly useful for recording sequential herbicide effects such as change in size of the stressed area, rate of stunting or killing off of the plant mat, period before regrowth and rate of regrowth into the cleared area. The cost of a monitoring system for the state of Texas is shown to be quite low. Dissert Abstr

# N78-10532\*# Norsk Polarinstitutt, Oslo GLACIOLOGICAL AND MARINE BIOLOGICAL STUDIES AT PERIMETER OF DRONNING MAUD LAND, ANTARCTICA Final Report

Olav Orheim, Principal Investigator Jun 1977 20 p refs Sponsored by NASA Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls S D ERTS

(E78-10006, NASA-CR-155210) Avail NTIS HC A02/MF A01 CSCL 08L The author has identified the following significant results A nearly complete map of the Dronning Land coastline from 10 deg W to 29 deg E was produced Based on this, it was determined that for the past 20 years, the minimum calving rate from this part of the coastline was 60 cu km/year The drift speeds were measured for ice floes and bergs between 9 and 20 km/day, and it was found that the number of ice floes of a given size decrease exponentially with size, so that each size class covers approximately the same area A large melt phenomena at blue ice fields around 70 deg 45' S and 26-29 deg E was discovered

N78-10674# Numerical Computational Corp., Stony Brook, N Y A NUMERICAL ALGORITHM FOR REMOTE SENSING OF OCEAN DENSITY PROFILES BY ACOUSTIC PULSES Final Report, 1 Jun. 1976 - 31 Jan. 1977

Yung Ming Chen and Dar Sun Tsien 1 Feb 1977 36 p refs (Contract N00014-76-C-0804)

(AD-A042372, NCC-1) Avail NTIS HC A03/MF A01 CSCL 08/10

An iterative algorithm for solving nonlinear inverse problems in remote sensing of ocean density profiles by acoustic pulses is developed. The basic idea of this new algorithm is that first, the original pulse problem in the time-domain is reduced to a continuous wave problem in frequency-domain and then the nonlinear inverse problem in frequency-domain is solved by a hybrid of a Newton-like iterative method, Backus and Gilbert linear inversion technique, and the finite difference method. This new computational algorithm is tested by numerical simulations with given data from ten different frequencies and is found to give excellent results.

N78-10675# Naval Supply Systems Command, Washington, D. C.

## PRELIMINARY EASTERN INDIAN OCEAN GEOID FROM GEOS-3 DATA

Samuel L Smith III and Alan C Chappell Jun 1977 31 p refs

(AD-AO43788, NSWC/DL-TR-3668) Avail NTIS HC AO3/MF AO1 CSCL 08/5

Ninety-four passes of GEOS-3 short pulse radar altimetry data taken in July-August 1975 over the eastern Indian Ocean (by the DoD telemetry station at Perth, Australia) have been analyzed to arrive at a preliminary ocean geoid. The self consistency of the data at track intersections has a mean geoid height difference of 75 cm with a standard deviation of 2.3 meters with normal processing. Application of bias removal techniques reduced the mean geoid height difference to 9 cm and improves the self consistency of the results to a standard deviation of less than 1 m. A comparison of the GEOS-3 Geoid is made with the NASA Marsh and Chang 1976 Geoid. The GEOS-3 Geoid correlates well with the larger features of the local bottom topography.

N78-10678# Environmental Research Inst of Michigan, Ann Arbor Radar and Optics Div

ANALYSIS OF SYNTHETIC APERTURE RADAR OCEAN WAVE DATA COLLECTED AT MARINELAND AND GEORGES BANK Final Report

Robert A Shuchman, Robert F Rawson and Eric S Kasischke Apr 1977 171 p refs

(Grant NOAA-04-6-158-44078)

(PB-268675/6, Rept-123000-11-F, NOAA-77052503) Avail NTIS HC A08/MF A01 CSCL 08C

Processing and analysis of data collected by the ERIM X-L imaging radar was carried out to extract useful information about ocean waves. A focusing algorithm was developed and backscatter measurements were made using an optical processor. A number of conclusions were made, including (1) the 180 degrees wave-direction ambiguity can be resolved by a study of defocusing in the processor, (2) the modulation depth is greater for X-band than for L-band and greater for range-direction waves than for azimuth-direction waves, and (3) X-band (HH). L-band (HH), and L-band (HV) produce significant backscatter.

N78-11292# Helsinki Univ of Technology, Espoo (Finland)

MICROWAVE EMISSION FROM SEA ICE

Surendra K Parashar 1976 19 p refs (Rept-S-90 ISBN-951-750-797-6) Avail NTIS HC A02/MF A01

The available literature on microwave emission from sea ice is reviewed. Sections are included on the formation of sea ice and its relevant characteristics radiometry theory and theory of emission. Some of the past radiometric measurements of sea ice are given in addition different methods which can be used to analyze the radiometric data are presented. Author (ESA)

N78-11491# Naval Oceanographic Office Washington D C AERIAL ICE RECORNAISSANCE AND SATELLITE ICE INFORMATION MICROFILM FILE 1976, SUPPLEMENT 1

Peter A Mitchell May 1977 17 p refs (AD-A043046, NOO-RP-17(76)-Suppl-1) Avail NTIS HC A02/MF A01 CSCL 08/12

Between 1953 and 1974 the Naval Oceanographic Office (NAVOCEANO) presented historical synoptic ice data gathered during U.S. Navy U.S. Coast Guard, and Danish polar operations conducted from 1952 through 1971 in its annual reports of both the Arctic and Antarctic ice observing and forecasting programs (Naval Oceanographic Office 1953-1974) These publications provided in chart form ice conditions observed by aerial reconnaissance and interpreted from satellite imagery for the eastern and western sectors of the North American Arctic and in selected portions of the seas surrounding the Antarctic Continent These series of reports terminated with the 1969 and 1971 annual reports for the Antarctic and Arctic, respectively. This supplement lists all available microfilm imagery, of ice data gathered and subsequently added to the Aerial Ice Reconnaissance and Satellite Ice Information Microfilm File during calendar year 1976 GRA

N78-12492\*# Delaware Univ , Newark Coll of Manne Studies

SKYLAB/EREP APPLICATION TO ECOLOGICAL.GEOLOGICAL, AND OCEANOGRAPHIC INVESTIGATIONS OF DELAWARE BAY Final Report, Jun. 1973 - Mar. 1976

Vytautas Klemas Principal Investigator, David S Bartlett, William D Philpot, Robert H Rogers (Bendix Aerospace Systems Div, Ann Arbor, Mich), and Larry E Reed (Bendix Aerospace Systems Div, Ann Arbor Mich) May 1976 68 p refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D EREP (Contract NAS1-12304)

(E78-10003, NASA-CR-155207, CMS-NASA-1-76) Avail NTIS HC A04/MF A01 CSCL 08C

The author has identified the following significant results Skylab/EREP S190A and S190B film products were optically enhanced and visually interpreted to extract data suitable for mapping coastal land use, inventorying wetlands vegetation, monitoring tidal conditions, observing suspended sediment patterns charting surface currents, locating coastal fronts and water mass boundaries, monitoring industrial and municipal waste dumps in the ocean, and determining the size and flow direction of river, bay and man-made discharge plumes Film products were visually analyzed to identify and map ten land use and vegetation categories at a scale of 1 125,000 Thematic maps were compared with CARETS land use maps, resulting in classification accuracies of 50 to 98% Digital tapes from S192 were used to prepare thematic land use maps. The resolutions of the S190A, S190B, and S192 systems were 20-40m, 10-20m, and 70-100m respectively

N78-12500\*# National Marine Fisheries Service, Bay Saint Louis. Miss

LANDSAT MENHADEN AND THREAD HERRING RE-SOURCES INVESTIGATION Final Report

Andrew J Kemmerer, Principal Investigator J T Brucks, J A Butler, K H Faller (NASA National Space Technol Labs, Miss), H J Holley T D Leming, K J Savastano, and T M Vanselous Oct 1977 274 p refs Original contains color imagery Original

photography may be purchased from the EROS Data Center, Sioux Falls, S D ERTS (NASA Order S-54114)

(E78-10024, NASA-CR-155248, SEFC-Contrib-77-16

MARMAP-Contrib-145) Avail NTIS HC A12/MF A01 CSCL

The author has identified the following significant results The relationship between the distribution of menhaden and selected oceanographic parameters (water color turbidity, and possibly chlorophyll concentrations) was established Similar relationships for thread herring were not established nor were relationships relating to the abundance of either species. Use of aircraft and LANDSAT remote sensing instruments to measure or infer a set of basic oceanographic parameters was evaluated Parameters which could be accurately inferred included surface water temperature salinity, and color Water turbidity (Secchi disk) was evaluated as marginally inferrable from the LANDSAT MSS data and chlorophyll-a concentrations as less than marginal These evaluations considered the parameters only as experienced in the two test areas using available sensors and statistical techniques

N78-12632# National Oceanic and Atmospheric Administration Ann Arbor Mich Great Lakes Environmental Research Lab
ON THE USE OF MICROWAVE RADIATION FOR GREAT LAKES ICE SURVEILLANCE

Brenda Blanton Hagman May 1976 18 p refs (PB-271254/5, NOAA-TM-ERL-GLERL-13 NOAA-77072206) Avail NTIS HC A02/MF A01 CSCL 04B

A method using microwave remote sensing for ice surveillance was investigated Microwave systems were found to be advantageous because they can penetrate cloud cover operate day or night, and provide greater areal coverage at aircraft altitudes than can optical systems. Microwave radar can detect a world of edges and interfaces that correspond to relative amounts of backscattered radiation. Radar was shown effective in classifying certain ice types conditions, and features, and for aiding ships in ice-covered waters or during severe weather

N78-12644# National Aeronautics and Space Administration Lyndon B Johnson Space Center, Houston, Tex

REMOTE SENSING OF OCEANIC PARAMETERS DURING THE SKYLAB/GAMEFISH EXPERIMENT

Kenneth H Faller Nov 1977 43 p refs (NASA-RP-1012 JSC-S-468) Avail NTIS HC A03/MF A01

Efforts to demonstrate the feasibility of using remotely acquired information to assess and monitor the distribution of oceanic gamefish are described Data supplied by Skylab and aircraft surveying an area in the Gulf of Mexico with thermal and optical radiometers and cameras were used in conjunction with oceanographic data provided by surface vessels to explore a relationship between oceanographic parameters and remotely acquired data. Thermal scanner imagery and precision radiometric thermometer data obtained by the two aircraft were combined to provide a composite surface temperature map of the test area Spectral radiometer data were studied in conjunction with surface measurements of chlorophyll-a and turbidity, and several models were developed which predicted these two oceanic parameters from the radiance data. Contour maps of the chlorophyll-a content and turbidity were developed from the best chlorophyll and turbidity models and from surface measurements. Basic problems concerning the remote measurement of the Sicchi extinction depth are discussed and suggestions are made for improving the remote measurement turbidity

N78-13289# Physical Dynamics, Inc., McLean, Va

THE MAGNETIC FIELD AND MAGNETIC FIELD GRADIENTS OF THE NUC OCEANOGRAPHIC RESEARCH TOWER Final Technical Report, Jan - Dec. 1976

George H Gillespie and Walter N Podney Griffiss AFB, N Y BADC Mar 1977 63 p refs

(Contract F30602-72-C-0494 ARPA Order 1649) (AD-A045161 PD-76-109, RADC-TR-77-101 FTR-2) Avail NTIS HC A04/MF A01 CSCL 17/6

Measurements were made of the ambient magnetic field and magnetic field gradients near the Naval Undersea Center (NUC) Oceanographic Research Tower This report summarizes the experiment and its results. The NUC Tower is located approximately 0.7 miles off the California Coast, near San Diego, and is the proposed site for the shallow water trials of the ARPA Internal Wave Magnetic Sensing (IWMS) experiment The measurements described here were made in order to determine accurately the magnetic field and associated gradients of the NUC tower, so that their significance as a possible source of noise and interference during the IWMS experiment may be assessed An analytic model of the magnetic field of the NUC tower which accurately describes the field and associated gradients is also described

N78-13313# European Space Agency, Paris (France) MICROWAVE SCATTERING FROM THE SEA SURFACE Volker Stein Oct 1977 88 p refs Transl into ENGLISH of 'Zur Streuung von Mikrowellen an Meeresoberflaechen' DFVLR. Oberpfaffenhofen, West Ger Report DRL-FB-77-09, 23 Mar 1977 Original report in GERMAN previously announced as N77-32373 Original German report available from DFVLR, Cologne DM 27 40

(ESA-TT-422, DLR-FB-77-09) Avail NTIS HC A05/MF A01 In sensing the ocean surface with microwave methods from remote platform such as an aircraft, satellite or Spacelab, there arises the problem of describing, in an analytic form, the interaction between electromagnetic wave and water wave. The total electrodynamic processes can be represented in compact form by the radar cross section. For the derivation of this quantity a classification of surface models with different roughness scales is carried out. This facet model is explained in more detail because it is suited to describe composite surfaces and hydrodynamic interaction processes. The most important constituent in this model is the average radar cross section per unit area of a statistical surface with small scale roughness. This quantity is derived for the case of a perfectly conducting time invariant surface by solving the boundary value problem under approximate realization of the boundary condition. Only zero-order and first-order terms in the random coefficients of the surface function are taken into account. The extended radar cross section formulas are cited from literature for a lossy and a time varying surface. as well as for depolarization phenomena Author (ESA)

N78-14381 Stanford Univ Calif DESIGN OF A LASER INTERFEROMETER FOR MEASURE-MENT OF EXTREMELY SMALL BIOLOGICAL MOTIONS APPLICATION TO CRAYFISH GIANT AXON Ph D. Thesis

Bruce Colman Hill 1977 118 p Avail Univ Microfilms Order No 77-18217

The interferometer was used to measure diameter changes in a giant axon from the crayfish Procambarus clarkii which occurred whenever the axon was stimulated to produce an action potential. The axon was removed from the animal and gold dust was placed on it to increase its reflectivity. It was found that there is a mechanical pulse which has the same all-or-nothing threshold as that of the action potential and has the same velocity The average size of this motion is 10 Angstroms Although most observations showed a contraction in the diameter followed by an expansion, some preparations produced different results, and the exact form of the motion is therefore not yet determined Suggestions for improving the measurement technique were Dissert Abstr

N78-14484\* # National Environmental Satellite Service Washing-

#### CURRENT AND FUTURE SATELLITES FOR OCEANIC MONITORING

John W Sherman III In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 279-297 refs Avail NTIS HC A99/MF A01 CSCL 08C

Current applications and products from existing operational satellites are reviewed. The future data and information that will become available before the end of this decade are described with emphasis on global oceanic data Author

N78-14503°# Chiba Univ (Japan) Inst of Color Technol-

ON THE PHOTOGRAPHIC PROCESSING AND DIGITAL TEXTURE FOR REMOTE SENSING OF KUJUKURI COAST OF CHIBA IN JAPAN

Hidesaburo Genda, Hiroshi Okayama, Takashi Ishiyama, and Kaname Takeda (Natl Inst of Resources, Tokyo, Japan) In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 571-578 refs

## Avail NTIS HC A99/MF A01 CSCL 14E

Remote sensing of various coastal phenomena on the Kujukuri Coast and Kashimanada Coast was done by the use of aircraft for the purpose of investigating the characteristics of shore reefs and floating sand, and the depth of the sea A multispectral camera and a video ITV camera were used as sensors. The first flight was over the Kashimanada and Kujukuri Coasts and the next flight was over the Katsuura Bay. The shape of shore reefs, the state of floating sand the depth of the sea, etc., are represented by equidensitographs using texture. The interval of density slices is 0.05. Correlations between the textures represented by equidensitographs, digital graphs and analog display are estimated.

 $\Re 78-14512^{\circ}\#$  National Oceanic and Atmospheric Administration, Suitland Md

## present and future operational moaa satellite oceanographic products an introduction

J Keith Kalinowski, Theodore L Signore, William G Pichel, Charles C Walton Robert L Brower Stanley R Brown, and Kenneth G Bennekamper In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 625-633 refs

Avail NTIS HC A99/MF A01 CSCL 08C

A review of operational satellite-derived National Oceanic and Atmospheric Administration/National Environment Satellite Service oceanographic products is presented and some current applications of these products are noted Recent improvements to procedures used in deriving sea surface temperature observations and fields are described Changes to data reduction techniques and products which will be incorporated with the advent of TIROS-N are outlined and some potential future developments are mentioned

N78-14513\*# Grumman Aerospace Corp., Bethpage, N Y Research Dept

## POLARIMETER MEASURES SEA STATE CHARACTERISTICS USING EMITTED INFRARED RADIATION

W G Egan and T Hilgeman In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 635-644 refs

Avail NTIS HC A99/MF A01 CSCL 08C

An infrared polarimeter, capable of operating between 1 and 12 micrometers wavelength has been used to measure the polarization of emitted radiation from the sea. The observed to be positive, indicating the dominance of reflected infrared sky radiation over the emitted. With the appearance of waves, the percent polarization increased as expected, for a zenith angle well above the Brewster angle for water. This is qualitatively in accordance with a model presented to explain the behavior Initial analyses indicate that the polarized components of the sea's emitted and reflected radiation are affected by type and direction of waves, angle of viewing and foam. The effects of variations in these parameters require further delineation. The infrared polarimetric technique appears to be a novel new passive method for remote monitoring of waves.

N78-14514\*# Canada Centre for Remote Sensing Ottawa (Ontario)

SCATTEROMETER RESULTS FROM SMOREFAST AND FLOATING SEA ICE

J Cihlar, L Gray S Parashar and R Worsfold (Centre for Cold Ocean Resources Engineering, St John's Canada) *In* ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 645-657 refs

Avail NTIS HC A99/MF A01 CSCL 08L

Multipolarized scatterometer sea ice measurements at 13 3 GHz obtained during the winter and spring of 1975-76 from a number of flight lines off the east coast of Canada were analyzed Radar scattering coefficients sigma were calculated for several regions of sea ice as interpreted from aerial photographs. The variation in sigma which incidence angle is presented for HH (Horizontal transmit - Horizontal receive) and HV (Horizontal transmit - Vertical receive) polarizations for the various ice regions. The depolarization ratio (sigma HH/sigma HV) as a function of incidence angle is also given. The sea ice regions studied included shorefast ice with varying degrees of snow cover and surface roughness and several varieties of floating sea ice with different thicknesses.

N78-14530°# Army Engmeer Waterways Experiment Station, Vicksburg, Miss

REMOTE SENSING OF AQUATIC PLANTS

K S Long and L E Link, Jr In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 817-836 refs

Avail NTIS HC A99/MF A01 CSCL 02D

Various sensors were tested in terms of their ability to detect and discriminate among noxious aquatic macrophytes. A survey of researchers currently studying the problem and a brief summary of their work is included. Results indicated that the sensor types best suited to assessment of the aquatic environment are color color infrared, and black-and-white infrared film, which furnish consistently high contrasts between aquatic plants and their surroundings.

R/78-14533\*# Instituto de Pesquisas Espaciais Sao Jose dos Campos (Brazil)

STUDY OF THE BRAZIL AND FALKLAND CURRENTS USING THEIR IMAGES OF MIMBUS 5 AND OCEANO-GRAPHIC DATA IN 1972 - 1973

Y C Tseng, H M V Inostroza, and R Kumar In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 859-871 refs

## Avail NTIS HC A99/MF A01 CSCL 05B

The Western Edge of the Sub-tropical Convergance of the South-western Atlantic Ocean called the Front which is a thermal discontinuity between the Brazil and Falkland Currents, was studied utilizing the Temperature Humidity Infrared Radiometer (THIR) of Nimbus V in the 105 to 125 micrometers channel and historical oceanographic data. Some important results obtained are the oceanographic Front could be detected from Nimbus THIR data, oceanographic charts showed that the transition zone where the Brazil and the Falkland Currents meet was the Front detected from satellite data ocean current speeds calculated with THIR data were of the same order of magnitude as those calculated oceanographically fisheries statistics for Pargo Roseo showed that the maximum catches were in September of 1973, in the period when the Front was observed most distinctly and clearly. The results showed the great potentiality of satellite data to study surface thermal structures surface currents and oceanic fisheries Author

N78-14648\* Université des Sciences et Techniques de Lille (France) Laboratoire d'Optique Atmospherique
REMOTE SENSING OF OCEAN COLOR AND DETECTION

OF CHLOROPHYLL CONTENT

P Y Deschamps P Lecompte and M Viollier In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1021-1033 refs 05-43)

Avail NTIS HC A99/MF A01 CSCL 08J

The chlorophyll enrichment of the water in an equatorial upwelling was surveyed and described with the aid of a radiometer specially designed for the airborne measurement of ocean color A relation is proposed between airborne measurement of difference of albedos at two wavelengths in the blue and green, and the concentration of chlorophyll in the ocean

N78-14572\*# National Aeronautics and Space Administration Wallops Station, Wallops Island, Va.

#### AIRBORNE OCEANOGRAPHIC LIDAR SYSTEM

C Bressel (Avco-Everett Res Lab, Inc.) | Itzkan (Avco-Everett Res Lab, Inc.) J E Nunes (Avco-Everett Res Lab Inc.) and F Hoge In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1259-1268 refs

Avail NTIS HC A99/MF A01 CSCL 171

The characteristics of an Airborne Oceanographic Lidar (AOL) are given. The AOL system is described and its potential for various measurement applications including bathymetry and fluorosensing is discussed Author

N78-14586\*# Institute of Ocean Sciences Victoria (British Columbia)

## USE OF AN INERTIAL NAVIGATION SYSTEM FOR ACCURATE TRACK RECOVERY AND COASTAL OCEANO-GRAPHIC MEASUREMENTS

B M Oliver and J F R Gower In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1399-1413 refs \ Avail NTIS HC A99/MF A01 CSCL 17G

A data acquisition system using a Litton LTN-51 inertial navigation unit (INU) was tested and used for aircraft track recovery and for location and tracking from the air of targets at sea The characteristic position drift of the INU is compensated for by sighting landmarks of accurately known position at discrete time intervals using a visual sighting system in the transparent nose of the Beechcraft 18 aircraft used. For an aircraft altitude of about 300 m, theoretical and experimental tests indicate that calculated aircraft and/or target positions obtained from the interpolated INU drift curve will be accurate to within 10 m for landmarks spaced approximately every 15 minutes in time For applications in coastal oceanography, such as surface current mapping by tracking artificial targets, the system allows a broad area to be covered without use of high altitude photography and its attendant needs for large targets and clear weather

Author

N78-14606\*# Louisiana State Univ., Baton Rouge Coastal Studies Inst

### SURFACE TEMPERATURES AND TEMPERATURE GRA-DIENT FEATURES OF THE US GULF COAST WATERS

Oscar K Huh Lawrence J Rouse, Jr, and Glenn W Smith In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1609-1618 ref

Avail NTIS HC A99/MF A01 CSCL 08C

Satellite thermal infrared data on the Gulf of Mexico show that a seasonal cycle exists in the horizontal surface temperature structure in the fall the surface temperatures of both coastal and deep waters are nearly uniform. With the onset of winter atmospheric cold fronts, which are accompanied by dry, low temperature air and strong winds, draw heat from the sea. A band of cooler water forming on the inner shelf expands until a thermal front develops seaward along the shelf break between the cold shelf waters and the warmer deep waters of the Gulf Digital analysis of the satellite data was carried out in an interactive mode using a minicomputer and software. A time series of temperature profiles illustrates the temporal and spatial changes in the sea-surface temperature field Author

N78-14772# General Accounting Office Washington, D C Procurement and Systems Acquisition Div

THE SEASAT-A PROJECT WHERE IT STANDS TODAY NATIONAL AERONAUTICS AND SPACE ADMINISTRA-TION NATIONAL OCEANIC AND ATMOSPHERIC **ADMINISTRATION** 

16 Sep 1977 50 p

(PB-272004/3, PSAD-77-126) Avail NTIS HC A03/MF A01 CSCL 08J

It was recommended by GAO that Congress and NASA take several actions before the experimental SEASAT-A project is expanded to an operational program. The SEASAT-A spacecraft scheduled for launch in 1978, will measure ice fields, winds, waves, ocean currents sea temperatures, and atmospheric water

NASA's January 1977 project cost estimate of \$80.5 million excludes \$12.3 million of related costs. The cost estimate is continuing to be reviewed by NASA

N78-15537\*# General Land Office, Austin, Tex
DEVELOPMENT AND APPLICATION OF OPERATIONAL TECHNIQUES FOR THE INVENTORY AND MONITORING OF RESOURCES AND USES FOR THE TEXAS COASTAL ZONE. VOLUME 1 TEXT Final Report, Apr 1975 - Oct.

Peggy Harwood, Principal Investigator Robert Finley (Texas Univ Austin), Samuel McCulloch (Texas Natural Resources Information System, Austin) Patricia A Malin (Texas A and M Univ College Station) and John A Schell Oct 1977 299 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center Sloux Falls S D ERTS (Contract NAS5-20986)

NASA-CR-155342) (F78-10042 NTIS HC A13/MF A01 CSCL 08F

The author has identified the following significant results Image interpretation and computer-assisted techniques were developed to analyze LANDSAT scenes in support of resource inventory and monitoring requirements for the Texas coastal region. Land cover and land use maps at a scale of 1 125 000 for the image interpretation product and 1 24 000 for the computer-assisted product, were generated covering four Texas coastal test sites. Classification schemes which parallel national systems were developed for each procedure, including 23 classes for image interpretation technique and 13 classes for the computer-assisted technique Results indicate that LANDSATderived land cover and land use maps can be successfully applied to a variety of planning and management activities on the Texas coast Computer-derived land/water maps can be used with tide gage data to assess shoreline boundaries for management purposes

N78-15538\*# General Land Office, Austin, Tex DEVELOPMENT AND APPLICATION OF OPERATIONAL TECHNIQUES FOR THE INVENTORY AND MONITORING OF RESOURCES AND USES FOR THE TEXAS COASTAL ZONE VOLUME 2 APPENDICES Final Report, Apr 1975 - Oct 1977

Peggy Harwood, Principal Investigator Robert Finley (Texas Univ Austin) Samuel McCulloch (Texas Natural Resources Information System Austin) Patricia A Malin (Texas A and M Univ College Station) and John A Schell Oct 1977 156 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center Sloux Falls S D ERTS NASA-CR-155358) (E78-10048 NTIS

HC A08/MF A01 CSCL 08F

N78-15550\*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md

THE ANALYSIS OF GEOS-3 ALTIMETER DATA IN THE TASMAN AND CORAL SEAS Technical Report, Apr - Nov 1975

R S Mather Nov 1977 40 p refs Presented at GEOS-3 Principal Investigator's Final Meeting, New Orleans, 18-19 Nov 1977 Submitted for publication

(NASA-TM-78032) Avail NTIS HC A03/MF A01 CSCL 05B A technique was developed for preprocessing GEOS-3 altimetry data to establish a model of the regional sea surface The algorithms developed models for a 35,000,000 sq km area with an internal precision of + or - 1 m. There were discrepancies between the sea surface model so obtained and GEM6 based geoid profiles with wavelengths of approximately 2500 km and amplitudes of up to 5 m in this region. The amplitudes were smaller when compared with GEM10-based good determinations However, the comparison of 14 pairs of overlapping passes in the region indicated altimeter resolution of the + or - 25 cm level if the wavelength corresponding to the Nyquist frequency were 30 km. The spectral analysis of such comparisons indicated the existence of significant signal strength in the discrepancies after least squares fitting, with wavelengths in excess of 200 km Author N78-15662\*# Environmental Research Inst of Michigan, Ann Arbor

NASA/COUSTEAU OCEAN BATHYMETRY EXPERIMENT REMOTE BATHYMETRY USING HIGH GAIN LANDSAT DATA Final Report, Aug 1975 - Apr 1976

Fabian C Polcyn Jul 1976 132 p refs (Contract NAS5-22597)

(NASA-CR-156658, ERIM-118500-1-F) HC A07/MF A01 CSCL 08C NTIS Avail

Satellite remote bathymetry was varified to 22 m depths where water clarity was defined by alpha = 058 1/m and bottom reflection r(b), was 26% High gain band 4 and band 5 CCT data from LANDSAT 1 was used for a test site in the Bahama Islands and near Florida Near Florida where alpha = 11 1/m and r(b) = 20%, depths to 10 m were verified Depth accuracies within 10% rms were achieved Position accuracies within one LANDSAT pixel were obtained by reference to the Transit navigation satellites The Calypso and the Beayondan, two ships, were at anchor on each of the seven days during LANDSAT 1 and 2 overpasses LORAN C position information was used when the ships were underway making depth transects Results are expected to be useful for updating charts showing shoals hazardous to navigation or in monitoring changes in nearshore topography Author

N78-15663\*# Wentz (Frank J) and Associates, Cambridge,

RADAR BACKSCATTERING FROM A SEA HAVING AN ANISOTROPIC LARGE-SCALE SURFACE, PART 2 Final Report

Frank J Wentz Nov 1977 37 p refs

(NASA Order L-24420-A)

(NASA-CR-145278) Avail NTIS HC A03/MF A01 CSCL 08B

A two scale scattering model was derived that combines specular reflections from sea waves and Bragg scattering in a manner consistent with energy conservation. The effect of the tilting of the small scale roughness by the large scale roughness was included, which accounted for the reduction of reflected power. The special case of backscattering for which the transmitted polarization equaled the received polarization was considered An anisotropic large scale surface was used to specify the probability density function of the large scale surface normal. In order to isolate the azimuthal variation of the normalized radar cross section produced by the anisotropic probability density function an isotropical small scale spectrum was assumed

Author

## 06

## HYDROLOGY AND WATER MANAGEMENT

Includes snow cover and water runoff in rivers and glaciers saline intrusion drainage analysis geomorphology of river basins land uses and estuarine studies

A78-10386 Experiments on the radar backscatter of snow. F T Ulaby, W H Stiles, L F Dellwig, and B C Hanson (Center for Research, Inc., Lawrence, Kan.) *IEEE Transactions on Geoscience Electronics*, vol. GE-15, Oct. 1977, p. 185-189

The 1-8-GHz microwave active spectrometer (MAS) system was used to measure the backscatter response from ground covered with a relatively thin layer of snow (up to 15 cm) in the 1975 winter Except for one dry snow data set, the results of this experiment pertain to wet snow conditions. The scattering coefficient was measured for all linear polarization combinations at angles of incidence between nadir and 70 deg. The ground truth data consisted of soil moisture, soil and air temperatures, snow depth, snow density, and snow water equivalent. Radar sensitivity to the total snow water equivalent increases in magnitude with increasing frequency and is almost angle independent for angles of incidence higher than 30 deg. particularly at the higher frequencies. In the 50-70 deg angular range in the 6-8 GHz frequency range, the sensitivity is typically around -0 4 dB per 0 1 g per sq cm of the snow water equivalent and the associated linear correlation coefficient has a magnitude of about (Author)

A78-10524 \* Computer processing of SAR L-band imagery M L Bryan, W D Stromberg, and T G Farr (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif) Photogrammetric Engineering and Remote Sensing, vol 43, Oct 1977, p 1283-1294 25 refs Contract No NAS7-100

The described work in the areas of hydrology and polar ice defines possible uses of automatic picture processing of uncalibrated radar images. The data used in the study were collected with the aid of an L-band synthetic aperture radar mounted in the NASA CV-990 aircraft. The radar was operated at approximately 30,000 feet altitude. One study area used was located in the Beaufort Sea and contained sea ice. The other study area contained lakes on the Alaskan North Slope. The reported investigations demonstrate that certain types of features can be efficiently studied by using simple automatic picture processing techniques applied to uncalibrated radar data.

A78-12730 The difference method - An approach for the objective prediction of the temperature (Die Differenzenmethode - Ein Weg zur objektiven Vorhersage der Temperatur) A Machalek (Zentralanstalt fur Meteorologie und Geodynamik, Vienna, Austria) Archiv fur Meteorologie, Geophysik und Bioklimatologie, Serie A Meteorologie und Geophysik, vol 26, no 2-3, 1977, p 187-195 in German

The first step in a procedure for obtaining objective weather forecasts is related to the prediction of the daily temperature maxima and minima. A description is presented of a new method which was developed in Vienna, Austria, in an attempt to improve the quality of temperature forecasts. The method involves the determination of the temperature differences between the daily temperature maximum and minimum and the assignment of temperature differences, after a partition in groups of two degrees in each case, to one of a number of different types of weather. The quality of the new method was studied by applying it to the meteorological data of the period from July to October 1976. It was found that the results provided by the new method for the prediction of the temperature maximum are better than the respective results obtained in the case of two other approaches.

A78-12933 # Snow mapping from Landsat digital data T T Alfoldi and K P B Thomson (Canada Centre for Remote Sensing, Ottawa, Canada) In International Electronics Congress, 24th, Rome, Italy, March 28-30, 1977, Proceedings

Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1977, p. 73-80 7 refs

This paper reports on the applicability of Landsat digital data in operational snow cover mapping. Landsat data for two test sites in Eastern Canada have been analyzed and the results of classification and enhancements of these data are compared and discussed Suggestions are made on the implementation of Landsat data into a operational snow mapping program (Author)

A78-14780 \* # The utility of short wavelength /less than 1 mm/ remote sensing techniques for the monitoring and assessment of hydrologic parameters A Rango and V Salomonson (NASA, Goddard Space Flight Center, Greenbelt, Md.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 55-66 25 refs

The paper reviews advances made in remote sensing applications to the fields of hydrology and water resources management, with emphasis on sensing from spacecraft platforms. An overview is presented of a remote sensing applications program for water resources management with attention given to water resources requirements and information content research. Consideration is also given to snowcovered area mapping in the Western United States, the use of Landsat imagery in land-use mapping and in the development of hydrological watershed models employed in flood control/water-works planning and management.

A78-14781 # Microwave remote sensing of hydrologic parameters F T Ulaby (University of Kansas Center for Research, Inc., Lawrence, Kan.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 67-86 46 refs

A perspective on the implementation of microwave sensors in future airborne and spaceborne observations of hydrologic parameters is presented. The rationale is based on a review of the status and future trends of active (radar) and passive (radiometer) microwave research as applied to the remote sensing of soil moisture content, snowpack water equivalent, freeze/thaw boundaries, lake ice thickness, surface water area, and the specification of watershed runoff coefficients included are analyses and observations based on data acquired from ground based, airborne and spaceborne platforms and an evaluation of advantages and limitations of microwave sensors

(Author)

A78-14782 # Utilization of remote sensing observations in hydrologic models R M Ragan (Maryland, University, College Park, Md). In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p. 87-99, 27 refs.

Parameter definitions for hydrologic models are reviewed and model modifications for remote sensing capability are examined. A number of remote-sensing-based hydrologic models are considered including the SCS model, the STORM model, and the EPA stormwater management model. Time and cost comparisons among these models are presented and future directions in the development of remote sensing models are projected.

A78-14794 # Coastal wetlands - The present and future role of remote sensing V Carter (U S Geological Survey, Reston, Va) In- International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1
Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 301-323 60 refs

The organization of coastal wetland inventories as performed by the 23 coastal states is described, and the remote sensing techniques used are discussed. USGS and Fish and Wildlife Service inventories are also explained. Film types are recommended for the nine classes of the estuarine ecological system. Problems in using satellite data are considered, and a discussion of the future use of remotely sensed data is presented.

A78-14816 \* # Automated image processing of Landsat II digital data for watershed runoff prediction R R Sasso, J R Jensen, and J E Estes (California, University, Santa Barbara, Calif) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 591-599 Grant No NsG-722

Digital image processing of Landsat data from a 230 sq km area was examined as a possible means of generating soil cover information for use in the watershed runoff prediction of Kern County, California The soil cover information included data on brush, grass, pasture lands and forests. A classification accuracy of 94% for the Landsat-based soil cover survey suggested that the technique could be applied to the watershed runoff estimate. However, problems involving the survey of complex mountainous environments may require further attention.

A78-14817 # Microwave multispectral investigations of snow. E Schanda and R Hofer (Bern, Universität, Berne, Switzerland) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 601-607

A long-term observational program on the microwave emission and scatter behavior under controlled conditions has been started at a high-altitude alpine test site. All stages of development of the snow-cover during the whole season are under investigation. The purpose of this study is to achieve the required knowledge on the microwave radiative properties of snow for the optimization of the microwave payloads of air- and space-borne snow sensors and for the interpretation of large-scale snow maps obtained by these sensors. Preliminary results of the first month of the investigation obtained with the radiometers at 4.9, 10.5, 21 and 36 GHz are presented.

(Author)

A78-14818 \* # Application of Landsat data to wetland study and land use classification in West Tennessee N L Jones and F Shahrokhi (Tennessee, University, Tullahoma, Tenn.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1

Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 609-613 U.S. Department of Agriculture Contract No. AG-47-SCS00210, Contract No. NAS8-31980

Landsat data were employed in determining land use of a 32,300-hectare watershed area within the Obion-Forked Deer River Basin in northwest Tennessee Black and white transparency chips for all four wavelength bands were interpreted by use of a video-input analog/digital automatic analysis and classification facility, densitometric methods showed that wetlands, urban areas, agricultural lands and forests could be discriminated by analysis of band 6 or 7 together with band 4 or 5 Comparison with high- and low-altitude photography indicated that the Landsat data could provide sufficiently accurate resource information and determine drainage trends

A78-14834 # Remote sensing-aided systems for snow quantification, evapotranspiration estimation, and their application in hydrologic models S Khorram (California, University, Berkeley, Calif) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 795-806 24 refs

A78-14835 \* # Application of aerial photography to waterrelated programs in Michigan W R Enslin, R Hill-Rowley, and S E Tilmann (Michigan State University, East Lansing, Mich.) In International Symposium on Remote Sensing of Environment, 11th, Ann. Arbor, Mich., April 25-29, 1977, Proceedings Volume 1 Ann. Arbor, Mich., Environmental Research

Institute of Michigan, 1977, p 807-816 Grant No NGL-23-004-083

The paper describes the use of aerial photography and information system technology in the provision of information required for the effective operation of three water-related programs in Michigan Potential mosquito breeding sites were identified from specially acquired low altitude 70 mm color photography for the City of Lansing Vector Control Area A comprehensive inventory of surface water sources and potential access sites was prepared to assist fire departments in Antrim County with fire truck water-recharge operations Remotely-sensed land cover/use data for Windsor Township, Eaton County were integrated with other resource data into a computer-based information system for regional water quality studies Eleven thematic maps specifically focussed on landscape features affecting non-point water pollution and waste disposal were generated from analyses of a four-hectare grid-based data file containing land cover/use, soils, topographic and geologic (well-log) data (Author)

A78-14836 # Remote sensing of aquatic plants K S. Long and L E Link, Jr (U S Army, Engineer Waterways Experiment Station, Vicksburg, Miss ) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 817-826

To develop a means of rapidly assessing the extent and composition of aquatic plant infestations, a study including both computer simulation and field exercises was begun in 1975 to test various sensors in terms of their ability to detect and discriminate among noxious aquatic macrophytes. A survey of researchers currently studying the problem and a brief summary of their work is included. Results indicated that the sensor types best suited to assessment of the aquatic environment are color, color infrared, and black-and-white infrared film, which furnish consistently high contrasts between aquatic plants and their surroundings. (Author)

A78-14851 # Multidate mapping of mosquito habitat T L Woodzick and E L Maxwell (Colorado State University, Fort Collins, Colo ) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 979-989 10 refs PHS-supported research

Landsat data from three overpasses in 1975 (25 June, 13 July, 9 August) formed the data base for a multidate classification of 15 ground cover categories in the margins of Lewis and Clark Lake, a fresh water impoundment between South Dakota and Nebraska When scaled to match topographic maps of the area, the ground cover classification maps were used as a general indicator of potential mosquito-breeding habitat by distinguishing productive wetlands areas from non-productive non-wetlands areas. More specifically, the interpretation of the Consolidated Wetlands, Flooded and Transitional classes as permanently-flooded, frequently-flooded and intermittently-flooded, respectively, permitted a breeding potential to be assigned to each class vis-a-vis the preferred breeding habitat of Culex tarsalis, a permanent pool species and Aedes vexans, a floodwater species. The 12 channel multidate classification was found to have an accuracy 23% higher than the average of the three single date 4 channel classifications. By assuming that the 1.1 acre Landsat resolution reflects the dominant tendency within each pixel, the multidate classification map of ground cover categories can be considered a broadbrush indicator of potential mosquito-production and used to plan control programs (Author)

A78-14856 # Textural analysis by statistical parameters and its application to the mapping of flow-structures in wetlands /Mudflat area at the German coast of the North Sea/ U Wieczorek

(München, Universitat, Munich, West Germany) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p. 1035-1043

A78-14857 # Production of a water quality map of Saginaw Bay by computer processing of Landsat-2 data J B McKeon, R H Rogers (Bendix Corp., Aerospace Systems Div., Ann Arbor, Mich.), and V E Smith (Cranbrook Institute of Science, Bloomfield Hills, U S Environmental Protection Agency, Grosse Ile, Mich.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2
Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 1045-1054.

Surface truth and Landsat measurements collected July 31, 1975 for Saginaw Bay are used to demonstrate a technique for producing a color coded water quality map. On this map, color is used as a code to quantify five discrete ranges in the following water quality parameters temperature, Secchi depth, chloride, conductivity, total Kjeldahl nitrogen, total phosphorous, chlorophyll a, total solids and suspended solids. The Landsat and water quality relationship is established through the use of a set of linear regression equations where the water quality parameters are the dependent variables and Landsat measurements are the independent variables.

(Author)

A78-14869 # Use of thermal-infrared imagery in ground-water investigations in Montana A J Boettcher (U S Geological Survey, Helena, Mont) and R M Haralick (Kansas, University, Lawrence, Kan) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 1161-1170

A78-14870 # Satellite land use acquisition and applications to hydrologic planning models V R Algazi and M Suk (California, University, Davis, Calif) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2. Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 1171-1181 14 refs

The use of Landsat digital data to assess the flood hazards, general damage potential and environmental status of US watersheds is discussed. The hydrologic models employed in the watershed analyses discriminate among such land-use categories as forests, residential areas, highly impervious lands, grassy regions, bare land, streams and ponds. Maximum likelihood classification and clustering techniques used to process the Landsat data are considered. Sample analyses involving the Trail Creek watershed in Georgia and the highly urbanized Castro Valley watershed in California are presented.

A78-14888 # Groundwater studies in and areas in Egypt using Landsat satellite images E M El Shazly (Academy of Scientific Research and Technology, Remote Sensing Centre, Cairo, Egypt), M A Abdel Hady (Atomic Energy Establishment, Cairo, Egypt), and M M El Shazly (Egyptian Desert Institute, Cairo, Egypt) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 1365-1372

A78-14890 # Development of an integrated data base for land use and water quality planning J Adams, C VanSchayk (Toledo Metropolitan Area Council of Governments, Toledo, Ohio), and L B Istvan (Michigan, Environmental Research Institute, Ann Arbor, Mich.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 1381-1386

The Land Resource Information System has been developed by the Toledo Metropolitan Area Council of Governments for the

evaluation of the role played by various land resources in water quality management. The system uses a computer-based data program, and has been tested in areas of Ohio and Michigan. Its applications include the abatement of runoff from agricultural land, the mapping of septic tank capability based on soil data, the determination of an area's capability for underground sewage treatment facilities, land development planning, the design of resource management systems, and the functional characterization of natural regions and features.

A78-14893 \* # Lake water quality mapping from Landsat J P Scherz (Wisconsin, University, Madison, Wis) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 1417-1425 5 refs Grant No NGL-50-002-127, Contract No NAS5-20942

In the project described remote sensing was used to check the quality of lake waters. The lakes of three Landsat scenes were mapped with the Bendix MDAS multispectral analysis system. From the MDAS color coded maps, the lake with the worst algae problem was easily located. The lake was closely checked, and the presence of 100 cows in the springs which fed the lake could be identified as the pollution source. The laboratory and field work involved in the lake classification project is described.

A78-14906 # Three approaches to the classification and mapping of inland wetlands P T Gammon (U S Geological Survey, Suffolk, Va), D Malone (Tennessee Valley Authority, Chattanooga, Tenn), P D Brooks, and V Carter (U S Geological Survey, Reston, Va.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 1545-1555 10 refs

Three projects representing three approaches to the classification and mapping of inland wetlands are discussed in the Dismal Swamp project, seasonal, color-infrared aerial photographs and Landsat digital data were interpreted for a detailed analysis of the vegetative communities in a large, highly altered wetland in western Tennessee, seasonal high-altitude color-infrared aerial photographs provided the hydrologic and vegetative information needed to map inland wetlands using a classification system developed for the Tennessee Valley Region in Florida, color-infrared aerial photographs were analyzed to produce wetland maps using three existing classification systems to evaluate the information content and mappability of each system. The methods used in each of the three projects can be extended or modified for use in the mapping of inland wetlands in other parts of the United States. (Author)

A78-15935 NOAA satellite monitoring of snow cover in the northern hemisphere during the winter of 1977 D R Wiesnet, M. Matson, and D F McGinnis (NOAA, National Environmental Satellite Service, Washington, D C) International Astronautical Federation, International Astronautical Congress, 28th, Prague, Czechoslovakia, Sept 25-Oct 1, 1977, Paper 77-121 19 p 5 refs

Widespread snow has the effect of raising the earth surface albedo and decreasing the net amount of long-wave radiation absorbed by the surface. The snow cover also tends to cool the adjacent atmosphere, thereby inducing snow, rather than rain, in peripheral snow-free areas. It has been suggested that these simple regressions might be used to forecast continental and hemispheric snow cover 30, 60, or 90 days in advance. Advance estimates of snow cover, prepared to test and evaluate this antecedent snow nover technique, are tabulated. Analysis shows that long-range predictions of severe global climatic change cannot be substantiated on the basis of satellite snow cover data (at least in winter 1977). Nevertheless, over the 10-year period of record, snow cover does show a tendency to increase slightly. Continued satellite monitoring of this important climatic variable is clearly warranted.

A78-16505 # On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation V Lappalainen (Tampere University of Technology, Tampere, Finland) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 55 p 41 refs

Black and white, color and infrared aerial photographs have been taken of two lakes near Helsinki, Finland. The photographs were used to prepare soil maps applicable in conservation and recreational land-use planning, and to study lake catchment areas and bedrock lineaments. The infrared photographs facilitate the preparation of vegetation profiles used in water vegetation studies. It is noted that aerial photography may be suitable in operations such as dredging, the removal of coastal vegetation, and the draining of waters.

A78-16514 # Spectral reflection measurements of water with particle suspensions for an analysis of the water quality on the basis of multispectral recordings (Spektrale Reflexionsmessungen von belastetem Wasser zur Analyse der Wasserqualitat aus multispektralen Aufnahmen). D. Kolouch, P Lohmann (Hannover, Technische Universität, Hanover, West Germany), M Schroeder, and R Statter (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Optoelektronik, Oberpfaffenhofen, West Germany). International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper. 15 p In German.

An inlet at the German North Sea coast is to be used by large industrial firms for the disposal of waste water. A study is to be conducted in this connection to find out whether the introduced pollutants will remain in the inlet or will be carried off into the open sea. It is planned to study water exchange processes by means of remote-sensing methods involving the use of aircraft. A description is presented of experiments which were carried out to obtain information for a suitable selection of the sensing devices, taking into account the characteristics of the water in the inlet which has a yellowish color in connection with the presence of suspended clay particles It was found that three spectral ranges have to be considered for a detection of the suspended turbid materials in the sea water. The ranges lie at the wavelengths of 600 nm, 850 nm, and 1085 nm. Turbid materials of the considered type are characterized by an increase in spectral reflection in the infrared, it is expected that the remote-sensing data will provide quantitative information regarding the turbid material concentration if measurements of the spectral distribution of the incident radiation are included

A78-16528 # Remote sensing of water quality in 7 lakes in northern Italy B M Sorensen, B Sturm, and E Gatelli (EURATOM and Comitato Nazionale per L'Energia Nucleare, Centro Comune di Richerche, Ispra, Italy) International Society for Photogrammetry, Italy, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 18 p Research supported by the Danish Natural Science Research Council

Some important considerations in connection with remote sensing of water quality are presented. A procedure is suggested to determine the maximum water depth where qualitative information can be obtained from aircraft altitude. Density slicing and ratioing techniques applied on computer compatible tapes have been analyzed and the preliminary results are discussed. A solution to compensate for discrepancies between upwelling radiance values measured by a radiometer from a lake station and from an aircraft is presented. (Author)

A78-16540 # Establishment of the hydro-morphometric characteristics for water bodies, using photogrammetric and remotesensing recordings M Albota and D Rosca (Rumanian Committee of Photogrammetry, Bucharest, Rumania) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 10 p

Aerial and satellite photogrammetric studies of a river bed, a water storage basin, and a river delta are reported. Photographs of

the Olt and lalomita rivers in Romania were obtained at a scale of 1 25,000. Transverse profiles obtained by stereophotogrammetric techniques were used to study the flood-water discharge Photographs at scales of 1 15,000 to 1 1000 were used to study silting in the Vidraru storage basin of the Arges River while the basin was partially drained, the Bicaz lake in the Bistrita River was photographed while the basin was full. Landsat data were used to investigate the impact zone between the Danube delta and the Black Sea, features studied include coast line evolution within the impact zone between the delta and the sea, the evolution of Sacalin Island, underwater bar developments along the coast line, delta development, alluvial deposition, sea stream distribution, and silting of lakes in the marine delta.

A78-17019 # Simulation of attenuation by rainfall at a wavelength of 5 cm M L Weible and D Sirmans (NOAA, National Severe Storms Laboratory, Norman, Okla ) In Conference on Radar Meteorology, 17th, Seattle, Wash, October 26-29, 1976, Preprints Boston, Mass, American Meteorological Society, 1977, p 75-78 6 refs

Simulated rainfall rate attenuation at a radar wavelength of 5 cm has been obtained in order to quantitatively determine effects of attenuation due to rainfall. Digital data collected with the 10 cm NSSL WSR-57 radar is used to compute the attenuation estimate expected with a 5 cm radar. Two cases involving heavy rainfall from Oklahoma thunderstorms are examined an organized squall line which occurred on June 6, 1975 and produced radar-measured rainfall amounts in excess of 80 mm with rates exceeding 100 mm/hr, a succession of convective rainshowers which repeatedly formed and matured in the vicinity of Enid, Oklahoma on October 10, 1973.

A78-17074 # Radar observed land/lake precipitation differences J W Wilson (Center for the Environment of Man, Inc, Hartford, Conn.) In Conference on Radar Meteorology, 17th, Seattle, Wash, October 26-29, 1976, Preprints

Boston, Mass, American Meteorological Society, 1977, p. 422-429.

Hoston, Mass, American Meteorological Society, 1977, p. 422-429.

14 refs. Contract No NOAA-03-5-022-17

The precipitation over Lake Ontario and its drainage basin has

The precipitation over Lake Ontario and its drainage basin has been measured during a one-year period by two weather radars and 338 rain gages. These data were then used to evaluate the influence of Lake Ontario on precipitation distributions. It was found that the lake and surrounding hills significantly affect precipitation distribution over the drainage basin. During the warm season, cold lake waters may suppress shower activity over the lake, whereas during the cold season the lake may stimulate precipitation over and downwind of the lake. Although the lake is estimated to influence precipitation patterns on about 50% of the yearly precipitation days, the overall effect on precipitation amount is not large. The results of this study indicate that radar may be effectively used to monitor regional climatological features in the precipitation fields generated by local topography.

A78-18243 Experience with the per-point classification algorithms for the mapping of estuarine areas from Landsat A C Armstrong (Ministry of Agriculture, Fisheries and Food, Trumping ton, Cambs, England) and P Brimblecombe (East Anglia, University, Norwich, England) British Interplanetary Society, Journal (Remote Sensing), vol 31, Jan 1978, p 33-36 13 refs

The Bayesian algorithm, an unsupervised clustering algorithm, and a decision tree algorithm were compared in a test of estuarine mapping from Landsat data. The Bayesian classification was found to perform poorly, while the decision tree algorithm provided the most accurate mapping of land, wet sand, dry sand, and shallows. The unsupervised clustering algorithm yielded classifications less accurate than the decision tree results, but had the advantage of involving short computing times. The usefulness of the estuarine mapping for navigation charts was also assessed.

A78-18247 \* Optimal spatial sampling techniques for ground truth data in microwave remote sensing of soil moisture R

G S Rao and F T Ulaby (University of Kansas Center for Research, Inc., Laurence, Kan.) Remote Sensing of Environment, vol. 6, no. 4, 1977, p. 289-301 5 refs. Contract No. NAS9-14052

The paper examines optimal sampling techniques for obtaining accurate spatial averages of soil moisture, at various depths and for cell sizes in the range 25-40 acres, with a minimum number of samples Both simple random sampling and stratified sampling procedures are used to reach a set of recommended sample sizes for each depth and for each cell size. Major conclusions from statistical sampling test results are that (1) the number of samples required decreases with increasing depth, (2) when the total number of samples cannot be prespecified or the moisture in only one single layer is of interest, then a simple random sample procedure should be used which is based on the observed mean and SD for data from a single field. (3) when the total number of samples can be prespecified and the objective is to measure the soil moisture profile with depth, then stratified random sampling based on optimal allocation should be used, and (4) decreasing the sensor resolution cell size leads to fairly large decreases in samples sizes with stratified sampling procedures, whereas only a moderate decrease is obtained in simple random sampling procedures

A78-18250 Satellite observations of snowcover in the Sierra Nevadas during the great California drought S Schneider and M Matson (NOAA, National Environmental Satellite Service, Washington, D C) Remote Sensing of Environment, vol. 6, no. 4, 1977, p. 327-334

Images from the NOAA polar orbiting satellites are used to assess the extent of snowcover in the Sierra Nevada mountain range during the 1977 drought year. Areal snowcover measurements derived from late April satellite imagery reveal the entire mountain range to have less than one third the snowcover that was present at a comparable date in 1975. Ratios of 1977 to 1975 snowcover for individual basins of the Sierra Nevada ranged from a low of 1.9 in low-elevation watersheds to a high of 1.2 in high-elevation water sheds. Reduction of the satellite data was accomplished through the use of a density slicer, a color additive viewer, and an optical rectification device. (Author)

A78-18859 Remote sensing of soil moisture and ground-water, Proceedings of the Workshop, Toronto, Canada, November 8-10, 1976 Workshop sponsored by the Canadian Aeronautics and Space Institute Ottawa, Canadian Aeronautics and Space Institute, 1977 246 p \$25

An introduction to hydrologic problems and the principles of remote sensing is presented, taking into account agriculture and soil moisture, groundwater projects in Saskatchewan and Alberta, and the application of remote sensing to watershed modeling and real-time flood forecasting. Surface and near surface techniques are discussed along with airborne techniques and spaceborne methods with attention given to advances in surface geophysical techniques for groundwater and soil moisture, the surface electrical investigation of a sandy aguifer contaminated by fertilizer, the electromagnetic detection of soil water content, and the electrical properties of water in rocks and soil. The integration of remote sensing techniques is applied to groundwater investigations, noting airborne thermal infrared sensing of soil moisture, methods of assessment of ground truth soil moisture, an evaluation of radar as a soil moisture sensor, microwave radiometry for soil moisture sensing, the identification of groundwater regimes in a Great Lakes basin, and the use of Landsat imagery in studies of spring icings and seasonally flooded Karst in permafrost areas

A78-18860 # Groundwater projects, problems, and parameters in Saskatchewan and Alberta, Canada J D Mollard (J D Mollard and Associates, Ltd., Regina, Saskatchewan, Canada) In Remote sensing of soil moisture and groundwater, Proceedings of the Workshop, Toronto, Canada, November 8-10, 1976

Ottawa, Canadian Aeronautics and Space Institute, 1977, p. 15-27

Data selected from over 400 groundwater projects on which remote sensing methods were used, mostly conventional airphoto interpretation, are summarized. The investigations cover a 20-year period and mainly concern prospecting and exploration for municipal and industrial groundwater supplies. These subsurface exploration studies were followed by water well construction and testing, and by groundwater source evaluation. Characteristic types of groundwater projects, examples of problems frequently encountered, and cost and hydrogeologic parameters associated with these investigations are listed and briefly discussed. (Author)

A78-18861 # The application of remote sensing to water resources planning, watershed modelling and real-time flood forecasting D W Lawson (Environment Canada, Hydrology Research Div , Calgary, Alberta, Canada) In Remote sensing of soil moisture and groundwater, Proceedings of the Workshop, Toronto, Canada, November 8-10, 1976 Ottawa, Canadian Aeronautics and Space Institute, 1977, p 28-48 13 refs

It is shown that watershed modeling which is associated with real-time flood forecasting provides the greatest opportunity to demonstrate the hydrological utility of remote sensing. An overview is presented of the type of water resources planning which would be required to develop an optimal hydroelectric generating scheme for a large river basin. The choice of the most appropriate hydrological models is considered along with the related implications for remote sensing. The classes of models generally distinguished in water resources planning include economic models, optimization (mathematical programming) models, and simulation models. Attention is given to analysis techniques, the potential for remote sensing applications, project management decisions, the interrelated aspects of hydrologic model building which can be aided by remote sensing, the calibration of the gauged watersheds, and the modeling of ungauged areas.

A78-18862 # Advances in surface geophysical techniques for groundwater and soil moisture L S Collett (Geological Survey of Canada, Resource Geophysics and Geochemistry Div, Ottawa, Canada) In Remote sensing of soil moisture and groundwater, Proceedings of the Workshop, Toronto, Canada, November 8-10, 1976 Ottawa, Canadian Aeronautics and Space Institute, 1977, p 51-80 86 refs

The geophysical parameters considered for hydrogeological studies are electrical resistivity, compressional wave velocity, and, to a lesser extent, density The use of the induced polarization (IP) method constitutes an important advance with respect to the technical resistivity technique. The electrical resistivity of rock is a property which depends on lithology, porosity, and fluid content Resistivity ranges of various rock types measured in situ by the galvanic resistivity method are listed in a table. The seismic refraction method is used to measure the compressional wave velocity. The IP method is widely used in mineral exploration for the detection of disseminated sulfides. New methods in the area of electromagnetic sounding are related to the use of a new induction system operating on 14 selected frequencies in the range from 5 Hz to 45,000 Hz and to the employment of a magnetotelluric method which makes use of the natural electric currents that flow in the earth in the form of large sheets

A78-18863 # Electromagnetic detection of soil water content - Progress report II J L Davis, A P Annan (Geological Survey of Canada, Ottawa, Canada), and G C Topp (Agriculture Canada, Soil Research Institute, Ottawa, Canada) In Remote sensing of soil moisture and groundwater, Proceedings of the Workshop, Toronto, Canada, November 8 10, 1976 Ottawa, Canadian Aeronautics and Space Institute, 1977, p 96-109 18 refs

Most of the proposed rapid, reliable, nondestructive water content measuring systems are based on the determination of the electrical properties of the soil to be studied. The real dielectric constant K' appears to be highly sensitive to the amount of water in the soil. A description is given of an investigation concerned with the dependence of K' on the soil water content in the frequency range.

from 1 MHz to 1 GHz Laboratory measurements are being used to derive an empirical relationship between K' and soil water content Field results indicate that the time domain reflectometry techniques provide a practical method for determining soil water content profiles in the top water of the soil. It is found that K' is a sensitive indicator of soil water content with a precision of better than + or - 3% overall. Greater precision may result if other soil variables are considered.

A78-18864 # Electrical properties of water in rocks and soils T J Katsube (Geological Survey of Canada, Resource Geophysics and Geochemistry Div , Ottawa, Canada) In Remote sensing of soil moisture and groundwater, Proceedings of the Workshop, Toronto, Canada, November 8-10, 1976

Ottawa, Canadian Aeronautics and Space Institute, 1977, p. 110-121, 13 refs

Moisture in soils and rocks is mainly contained in pores. The 'firmly bound water' consists of layers of water molecules firmly bound to the surfaces of the soil particles or rock grains, 'loosely bound water' consists of water molecule layers outside of the firmly bound water layers, and 'free water' is water which is not subject to any attraction forces towards the particle or grain surfaces. The electrical properties of pore water in rocks and soils can usually be characterized by three bulk parameters. The dielectric constant appears to indicate total water content in soils. Resistivity and other parameters may produce further information on the bound and free water contents. It is pointed out that measurements by multifrequency techniques are necessary to extract the most useful information which can be gained by electrical or EM remote sensing methods.

A78-18865 # Integration of remote sensing techniques applied to groundwater investigations J D Mollard (J D Mollard and Associates, Ltd , Regina, Saskatchewan, Canada) In Remote sensing of soil moisture and groundwater, Proceedings of the Workshop, Toronto, Canada, November 8-10, 1976 Ottawa, Canadian Aeronautics and Space Institute, 1977, p 125-144

Properly integrated remote sensing methods can be a valuable aid in investigations of different types of groundwater projects. It is shown that the interpretation of aerial remote sensing images, particularly medium scale panchromatic airphotos, can assist materially in about 7 out of 10 groundwater investigations in the Prairie Provinces of Western Canada. However, the correct interpretation of the data requires that the photo interpreter has a sound knowledge regarding the proper integration of data developed from different aerial imaging remote sensors. Especially important is the ability to recognize the groundwater indicator clues which are discernible in airphotos of the terrain, taking into account the interpretation of their significance in terms of a potentially economically developable groundwater source.

A78-18866 # Airborne thermal infra-red sensing of soil moisture and groundwater J M Whiting (Saskatchewan Research Council, Saskatoon, Canada) In Remote sensing of soil moisture and groundwater, Proceedings of the Workshop, Toronto, Canada, November 8-10, 1976 Ottawa, Canadian Aeronautics and Space Institute, 1977, p 145-154 23 refs

The basic element of the airborne thermal mapping system is the line scanner which is operated by means of a rotating plane mirror. The intensity changes of the received radiation are converted into voltage changes by the IR detector. The signal is finally recorded on magnetic tape. Distortions related to the nature of the scanning techniques can be corrected with the aid of computer processing. Thermal infrared methods have been successfully applied to the detection of groundwater discharge into bodies of open water. Potential economic benefits of thermal IR scanning are related to the finding of new water supplies, the detection of areas of water contamination, and the discovery of new energy sources. The economic potential of thermal IR for detection of soil moisture lies in its uses in agricultural research and in runoff hydrology modeling applications. However, more development work is required for a realization of this potential.

A78-18867 # Methods of assessment of ground truth soil moisture H H Neumann and E I Mukammal (Department of the Environment, Atmospheric Environment Service, Toronto, Canada) In Remote sensing of soil moisture and groundwater, Proceedings of the Workshop, Toronto, Canada, November 8-10, 1976

Ottawa, Canadian Aeronautics and Space Institute, 1977, p 155-166 28 refs

Gravimetric sampling is the only technique for the measurement soil moisture which provides absolute values. The absolute moisture content from a sample is determined on the basis of the loss in weight of the sample in response to oven drying. The principal limitations of the technique are the labor required in obtaining the samples and performing the required operations in the laboratory Details of sampling are discussed, taking into account random sampling, the independent sampling of each stratum, and systematic sampling. The method most likely to be used in any relatively large scale field study of soil water contents is the neutron scattering technique. The method is most suited for determining water content profiles and is less effective for the surface layer, although surface instruments are available. A neutron meter consists of a radioactive source of fast or high energy neutrons and a detector of slow or thermal neutrons. The major difficulty with neutron probes is obtaining a reliable calibration for the particular soil and location

GR

A78-18868 # An evaluation of radar as a soil moisture sensor F T Ulaby (Kansas, University, Lawrence, Kan ) In Remote sensing of soil moisture and groundwater, Proceedings of the Workshop, Toronto, Canada, November 8 10, 1976

Ottawa, Canadian Aeronautics and Space Institute, 1977, p 169-183 13 refs

The sensitivity of radar to soil moisture variations is evaluated for bare and vegetation covered terrain. The optimum microwave frequency, angle of incidence, and polarization are specified such that the combined effects of soil surface roughness and vegetation parameters (crop type, morphological state, row direction, temporal and diurnal behavior, etc.) are minimized while retaining good sensitivity to soil moisture content.

(Author)

A78-18869 \* # Microwave radiometry for soil moisture sensing T Schmugge (NASA, Goddard Space Flight Center, Applications Directorate, Greenbelt, Md ) In Remote sensing of soil moisture and groundwater, Proceedings of the Workshop, Toronto, Canada, November 8-10, 1976 Ottawa, Canadian Aeronautics and Space Institute, 1977, p. 184-205 15 refs

Investigations have been conducted with truck-mounted radiometers to study the variation of microwave emissivity from a soil. It was found that the longer wavelength radiometers, (21 cm), are preferable for the remote sensing of soil moisture. Aircraft observations indicated a nonlinear dependence of microwave brightness temperature on soil moisture. The dielectric constants of soils are considered along with the radiative transfer in soils, and soil water characteristics. A description is presented of test flights conducted with a NASA aircraft, taking into account soil moisture measurements and instrumentation. The obtained results show that the surface emissivity of a soil is determined by the dielectric properties of the surface soil layer a few tenths of a wavelength thick while the thermal sampling depths are much greater. The capability of the 21-cm radiometer to sense soil-moisture variations through a moderate vegetation canopy, and the promising Skylab results encourage consideration of a radiometer operating at this wavelength for routine soil moisture observations

A78-18870 # Soil moisture determination by thermal infrared remote sensing J Cihlar (Canada Centre for Remote Sensing, Applications Development Section, Ottawa, Canada) In Remote sensing of soil moisture and groundwater, Proceedings of the Workshop, Toronto, Canada, November 8 10, 1976

Ottawa, Canadian Aeronautics and Space Institute, 1977, p 206-215 14 refs

The determination of the soil water content by thermal infrared remote sensing includes the measurement of the surface temperature

and an evaluation procedure in which this temperature must be quantitatively related to the amount of water present in the soil. The procedure used in calculating the surface temperature on the basis of the received radiation is briefly considered and approaches are discussed which can be used to establish the temperature soil moisture relationship required to evaluate the temperature data. Attention is also given to various experimental studies concerning the relationship between surface temperature and soil moisture.

A78-18871 # Landsat-1 identification of groundwater regimes in a Great Lake basin A G Bobba, J E Bruton, and R P Bukata (Canada Centre for Inland Waters, Remote Sensing Section, Burlington, Ontario, Canada) In Remote sensing of soil moisture and groundwater, Proceedings of the Workshop, Toronto, Canada, November 8-10, 1976 Ottawa, Canadian Aeronautics and Space Institute, 1977, p. 216-231

A preliminary report is presented concerning the application of telemetered Landsat 1 data to the synoptic classification of a Great Lake basin in terms of its component groundwater regimes which are related to discharge, recharge, and transition areas. The Big Creek and Big Otter Creek basins in southern Ontario were selected as test-sites for the satellite study. Both basins drain into northeastern Lake Erie. A training center for the classification procedure was selected in the Scotland area. The classification determined for the training center was extended to include the entire test basins. A graph is presented which displays the computer classification for all the discharge areas in the Big Otter and Big Creek basins as delineated by the Landsat 1 earth-orbiting satellite on March 20, 1974.

A78-18872 # Use of Landsat imagery in studies of spring icings and seasonally flooded karst in permafrost areas R O van Everdingen (Environment Canada, Hydrology Research Div., Calgary, Alberta, Canada) In Remote sensing of soil moisture and ground water, Proceedings of the Workshop, Toronto, Canada, November 8-10, 1976 Ottawa, Canadian Aeronautics and Space Institute, 1977, p. 231 A-235

A78-20174 # Electromagnetic detection of soil moisture Progress Report I J L Davis and A P Annan (Geological Survey of Canada, Ottawa, Canada) (Canadian Aeronautics and Space Institute, Aerospace Electronics Symposium, Banff, Alberta, Canada, Feb 4, 1976) Canadian Journal of Remote Sensing, vol 3, Dec 1977. p. 76-86 14 refs

The remote determination of soil moisture content requires a remotely detectable physical property of soils which is primarily dependent on moisture content. One physical property which holds promise of satisfying these conditions is the complex dielectric constant of the soil in the frequency band 10 to the 7th to 10 to the 9th Hz. Laboratory and field experiments employing time domain reflectometry (TDR) methods indicate the following that the dielectric constant depends strongly on soil moisture and weakly on soil type, and density, that variations of several hundred per cent in the dielectric constant occur as moisture content varies for the range of moisture content normally encountered in the field, that an empirical relationship between dielectric constant and soil moisture exists.

N78-10535\*# South Dakota State Univ , Brookings Remote Sensing Inst

HCMM ENERGY BUDGET DATA AS A MODEL INPUT FOR ASSESSING REGIONS OF HIGH POTENTIAL GROUNDWATER POLLUTION Interim Report, Jul. - Sep. 1977

Donald G Moore, Principal Investigator J Tunheim, and J Heilman Sep 1977 14 p ref ERTS

(Contract NAS5-24206)

(E78-10010, NASA-CR-155214, QR-1) Avail NTIS HC A02/MF A01 CSCL 08H

The author has identified the following significant results. The finite difference model was used to calculate the differences in surface temperature between two hypothetical sites which result from a temperature difference at 50 cm due to the presence

of shallow ground water at one of the sites. Although qualitative results of the model seemed consistant with experimental results, further evaluation showed a need for taking account of differences in thermal conductivity due to different moisture profiles at the two sites considered.

N78-10536\*# Texas A&M Univ. College Station Remote Sensing Center

LANDSAT/COASTAL PROCESSES Final Report, Jun. 1976 - Aug. 1977

Wesley P James, Principal Investigator, John M Hill, and Jon B Bright Aug 1977 105 p refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D ERTS (NASA Order S-55812A)

(E78-10011, NASA-CR-155215, RSC-3380) Avail NTIS HC A06/MF A01 CSCL 08C

The author has identified the following significant results Correlations between the satellite radiance values water color, Secchi disk visibility, turbidity, and attenuation coefficients were generally good. The residual was due to several factors including systematic errors in the remotely sensed data, errors, small time and space variations in the water quality measurements and errors caused by experimental design. Satellite radiance values were closely correlated with the optical properties of the water

N78-10541\*# National Aeronautics and Space Administration Lyndon B Johnson Space Center, Houston Tex

A TECHNIQUE FOR THE DETERMINATION OF LOUISIANA MARSH SALINITY ZONE FROM VEGETATION MAPPED BY MULTISPECTRAL SCANNER DATA: A COMPARISON OF SATELLITE AND AIRCRAFT DATA

Vegetation in selected study areas on the Louisiana coast was mapped using low altitude aircraft and satellite (LANDSAT) multispectral scanner data Fresh, brackish, and saline marshes were then determined from the remotely sensed presence of dominant indicator plant associations. Such vegetational classifications were achieved from data processed through a standard pattern recognition computer program. The marsh salinity zone maps from the aircraft and satellite data compared favorably within the broad salinity regimes. The salinity zone boundaries determined by remote sensing compared favorably with those interpolated from line-transect field observations from an earlier year.

N78-10542\*# National Aeronautics and Space Administration Goddard Space Flight Center Greenbelt Md AOIPS WATER RESOURCES DATA MANAGEMENT

SYSTEM

Peter VanWie Feb 1977 17 p Presented at Director's Sci
Seminar on Earth Resources Survey Technol Transfer and System
Concept Develop, Greenbelt, Md, 2 Dec 1976 Prepared in

cooperation with Earth Satellite Corp , Washington, D. C. Original

contains color illustrations (Contract NAS5-22894)

(NASA-TM-X-71396 X-931-77-38) Avail NTIS HC A02/MF A01 CSCL 08H

The text and computer-generated displays used to demonstrate the AOIPS (Automatic and Oceanographic Information Processing System) water resources data management system are investigated. The system was developed to assist hydrologists in analyzing the physical processes occurring in watersheds. It was designed to alleviate some of the problems encountered while investigating the complex interrelationships of variables such as land-cover type, topography, precipitation, snow melt, surface runoff, evapotranspiration, and streamflow rates. The system has an interactive image processing capability and a color video display to display results as they are obtained.

Author

N78-10630# Calspan Corp., Buffalo, N Y
THERMAL REMOTE SENSING CALIBRATION TECHNIQUES
Final Report

John R Schott 15 Mar 1977 107 p refs Sponsored by the New York State Energy Research and Development Author-

(PB-269471/9, CALSPAN-NA-6019-M-1, NYSERDA-75/22) Avail NTIS HC A06/MF A01 CSCL 13B

A technique is described for measuring water surface temperatures from airborne platforms. A number of techniques were tested and evaluated to determine which was the most suitable and with what precision surface temperatures could be measured from the air. The approaches considered were wholly airborne requiring no ground truth. The results indicate that the state-of-the-art has been advanced to a point where wholly airborne thermal infrared remote sensing of true water surface temperatures can be accomplished with sufficient precision to permit its use as a fully operational approach.

N78-11447\*# Bureau of Mineral Resources Geology and Geophysics, Canberra (Australia)

# WATER UTILIZATION, EVAPOTRANSPIRATION AND SOIL MOISTURE MONITORING IN THE SOUTH EAST REGION OF SOUTH AUSTRALIA Final Report

K R McCloy, K J Shepherd and G F McIntosh, Principal Investigators 10 Jan 1977 7 p refs Sponsored by NASA FRTS

(E78-10001, NASA-CR-155205) Avail NTIS HC A02/MF A01 CSCL 05B

The author has identified the following significant results. It was established that reliable estimates of sand and coastal scrub areas can be determined from LANDSAT image classification by the Vec classifier more economically than by conventional means from a map of the coastal zone produced by photointerpretation using 1 10 000 aerial photography. Current LANDSAT imagery is also suitable for monitoring for large scale storm damage to the zone, but the normal change in sand areas extent due to man's activity or other reasons is about 5 to 10 m per year, occasionally being as great as 30 m per year so that it is considered that LANDSAT D will have the resolution necessary to monitor these changes but not current imagery

N78-11455# World Meteorological Organization Geneva (Switzerland)

MODERN DEVELOPMENTS IN HYDROMETRY, VOLUME 2
Padua Intern Centre of Hydrol 1976 520 p refs Proc of
the WMO Intern Seminar, Padua, 8-13 Sept 1975 co-sponsored
by Intern Centre of Hydrol, UNESCO, and Intern Assoc of
Hydrol Sci

(WMO-427 ISBN-92-63-10427-1) Avail NTIS HC A22/MF A01, WMO Geneva

Topics presented include instrumentation, methods and techniques of observation, measurements under difficult conditions, accuracy of hydrometric measurements inter comparison of hydrometric instruments and remote sensing and telemetering techniques

N78-11467# Department of Environment Hull (Quebec) Water Resources Branch

APPLICATION OF ELECTRONIC DISTANCE MEASURING DEVICES TO MEASUREMENT OF DISCHARGE AND SEDIMENT DEPOSITION

Percy Ian Campbell In WMO Mod Develop in Hydrometry Vol 2 1976 p 160-170 refs

Avail NTIS HC A22/MF A01 WMO, Geneva

How the Canadian Dept of Environment has adapted Electronic Distance Measuring Devices (EDMD s) to the measurement of both discharge and sediment changes in Canadian rivers is described. The application of EDMD s was developed to reduce manpower requirements in the field, to permit automatic data handling, and to make possible measurement techniques not otherwise feasible.

Author (ESA)

N78-11468# World Meteorological Organization, Geneva (Switzerland)

## SOME SPECIFIC PROBLEMS IN THE OPERATION OF A GAUGING STATION

James C Lambie In WMO Mod Develop in Hydrometry, Vol 2 1976 p 171-190

Avail NTIS HC A22/MF A01, WMO Geneva

The accuracy of the record of discharge from a gaging station is dependent on the accuracy of the record of stage and of the relation established between stage and discharge. Some of the problems which arise in the operation of such a station are described and it is suggested that the quality of the stage recording instruments installed at the station should be related to the sensitivity of the station control and therefore of the stage discharge relation. A method of defining sensitivity to enable a comparison of this quality to be made station to station is proposed. The results of tests on different types of water level recorders both when new and after years of field use are given. Details are given of velocity pulsation patterns detected on a number of rivers and the effect of these on average velocity.

Author (ESA)

N78-11469# Atomic Energy Research Establishment Harwell (England)

#### ULTRASONIC RIVER GAUGING

Ronald W Loosemore *In* WMO Mod Develop in Hydrometry Vol 2 1976 p 190-208 refs

Avail NTIS HC A22/MF A01 WMO Geneva

The principle of a non-obstructive method for determining the total volumetric flow-rate in rivers is outlined combining an ultrasonic measurement of mean water velocity at one depth with the output of a resistance water level sensor. An instrument based on these principles is described which provides automatically a direct numerical display of net discharge and mean water depth together with outputs on punched tape. It will operate at a mean water velocity of less than 0.01 m/sec. Some details of its performance at three river sites in the U.K. are given. A second instrument is also described, incorporating up to 8 ultrasonic measuring paths, in which the multiplexing, control and arithmetic functions are provided by a single-chip microprocessor and separate single-chip calculator. It is intended for use in rivers which exhibit a wide range of stage.

N78-11470# Department of the Environmental Water Data Unit Reading (England)

## SITE CALIBRATION OF ELECTROMAGNETIC AND ULTRA-SONIC RIVER GAUGING STATIONS

Michael John Green and Reginald Walter Herschy /n WMO Mod Develop in Hydrometry Vol 2 1976 p 209-231 refs

Avail NTIS HC A22/MF A01, WMO Geneva

The output of the experimental electromagnetic river gaging system is compared to a Crump weir and it is shown that the rating equation may be expressed independent of the cross sectional area of the river A self calibrating procedure is described for the ultrasonic method of river gaging and compared to current metering and dilution gaging. An accuracy of plus or minus 11 % was achieved for the standard error of estimate for the electromagnetic method. The ultrasonic and current metering compared to within 6% and the dilution gaging between 3 and 14%.

Author (ESA)

## N78-11475# Geological Survey, Anchorage Alaska HYDROMETRY UNDER ARCTIC CONDITIONS

Joseph M Childers and James P Meckel In WMO Mod Develop in Hydrometry Vol 2 1976 p 298-303

Avail NTIS HC A22/MF A01 WMO Geneva

Streamflow measurement in Arctic Alaska requires special techniques and equipment in addition to those used in temperate regions. Annual snowmelt contributes practically all runoff in most years in Arctic streams. Variable ice and snow conditions require continuous discharge measurement to define the snowmelt hydrograph. Winter flow from Sept. to May produces channel ice, which hides the flow Much effort and specialized ice drilling or trenching are necessary to find and measure the flowing water, or to ascertain that no flow exists. Special current meters and suspensions were designed for use through narrow drill holes.

Remote sites accessible only by specialized aircraft require highly developed boating techniques where no bridges or cableways exist. If a hydrometric field party is to measure not only streamflow discharge but also suspended sediment and other water-quality parameters on each trip travel is very expensive. Also, this means that the hydrometrists must be versatile and trained in many Author (ESA)

### N78-11476# Institute of Hydrology Wallingford (England) TELEMETERING RIVER LEVEL FROM A LARGE, REMOTE, TROPICAL AREA

lan Strangeways In WMO Mod Develop in Hydrometry Vol 2 1976 p 304-310 refs

#### Avail NTIS HC A22/MF A01 WMO Geneva

The problems of designing a radio telemetry system for river forecasting in a remote area of Brazil are discussed. The area concerned is of about 490 000 sq km lacks more than rudimentary road or rail transport or a telephone network and is virtually unpopulated and undeveloped. The sophisticated back-up required by complex instruments is in the distant modern cities on the coast. The equipment used, and the results achieved are described. The importance of the part people play in instrument networks is discussed and a plea is made for instrument systems designed to fit the circumstances Author (ESA)

### N78-11480# State Hydrological Inst (USSR) AERIAL METHODS OF MEASURING WATER DIS-**CHARGES**

Vsevolod V Kuprianov In WMO Mod Develop in Hydrometry, Vol 2 1976 p 343-350 refs

#### Avail NTIS HC A22/MF A01, WMO Geneva

Methods of measuring water discharges with the help of an airplane have been under development in the USSR since 1965 By now no less than 4 000 measurements have been carried out at the rivers in hard-to-access areas, where the usage of routine methods is difficult. There were methods of stream surface velocities determination by means of floats and velocity integration along the vertical. The accuracy of aerial water discharge measurements if carefully carried out is not inferior to the accuracy of ground methods. This method is particularly advantageous in the case of a submerged flood plain, when ground measurements are practically impossible. The use of aerial methods affords the possibility of reducing or even eliminating ground measurements Author (ESA)

#### N78-11489# Geological Survey, Reston, Va USE OF EARTH SATELLITE TECHNOLOGY FOR TELEME-TERING HYDROMETEOROLOGICAL STATION DATA Richard W Paulson In WMO Mod Develop in Hydrometry, Vol 2 1976 p 476-489 refs

#### Avail NTIS HC A22/MF A01 WMO Geneva

Recent developments in communications and earth satellite technologies are presenting new and powerful tools for the collection of hydrometeorological station data. It is now possible, using existing technologies to deploy an earth satellite system to collect hydrometeorological data from a large network of stations distributed over continental or global areas. Experiments for the last 3 years with the LANDSAT series of polar orbiting satellites have demonstrated that data can be collected via inexpensive battery operated radios several times daily from 1,000 to 2 000 stations distributed over North America. The Geostationary Operational Environmental Satellites, two of which are in orbit are designed to collect data from 10,000 stations Existing technology can permit the collection of data from 100 000 stations deployed globally. Earth satellites can become powerful tools for collecting data related to changes in the environment and for monitoring the status and performance of data gathering networks. The hydrometeorological communities are faced with the challenge to develop water resources management and forecasting techniques to fully realize the benefits earth satellites can provide Author (ESA)

N78-11490# Inland Waters Directorate Ottawa (Ontario) Water Resources Branch

#### DATA RETRANSMISSION BY SATELLITE FOR OPER-ATIONAL PURPOSES

R A Halliday In WMO Mod Develop in Hydrometry Vol 2 1976 p 490-501 refs

Avail NTIS HC A22/MF A01 WMO Geneva

It is not economically possible to telemeter water resources data from many parts of Canada using conventional telephone or radio systems. Because of this experimental use of the LANDSAT data retransmission system was initiated in 1972 Since that time both the LANDSAT and GOES spacecraft have been used to retransmit water level and other related data for operational purposes. The retransmitted data have been used for flow and flood forecasting and for hydrometric operations The satellite data collection systems have operated so well and the costs of using the system have been so favorable that a considerable expansion of the network seems likely. There is also a good possibility that a data retransmission system using Canadian UHF satellites will be implemented Author (ESA)

N78-11647# Maryland Univ College Park Meteorology Program

#### AN INTERCOMPARISON OF SATELLITE IMAGES AND RADAR RAINFALL RATES Final Report

Nancy Cheng and David Rodenhuis Apr 1977 69 p refs (Grant NOAA-04-4-158-48)

(PB-270299/1 NOAA-77062709)

NTIS HC A04/MF A01 CSCL 04B

Digitized NOAA-2 visible and infrared data were compared with the observations of WSR-57 10 cm radar for 1041 AM June 28, 1973 in the Miami area. The linear correlation coefficients between satellite and radar data ranged from 0.23 to 0.34 for visible 0 17 to 0 27 for infrared. The correlation could not be improved by considering only a fraction of the satellite image

data above a threshold value. That is, the overlapping area ratios between satellite images and radar echoes ranged from 44% to 73% for the visible and slightly smaller (41% to 63%) for the infrared. When only the area of the radar echo is considered the area ratios could be increased to an average of 75% (visible)

N78-12490 Old Dominion Univ., Norfolk, Va

and 71% (infrared)

#### FUNDAMENTAL ANALYSIS OF THE LINEAR MULTIPLE REGRESSION TECHNIQUE FOR QUANTIFICATION OF WATER QUALITY PARAMETERS FROM REMOTE SENSING DATA Ph D Thesis

Charles Henry Whitlock III 1977 184 p Avail Univ Microfilms Order No 77-16940

Optical physics and environmental conditions under which multiple regression analysis is applicable were defined. An investigation of signal response equations was conducted and concepts were tested by application to both analytical test cases and actual remote sensing data. Least squares and statistical concepts for performing the analysis were examined and a test for evaluating the applicability of least squares techniques to a particular set of data was defined it was concluded that constituents with linear radiance gradients may be quantified from signals which contain nonlinear atmospheric and surface reflection effects for both homogeneous and nonhomogeneous water bodies provided accurate data can be obtained and Dissert Abstr nonlinearities are constant with wavelength

N78-12506\* # Tennessee Univ Space Inst , Tullahoma Remote Sensing Div

#### **APPLICATION OF LANDSAT IMAGES TO WETLAND STUDY** AND LAND USE CLASSIFICATION IN WEST TENNESSEE, **PART 1 Final Report**

F Shahrokhi, Principal Investigator and Nancy L. Jones [1977] 70 p refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sloux Falls, S D ERTS

(Contract NAS8-31980)

NASA-CR-150422) (E78-10031, HC A04/MF A01 CSCL 08B

Avail NTIS

The author has identified the following significant results Densiometric analysis was performed on LANDSAT data to permit numerical classification of objects observed in the imagery on the basis of measurements of optical density. Relative light transmission measurements were taken on four types of scene elements in each of three LANDSAT black and white bands in order to determine which classification could be distinguished The analysis of band 6 determined forest and agricultural classifications, but not the urban and wetlands Both bands 4 and 5 showed a significant difference existed between the confirmed classification of wetlands-agriculture, and urban areas Therefore, the combination of band 6 with either 4 or 5 would permit the separation of the urban from the wetland classification To enhance the urban and wetland boundaries, the LANDSAT black and white bands were combined in a multispectral additive color viewer. Several combinations of filters and light intensities were used to obtain maximum discrimination between points of interest. The best results for enhancing wetland boundaries and urban areas were achieved by using a color composite (a blue, green, and red filter on bands 4, 5 and 6 respectively)

N78-12807°# Calspan Corp. Buffalo, N Y
APPLICATIONS OF MCMM SATELLITE DATA Quantorly
Ropport, 23 Awg. - 23 Nov. 1977
23 Nov. 1977 2 p ERTS
(Contract NASS-24263)
(E78-10033, NASA-CR-155257, QR-1) Avail NTIS
HC A02/MF A01 CSCL 05B

N78-12518# Army Armament Research and Development Command, Aberdeen Proving Ground, Md Chemical Systems

IMPRARED ABSORPTION SPECTRA ATTRIBUTED TO ION-NUCLEATED WATER CLUSTERS Technical Report, Aug. 1976 - Jun. 1977

Hugh R Carlon Sep 1977 22 p refs

(AD-A044661. ARCSL-TR-77-59) Avail NTIS HC A02/MF A01 CSCL 04/1

Until recently it was assumed that atmospheric water was found in one of three phases vapor (monomer), liquid droplets or ice crystals. Now it is known that an ion-nucleated, polymolecular cluster phase of water exists in the vapor phase, as well These water clusters consist of numbers of water molecules gathered about small ionic nuclei, where the number of molecules per cluster is dependent upon relative humidity and other meteorological parameters in real atmospheres, mean cluster sizes range from about 11 to about 14 molecules per cluster Their infrared absorption is due to intermolecular hydrogen bonding, and the 'continuum'-like absorption spectrum which they produce is shifted in wavelength by changes in mean cluster size Water clusters are always present in the atmosphere and in the cleanest of laboratory experimental equipment. Except under supersaturations of about 420% relative humidity, clusters are not able, because of equilibrium considerations, to attain 'critical' size and to grow to droplets. Water cluster theory and equations give excellent agreement with observed data for infrared Author (GRA) 'continuum' absorption

N7©-13©03<sup>0</sup># Bendix Corp , Ann Arbor Mich Aerospace Systems Div

Application of Landsat to the surveillance of Lake Eutrophication in the Great Lakes Basin First Ropert, Mot. 1975 - Sop. 1977

Robert H Rogers, Vann E Smith (Cranbrook Inst of Science, Bloomfield Hills, Mich.), James P Scherz (Wisconsin Univ., Madison), William J Woelkerling (Wisconsin Univ., Madison), Michael S Adams (Wisconsin Univ., Madison), and John E Gannon, Principal Investigators (Michigan Univ., Pellston) Sep 1977—193 p refs Original contains color imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D ERTS

(Contract NAS5-20942)

(E78-10023, NASA-CR-154951, BSR-4291) Avail NTIS HC A09/MF A01 CSCL 08H

The author has identified the following significant results. A step-by-step procedure for establishing and monitoring the trophic

status of inland lakes with the use of LANDSAT data, surface sampling, laboratory analysis, and aerial observations were demonstrated. The biomass was related to chlorophyll-a concentrations, water clarity, and trophic state. A procedure was developed for using surface sampling, LANDSAT data, and linear regression equations to produce a color-coded image of large lakes showing the distribution and concentrations of water quality parameters, causing eutrophication as well as parameters which indicate its effects. Cover categories readily derived from LANDSAT were those for which loading rates were available and were known to have major effects on the quality and quantity of runoff and lake eutrophication. Urban, barren land, cropland, grassland, forest, wetlands, and water were included.

N7©-13€0≤0# Wisconsin Univ , Madison Inst for Environmental Studies

on multidisciplinary research on the application of remote sensing to water resources problems precious roper, 1976 - 1977

James L Clapp 1977 384 p refs Original contains color imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D ERTS

(Grant NGL-50-002-127)

(E78-10028, NASA-CR-155253) Avail NTIS HC A17/MF A01 CSCL 08H

N76-13503°# Norwegian Water Resources and Electricity Board, Oslo

APPLICATION OF LANDSAT IMAGERY FOR SHOW MAPPING IN HORWAY Final Report

Helger Odegaard Principal Investigator and Gunnar Ostrem 1 Feb 1977 64 p refs Sponsored by NASA Original contains color imagery Original photography may be purchased from the EROS Data Center Sioux Falls, S D ERTS

(E78-10029, NASA-CR-155254) Avail NTIS HC A04/MF A01 CSCL 08L

The author has identified the following significant results. It was shown that if the snow cover extent was determined from all four LANDSAT bands, there were significant differences in results. The MSS 4 gave the largest snow cover, but only slightly more than MSS 5, whereas MSS 6 and 7 gave the smallest snow area. A study was made to show that there was a relationship between the last date of snow fall and the area covered with snow as determined from different bands. Imagery obtained shortly after a snow fall showed no significant difference in the snow-covered area when the four bans were compared, whereas, pronounced differences in the snow-covered area were found in images taken after a long period without precipitation.

N78-13503°# Ecosystems International, Inc., Gambrills, Md APPLICATIONS OF REMOTE SENSING TO WATER RESOURCES Tochnical Roport, 15 Mar - 30 Apr. 1977 Dec 1977 52 p

(Contract NAS8-32408)

(NASA-CR-150467) Avail NTIS HC A04/MF A01 CSCL 08H

Analyses were inade of selected long-term (1985 and beyond) objectives, with the intent of determining if significant data-related problems would be encountered and to develop alternative solutions to any potential problems. One long-term objective selected for analysis was Water Availability Forecasting A brief overview was scheduled in FY-77 of the objective -primarily a fact-finding study to allow Data Management personnel to gain adequate background information to perform subsequent data system analyses. This report, includes discussions on some of the larger problems currently encountered in water measurement, the potential users of water availability forecasts, projected demands of users, current sensing accuracies, required parameter monitoring status of forecasting modeling and some measurement accuracies likely to be achievable by 1980 and 1990 Author

N78-13513# Army Cold Regions Research and Engineering Lab , Hanover N H
AERIAL PMOTOINTERPRETATION OF A SMALL ICE JAM

Stephen L Denhartog Oct 1977 21 p (AD-A045870, CRREL-SR-77-32) Avail NTIS HC A02/MF A01 CSCL 08/12

Aerial photos of a small ice jam on the Pemigewasett River near Plymouth, New Hampshire, were taken three days after the jam and compared with photos taken after the ice went out The winter photos show a marked and sudden decrease in floe size apparently indicative of faster and longer movement of the ice. The spring photos show a number of shallows and obstructions that apparently had no effect on the ice movement it is concluded that this jam was caused by a change in slope and subsequent reduction in velocity.

Author (GRA)

N7@-13622# Idaho Univ . Moscow Water Resources Research Inst

EFFECT OF ANTECEDENT ON FROZEN GROUND FLOODS

Ralph Pedersen, Myron Molnau, and En Sheng Yen (Ping Tung Inst of Agriculture) Jan 1977 32 p refs Sponsored by Dept of the Interior

(PB-270632/3 W77-10175, OWRT-A-045-IDA(3)) Avail NTIS HC A03/MF A01 CSCL 08H

Discriminant analysis is used to study frozen and unfrozen ground runoff events for four watersheds in the Pacific Northwest Part of the discriminant procedure was used to choose a set of meteorological factors for each area that can distinquish between frozen and unfrozen ground runoff events. These variables were then used to define a system to classify other past or future runoff events. The occurrence of a frozen ground runoff event is dependent on the combination of several meteorological factors interacting together rather than on the influence of one single variable such as the average minimum air temperature. This methodology proved successful for two of the watersheds studied.

N7©-13G2©<sup>0</sup># National Aeronautics and Space Administration Langley Research Center, Langley Station, Va

Quantitative analysis of Aircraft multispectral-scanner data and mapping of water-Quality parameters in the James River in Virginia

Robert W Johnson and Gilbert S Bahn (Vought Corp., Hampton Va.) Dec 1977 33 p refs

(NASA-TP-1021, L-10968) Avail NTIS HC A03/MF A01 CSCL 13B

Statistical analysis techniques were applied to develop quantitative relationships between in situ river measurements and the remotely sensed data that were obtained over the James River in Virginia on 28 May 1974 The remotely sensed data were collected with a multispectral scanner and with photographs taken from an aircraft platform. Concentration differences among water quality parameters such as suspended sediment, chlorophyll a, and nutrients indicated significant spectral variations. Calibrated equations from the multiple regression analysis were used to develop maps that indicated the quantitative distributions of water quality parameters and the dispersion characteristics of a pollutant plume entering the turbid river system. Results from further analyses that use only three preselected multispectral scanner bands of data indicatead that regression coefficients and standard errors of estimate were not appreciably degraded compared with results from the 10-band analysis

R78-14458\*# Norwegian Water Resources and Electricity Board,

APPLICATION OF LANDSAY IMAGERY FOR SNOW MAPPING IN NORWAY Final Roport, 16 May 1975 - 27 Aug. 1976

Heige Odegaard and Johnny E Skorve Principal Investigators 25 May 1977 29 p refs Sponsored by NASA Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D ERTS

(E78-10041, NASA-CR-155341) Avail NTIS HC A03/MF A01 CSCL 08L

The author has identified the following significant results During the summer seasons of 1975 and 1976, the snow cover was successfully monitored and measured in the four basins By using elevation distributions for these basins combined with the measured snow cover percentages, the equivalent snow line altitude was calculated Equivalent snow line altitude was used in accordance with Mark Meier's definition Cumulative runoff data were collected for the basins. Tables showing percentage snow cover versus cumulative runoff were worked out for 1975.

N78-14487\*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt Md

THE UTILITY OF SHORT WAVELENGTM (>1mm) REMOTE SENSING TECHNIQUES FOR THE MONITORING AND ASSESSMENT OF HYDROLOGIC PARAMETERS

A Rango and V Salomonson *In* ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 55-66 refs

Avail NTIS HC A99/MF A01 CSCL 08H

Remote sensing programs that respond to the requirements of the water resources management and hydrologic communities are reviewed. The major areas where the needs of water resources management are being met involve the mapping and monitoring of snowcovered areas, hydrologic landuse and surface water area. In the case of snowcovered area mapping the transfer of technology process is now being accomplished in the Western United States in a cooperative effort involving 6 federal agencies and 3 state agencies along with NASA A new collaborative effort of the U.S. Army Corps of Engineers and NASA involves the mapping of landuse by Landsat and its use in hydrologic engineering watershed models employed in flood control/ waterworks planning, design, and management. Improved systems planned for implementation in the 1978-1981 time frame can be expected to result in increased utilization of visible and near infrared remote sensing observations Author

 $\mbox{W78-144488}^{\circ} \#$  Kansas Univ Center for Research, Inc., Lawrence Remote Sensing Lab

MICROWAVE REMOTE SENSING OF MYDROLOGIC PARAMETERS

Fawwaz T Ulaby In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 67-86 refs

Avail NTIS HC A99/MF A01 CSCL 08H

A perspective on the implementation of microwave sensors in future airborne and spaceborne observations of hydrologic parameters is presented. The rationale is based on a review of the status and future trends of active (radar) and passive (radiometer) microwave research as applied to the remote sensing of soil moisture content, snowpack water equivalent, freeze/thaw boundaries, lake ice thickness, surface water area and the specification of watershed runoff coefficients. Analyses and observations based on data acquired from ground based, airborne and spaceborne platforms and an evaluation of advantages and limitations of microwave sensors are included.

N78-14469°# Maryland Univ, College Park Dept of Civil Engineering

UTILIZATION OF REMOTE SENSING OBSERVATIONS IN HYDROLOGIC MODELS

Robert M Ragan In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 87-99 refs

Avail NTIS HC A99/MF A01 CSCL 08H

Most of the remote sensing related work in hydrologic modeling has centered on modifying existing models to take advantage of the capabilities of new sensor techniques. There has been enough success with this approach to insure that remote sensing is a powerful tool in modeling the watershed processes. Unfortunately, many of the models in use were designed without recognizing the growth of remote sensing technology. Thus their parameters were selected to be map or field crew definable. It is believed that the real benefits will come through the evolution of new models having new parameters that are developed specifically to take advantage of our capabilities in remote sensing. The ability to define hydrologically active areas could have a significant impact. The ability to define soil moisture and the evolution of new techniques to estimate evoportransportation.

could significantly modify our approach to hydrologic modeling Still without a major educational effort to develop an understanding of the techniques used to extract parameter estimates from remote sensing data, the potential offered by this new technology will not be achieved

Author

N78-14486\*# Geological Survey Reston, Va COASTAL WETLANDS THE PRESENT AND FUTURE ROLE OF REMOTE SENSING

Virginia Carter In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 301-323

Avail NTIS HC A99/MF A01 CSCL 08C

During the past decade, there has been a rapid expansion of remote sensing research and technology development related to coastal wetlands. As a result of this research, all of the 23 coastal states have ongoing or completed wetland inventories, most utilizing aerial photographs as the data source for producing a variety of map products with varying scales formats, classification systems and intended uses. The U.S. Geological Survey is increasing emphasis on map production and revision for the coastal zone The new U.S. Fish and Wildlife Service National Wetland Inventory is intended to provide a standardized method for comparison of wetlands on a national basis - it too will use available aerial photographs as a basic data source. At present, satellite data is not used for operational mapping of coastal wetlands because of resolution and geometric constraints in the future, however satellite data may provide an accurate reliable and economical source to update wetland inventories and to monitor or evaluate coastal wetlands. The technological improvements accompanying the development and launch of Landsat C and D and the space shuttle promise to make satellite digital data a more powerful tool to supply information for future management decisions for coastal wetlands

N78-14492\*# Tennessee Valley Authority, Chattanooga Mapping Services Branch

REMOTE MONITORING AND TENNESSEE VALLEY AUTHORITY PROGRAMS

Alan R Stevens and Alan W Voss In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 385-392

Avail NTIS HC A99/MF A01 CSCL 05A

The Tennessee Valley Authority was created in 1933 as a resource development agency and was charged with the basic mission of improving the economy of a depressed region through power production flood control and navigation. Those programs which availed themselves of remotely monitored data, either directly or indirectly supporting this mission were examined.

Author

N78-14499\*# Universidad Nacional Autonoma de Mexico, Villa Obregon Interdisciplinario Lab

A STUDY OF SUSPENDED SOLIDS IN THE REQUENA DAM BY REMOTE SENSING

P Ruiz Azuara and L Lemus Hidalgo In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 495-504 refs

Avail NTIS HC A99/MF A01 CSCL 08H

Remote sensing was applied to a preliminary study of suspended solids in the Requena Dam Aerial and terrestrial photographs were analyzed by photointerpretation and microdensitometry. Field measurements and sampling were also made. A relationship between ground data for the concentration of suspended solids and the transmissibility of the aerial infrared film was suggested.

N78-14501\*# EROS Data Center Sioux Falls S Dak
MONITORING IRRIGATED LAND ACREAGE USING
LANDSAT IMAGERY AN APPLICATION EXAMPLE

William C Draeger In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 515-524 ref t

Avail NTIS HC A99/MF A01 CSCL 08B

A demonstration of the utility of LANDSAT imagery for quickly and cheaply estimating irrigated land area was conducted

in the Klamath River basin of Oregon LANDSAT color composite images at 1 250 000 scale and acquired on two dates during the 1975 growing season, were interpreted Irrigated lands were delineated manually and the irrigated area was estimated, based on dot-grid sampling of the manually delineated lands. The image interpretation estimate of irrigated area was then adjusted by a comparison of interpretation results with ground data on 45 sample plots each 2.6 square kilometers in size. Two interpreters independently estimated the irrigated area. Their adjusted estimates were 115 000 hectares and 108 000 hectares respectively with corresponding 95 percent confidence intervals of + or - 7 880 hectares and + or - 14,000 hectares. Author

N78-14508\*# California Univ Santa Barbara Geography Remote Sensing Unit

AUTOMATED IMAGE PROCESSING OF LANDSAT 2 DIGITAL DATA FOR WATERSHED RUNOFF PREDICTION Robert R Sasso, John R Jensen and John E Estes In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 591-599 refs

(Grant NGR-05-025-001)

Avail NTIS HC A99/MF A01 CSCL 08H

The U S Soil Conservation Service (SCS) model for watershed runoff prediction uses soil and land cover information as its major drivers. Kern County Water Agency is implementing the SCS model to predict runoff for 10,400 sq cm of mountainous watershed in Kern County California. The Remote Sensing Unit University of California Santa Barbara was commissioned by KCWA to conduct a 230 sq cm feasibility study in the Lake Isabella, California region to evaluate remote sensing methodologies which could be ultimately extrapolated to the entire 10,400 sq cm Kern County watershed. Digital results indicate that digital image processing of Landsat 2 data will provide usable land cover required by KCWA for input to the SCS runoff model.

N78-14509\*# Bern Univ (Switzerland) Inst of Applied Physics

MICROWAVE MULTISPECTRAL INVESTIGATIONS OF SNOW

E Schanda and R Hofer In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 601-607 refs

Avail NTIS HC A99/MF A01 CSCL 08L

A long term observational program on microwave emission and scatter behavior under controlled conditions, was started at a high altitude alpine test site. All stages of development of snow cover during the whole season are under investigation. The study was done to achieve required knowledge on microwave radiative properties of snow for optimization of the microwave payloads of air and spaceborne snow sensors and for the interpretation of large scale snow maps obtained by these sensors. Preliminary results of the first month obtained with radiometers at 4.9, 10.5. 21 and 36 GHz are presented.

N78-14510\*# Tennessee Univ Space Inst , Tullahoma Remote Sensing Div

APPLICATION OF LANDSAT DATA TO WETLAND STUDY AND LAND USE CLASSIFICATION IN WEST TENNESSEE N L Jones and F Shahrokhi /n ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 609-613

(Contract NAS8-31980)

Avail NTIS HC A99/MF A01 CSCL 08C

The Obion-Forked Deer River Basin in northwest Tennessee is confronted with several acute land use problems which result in excessive erosion sedimentation, pollution, and hydrologic runoff LANDSAT data was applied to determine land use of selected watershed areas within the basin with special emphasis on determining wetland boundaries. Densitometric analysis was performed to allow numerical classification of objects observed in the imagery on the basis of measurements of optical densities. Multispectral analysis of the LANDSAT imagery provided the capability of altering the color of the image presentation in order to enhance desired relationships. Manual mapping and

classification techniques were performed in order to indicate a level of accuracy of the LANDSAT data as compared with high and low altitude photography for land use classification. Author

N78-14527\*# California Univ Berkeley Space Sciences

#### REMOTE SENSING-AIDED SYSTEMS FOR SNOW QUALIFI-CATION, EVAPOTRANSPIRATION ESTIMATION, AND THEIR APPLICATION IN HYDROLOGIC MODELS

Siamak Korram In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 795-806 refs

Avail NTIS HC A99/MF A01 CSCL 08L

The design of general remote sensing-aided methodologies was studied to provide the estimates of several important inputs to water yield forecast models. These input parameters are snow area extent snow water content, and evapotranspiration. The study area is Feather River Watershed (780 000 hectares). Northern California The general approach involved a stepwise sequence of identification of the required information, sample design measurement/estimation and evaluation of results All the relevent and available information types needed in the estimation process are being defined. These include Landsat meteorological satellite and aircraft imagery, topographic and geologic data ground truth data, and climatic data from ground stations A cost-effective multistage sampling approach was employed in quantification of all the required parameters. The physical and statistical models for both snow quantification and evapotranspiration estimation was developed. These models use the information obtained by aerial and ground data through appropriate statistical sampling design Author

#### N78-14528\*# Michigan State Univ East Lansing APPLICATION OF AERIAL PHOTOGRAPHY TO WATER-RELATED PROGRAMS IN MICHIGAN

W R Enslin, R Hill-Rowley, and S E Tilmann In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 807-816 (Grant NGL-23-004-083)

Avail NTIS HC A99/MF A01 CSCL 08H

Aerial photography and information system technology were used to generate information required for the effective operation of three water-related programs in Michigan Potential mosquito breeding sites were identified from specially acquired low altitude 70 mm color photography for the city of Lansing, the inventory identified 35% more surface water areas than indicated on existing field maps. A comprehensive inventory of surface water sources and potential access sites was prepared to assist fire departments in Antrim County with fire truck water-recharge operations Remotely-sensed land cover/use data for Windsor Township, Eaton County, were integrated with other resource data into a computer-based information system for regional water quality studies Eleven thematic maps focusing on landscape features affecting non-point water pollution and waste disposal were generated from analyses of a four-hectare grid-based data file containing land cover/use, soils topographic and geologic (well-log) data

N78-14536\*# Consiglio Nazionale delle Richerche, Venice (Italy) Laboratorio per lo Studio della Dinamica delle Grandi Masse QUANȚITATIVE EVALUATION OF WATER BODIES DYNAMIC BY MEANS OF THERMAL INFRARED AND MULTISPECTRAL SURVEYS ON THE VENETIAN LAGOON

L Alberotanza and G M Lechi (CNR, Milano, Italy) In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 893-902

Avail NTIS HC A99/MF A01 CSCL 08H

Surveys employing a two channel Daedalus infrared scanner and multispectral photography were performed. The spring waning tide, the velocity of the water mass, and the types of suspended matter were among the topics studied. Temperature salinity sediment transport and ebb stream velocity were recorded. The bottom topography was correlated with the dynamic characteristics of the sea surface.

Author

N78-14545\*# Colorado State Univ Fort Collins Dept of Earth Resources

#### MULTIDATE MAPPING OF MOSQUITO HABITAT

Thomas L Woodzick and Eugene L Maxwell In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 979-989 refs Sponsored by PHS

Avail NTIS HC A99/MF A01 CSCL 06C

LANDSAT data from three overpasses formed the data base for a multidate classification of 15 ground cover categories in the margins of Lewis and Clark Lake a fresh water impoundment between South Dakota and Nebraska When scaled to match topographic maps of the area the ground cover classification maps were used as a general indicator of potential mosquito-breeding habitat by distinguishing productive wetlands areas from nonproductive nonwetlands areas The 12 channel multidate classification was found to have an accuracy 23% higher than the average of the three single date 4 channel classifications

Author

N78-14550\* Ludwig-Maximilians-Universitat Munich (West Germany) Institut für Geographie

## TEXTURAL ANALYSIS BY STATISTICAL PARAMETERS AND ITS APPLICATION TO THE MAPPING OF FLOW-STRUCTURES IN WETLANDS

STRUCTURES IN WETLANDS

U Wieczorek In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1035-1043

Avail NTIS HC A99/MF A01 CSCL 08B

From 1974 to 1977, the application of remote sensing methods in coastal areas and tidal bays and estuaries was investigated on the German coast of the North Sea Aerial photographs were taken using different films, (1) color (2) color infrared, and (3) black and white films Scanner recordings were taken by an 11 channel scanner Ground truth measurements of radiation and measurements of meteorological elements were carried out For mapping the morphology in mudflat areas a digital texture analysis was developed by which measurement of the change of image structures cased by distributing factors, such as changing illumination is possible

Author

N78-14551\*# Bendix Corp Ann Arbor Mich Aerospace Systems Div

PRODUCTION OF A WATER QUALITY MAP OF SAGINAW BAY BY COMPUTER PROCESSING OF LANDSAT-2 DATA John B Mckeon Robert H Rogers and V Elliott Smith (Cranbrook Inst of Sci. Bloomfield Hills Mich) / n ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1045-1054 refs Sponsored by EPA

Avail NTIS HC A99/MF A01 CSCL 08H

Surface truth and LANDSAT measurements collected July 31, 1975, for Saginaw Bay were used to demonstrate a technique for producing a color coded water quality map. On this map color was used as a code to quantify five discrete ranges in the following water quality parameters (1) temperature (2) Secchi depth (3) chloride (4) conductivity (5) total Kjeldahl nitrogen (6) total phosphorous (7)chlorophyll a, (8) total solids and (9) suspended solids. The LANDSAT and water quality relationship was established through the use of a set of linear regression equations where the water quality parameters are the dependent variables and LANDSAT measurements are the independent variables. Although the procedure is scene and surface truth dependent, it provides both a basis for extrapolating water quality parameters from point samples to unsampled areas and a synoptic view of water mass boundaries over the 3000 sq km bay area made from one days ship data that is superior, in many ways, to the traditional machine contoured maps made from three day's ship data Author

# N78-14563\*# Geological Survey Helena Mont USE OF THERMAL-INFRARED IMAGERY IN GROUNDWATER INVESTIGATIONS IN MONTANA

A J Boettcher and R M Haralick (Kansas Univ Lawrence)
In ERIM Proc of the 11th Intern Symp on Remote Sensing

of Environment, Vol 2 1977 p 1161-1170 refs

Avail NTFS HC A99/MF A01 CSCL 08H

Thermal infrared imagery was used to locate ground-water inflow along three streams and one lake in Montana. The thermal scanner used in May 1972, March 1973, and November 1975 was mounted in a twin-engined aircraft. On the 1973 and 1975 flights, the data were recorded in an analog format on magnetic tape in flight, later were converted to digital format and were computer processed using an assignment of patterns to indicate differences in water temperature. Output from the image processing program was converted to a temperature map having an isotherm spacing of 0.5 C. Computerization was found to be the most efficient method to manipulate data from lakes, large rivers, and narrow sinuous streams.

N78-14564\*# California Univ Davis Dept of Electrical Engineering

### SATELLITE LAND USE ACQUISITION AND APPLICATIONS TO HYDROLOGIC PLANNING MODELS

V R Algazi and Minsoo Suk In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1171-1181 refs

Avail NTIS HC A99/MF A01 CSCL 08H

A developing operational procedure for use by the Corps of Engineers in the acquisition of land use information for hydrologic planning purposes was described. The operational conditions preclude the use of dedicated interactive image processing facilities. Given the constraints, an approach to land use classification based on clustering seems promising and was explored in detail. The procedure is outlined and examples of application to two watersheds given.

N78-14582\*# Atomic Energy Establishment Cairo (Egypt)
Remote Sensing Center

### GROUNDWATER STUDIES IN ARID AREAS IN EGYPT USING LANDSAT SATELLITE IMAGES

E M EIShaziy, M A AbdelHady and M M EIShaziy In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1365-1372 refs

#### Avail NTIS HC A99/MF A01 CSCL 08H

Various features are interpreted which have strong bearing on groundwater in the arid environment. These include the nature of geological and lithologic units, structural lineaments, present and old drainage systems, distribution and form of water pools geomorphologic units, weathering surfaces and other weathering phenomena, desert soils sand dunes and dune sand accumulations growths of natural vegetation and agriculture, and salt crusts and other expressions of salinization. There are many impressive examples which illustrate the significance of satellite image interpretation on the regional conditions of groundwater which could be traced and interconnected over several tens or even several hundreds of kilometers. This is especially true in the northern Western Desert of Egypt where ground water issuing from deep strata comes to the surface along ENE-WSW and ESE-WNW fault lines and fracture systems. Another striking example is illustrated by the occurrence of fresh to brackish groundwater on the Mediterranean Sea Coastal Zone of the Western Desert where the groundwater is found in the form of lenses floating on the saline sea water

#### N78-14600\*# Geological Survey Suffolk Va THREE APPROACHES TO THE CLASSIFICATION OF INLAND WETLANDS

Patricia T Gammon, Donald Malone (Tenn Valley Authority, Chattanooga), Paul D Brooks, and Virginia Carter In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1545-1555 refs

#### Avail NTIS HC A99/MF A01 CSCL 08B

In the Dismal Swamp project, seasonal, color-infrared aerial photographs and LANDSAT digital data were interpreted for a detailed analysis of the vegetative communities in a large highly altered wetland in Western Tennessee seasonal high altitude color-infrared aerial photographs provided the hydrologic and

vegetative information needed to map inland wetlands, using a classification system developed for the Tennessee Valley Region In Florida, color-infrared aerial photographs were analyzed to produce wetland maps using three existing classification systems to evaluate the information content and mappability of each system The methods used in each of the three projects can be extended or modified for use in the mapping of inland wetlands in other parts of the United States

Author

N78-14609\*# Leningrad (A A Zhdanov) State Univ (USSR) Dept of Atmospheric Physics

### PASSIVE MICROWAVE REMOTE SENSING OF SOIL MOISTURE

K Ya Kondratyev, V V Melentyev, Yu I Rabinovich and E M Shulgina In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1637-1661 refs.

Avail NTIS HC A99/MF A01 CSCL 08M

The theory and calculations of microwave emission from the medium with the depth-dependent physical properties are discussed, the possibility of determining the vertical profiles of temperature and humidity is considered Laboratory and aircraft measurements of the soil moisture are described, the technique for determining the productive-moisture content in soil, and the results of aircraft measurements are given

Author

N78-14616# California Univ , Berkeley Lawrence Berkeley Lab.

### RECENT DEVELOPMENTS IN MODELING GROUNDWATER SYSTEMS

T N Narasımhan and P A Witherspoon 20 May 1977 34 p refs

(Contract W-7405-eng-48)

(LBL-5209) Avail NTIS HC A03/MF A01

Developments in the mathematical modeling of groundwater systems over the past decade are reviewed. The physics of the different types of problems that are of interest in hydrogeology and a statement of the related initial-boundary value problems are described. The various numerical techniques that have been employed to solve the governing equations are discussed and a few typical case histories are presented to illustrate the trend of progress that has occurred in the application of mathematical modeling to actual field problems.

N78-14624# Wyoming Univ Laramie Water Resources Research Inst

# RELATIONSHIP OF TECTONIC STRUCTURE TO AQUIFER MECHANICS IN THE WESTERN GRAND CANYON DISTRICT, ARIZONA

Peter W Huntoon Apr 1977 91 p refs (Contract DI-14-34-0001-6134, OWRT Proj B-031-WYO(1)) (PB-272308/8, W77-11867, Ser-66) Avail NTIS HC A05/MF A01 CSCL 08H

The Rampart Cave Member of the Muay Limestone, the major aquifer in the western Grand Canyon district was studied It was found that prospects for developing large ground water supplies in the district are dim because total recharge and permeabilities are small, and there are no extensive permeable zones under the plate in which large quantities of water are stored. Selected fault zones that supply water to large springs offer the most promising areas for drilling.

# N78-15529 Texas A&M Univ. College Station MICROWAVE REMOTE SENSING AND ITS APPLICATION TO SOIL MOISTURE DETECTION, VOLUMES 1 AND 2 Ph D Thesis

Richard Wayne Newton 1977 768 p Avail Univ Microfilms Order No 77-20398

Theoretical and experimental studies of the thermal microwave emission from moist soil were performed. The theoretical study was undertaken to provide a physical understanding of the emission from soil and its relationship to soil mositure. It is shown that the soil permittivity is dependent on the soil water metric potential independent of soil texture. Relationships

roughness and vegetation cover on the microwave emission from soil are developed. Emission from the soil volume is described using a radiative transfer approach, the effect of surface roughness is modeled using the Kirchhoff approximation and vegetation cover is modeled as a dielectric slab Dissert Abstr

N78-15531 Indiana Univ , Bloomington

### TRICHLOROFLUOROMETHANE, A NEW HYDROLOGIC TOOL FOR TRACING AND DATING GROUND WATER Ph.D Thesis

Glenn Michael Thompson 1976 103 p Avail Univ Microfilms Order No 77-22639

Preliminary investigations were conducted in three areas where the hydrology was well understood and where tritium measurements had been made in the past. They were the Wharton tract of southern New Jersey Hot Springs National Park, Arkansas, and the Edwards aquifer of south central Texas. Good agreement was observed between the CCI3F data and the known hydrology The Texas study revealed a series of anomalous CCI3F concentrations that were too high to be of atmospheric origin. The anomalous points occurred in a line extending from the northwest corner of San Antonio 46 miles along the Balcones fault zone The location of the plume indicates direction of ground-water movement in the area and demonstrates the likely utility of CCI3F as a ground-water tracer All CCI3F measurements were made in the field with a portable gas chromatograph

Dissert Abstr

NTIS

N78-15541\* Geological Survey, Reston, Va Water Resources

#### APPLICATION OF REMOTELY SENSED LAND-USE INFOR-MATION TO IMPROVE ESTIMATES OF STREAMFLOW CHARACTERISTICS, VOLUME 8 Final Report

Edward J Pluhowski, Principal Investigator Aug 1977 93 p refs ERTS

(NASA Order S-70243-AG)

(E78-10052, NASA-CR-155365) Avail

HC A05/MF A01 CSCL 08H

The author has identified the following significant results Land use data derived from high altitude photography and satellite imagery were studied for 49 basins in Delaware and eastern Maryland and Virginia Applying multiple regression techniques to a network of gaging stations monitoring runoff from 39 of the basins, demonstrated that land use data from high altitude photography provided an effective means of significantly improving estimates of stream flow. Forty stream flow characteristic equations for incorporating remotely sensed land use information, were compared with a control set of equations using map derived land cover. Significant improvement was detected in six equations. where level 1 data was added and in five equations where level 2 information was utilized. Only four equations were improved significantly using land use data derived from LANDSAT imagery Significant losses in accuracy due to the use of remotely sensed land use information were detected only in estimates of flood peaks. Losses in accuracy for flood peaks were probably due to land cover changes associated with temporal differences among the primary land use data sources

N78-15630# Army Cold Regions Research and Engineering Lab, Hanover, N H

#### **OBSERVATIONS OF THE ULTRAVIOLET SPECTRAL** REFLECTANCE OF SNOW

Harold W OBrien Jan 1977 25 p

(DA Proj 1T1-61102-B-52A)

(AD-A046349, CRREL-77-27) Avail NTIS HC A02/MF A01 CSCL 08/12

The spectral reflectance of natural snow in the range of 0 20- to about 0 40-micrometers wavelengths was studied in the laboratory using both continuous spectral scanning and fixed bandpass measurements. White barium sulfate pressed powder was used as a standard for comparison. The reflectance of fresh snow was found to be very high (usually nearly 100%) and only weakly wavelength dependent from 0.24 micrometers to the visible range. In the 0.20- to 0.24-micrometers portion of the spectrum, the reflectance was found to be quite erratic. Possible reasons for the irregularities in reflectance measurements are discussed

N78-15660# Center for the Environment and Man, Inc., Hartford,

#### PRECIPITATION (RADAR) PROJECT OF THE IFYGL LAKE METEOROLOGY PROGRAM

James W Wilson and David M Pollock (Atmospheric Environment Serv , Downsview Ontario) Jul 1977 53 p refs (Grant NOAA-03-5-022-17)

(PB-272152/O NOAA-77082507, IFYGL-Special-Bull-20) Avail NTIS HC A04/MF A01 CSCL 04B

Precipitation measurements for Lake Ontario and its watershed were derived for the period from April 1972 to March 1973 of the International Field Year for the Great Lakes. The precipitation observation systems and measurement techniques are described, and measurements are compared. The lake had a discernable effect on the precipitation approximately one half of the precipitation days. While the lake frequently influences precipitation patterns, its effect on total season precipitation is less apparent

# Page intentionally left blank

Page intentionally left blank

# 07 DATA PROCESSING AND DISTRIBUTION SYSTEMS

Includes film processing computer technology satellite and aircraft hardware and imagery

A78-10075 A modern tool for land design G E Clark Waste Age. vol 8, Sept 1977, p 10 12

Precision aerial photography and aerial photogrammetry of areas used for or projected for landfills are described. Weather obstacles to aerial surveys, and ground control measures required, are described, and mapping and stereoplotting techniques are outlined briefly. Information obtainable from comparison of panchromatic film records and IR or other special film records is noted, contrasts between the vivid IR false-color images of healthy and lush vegetation and the IR false-color of sickly vegetation affected by pollutants is described and also illustrated by the front cover color photo of the periodical.

A78-10325 Side-looking airborne radar H Jensen (Litton Industries, Beverly Hills, Calif), L C Graham (Goodyear Aerospace Corp, Litchfield Park, Ariz), L J Porcello (Science Applications, Inc., Tucson, Ariz), and E N Leith (Willow Run Laboratories, Mich) Scientific American, vol 237, Oct 1977, p 84-95

The article discusses airborne radar systems that form microwave images of adjacent terrain in fine detail, regardless of weather or time of day or night, by looking to the side of an aircraft. The question of why the radar antenna should be pointed to the side is considered along with the resolution of a side-looking airborne radar system, unique properties of the microwave images recorded by such a system, the reflection characteristic of various surfaces, and image geometry. Aperture synthesis with side-looking airborne radar is described, and it is shown that synthetic-aperture radar makes it possible to obtain high-resolution images of terrain many miles away from the aircraft flight path. Holographic imaging with syntheticaperture radar is examined, practical problems in recording a holographic radar image are noted, and simple solutions to these problems are outlined. Several applications of side-looking airborne radar are reviewed, including terrain-mapping surveys in South America, identification of faults and other tectonic features, site selection for nuclear power plants, and surface imaging of the moon and Venus

A78-10519 Height measurements from satellite images R Welch and C P Lo (Georgia, University, Athens, Ga) (American Society of Photogrammetry, Annual Meeting, 42nd, Washington, D C, Feb 1976) Photogrammetric Engineering and Remote Sensing, vol 43, Oct 1977, p 1233-1241 22 refs

A description is presented of the development of an instrument, the Zoom Height Finder, for the economical derivation of heights from small-scale images with the aid of instrumentation and techniques comparable to those employed with aerial photographs. An investigation is conducted of the interrelationships between various factors, including the base-height ratio, image quality, viewing magnification, and the precision and accuracy of height measurements obtained from Skylab and Landsat models. Attention is given to height difference measurements, height measurements, and Skylab and Landsat model characteristics.

A78-10543 # Stationary waves in the Southern Hemisphere mid-latitude zone revealed from average brightness charts T Yasunari (Kyoto University, Kyoto, Japan) Meteorological Society of Japan, Journal, vol 55, June 1977, p 274-285 16 refs

Zonal stationary waves in the Southern Hemisphere mid-latitude belt (20S to 60S) were analyzed using 90-day-average brightness charts for summer and winter and one intermediate season in 1969 based on daily satellite records of cloud cover. Stationary waves of wavenumber 1-4 were found (by harmonic analysis of average brightness) along the four latitude circles, with a general NW-SE tilt. The waves are correlated with geographic location and local features, maximum brightness (wavenumber 1) corresponds to the pressure wave trough and stays in the eastern Atlantic through the Indian Ocean at 40S-50S, but in the central Pacific at subtropical latitudes (20S-40S).

A78-12927 # The Italian ground receiving and processing facility for earth resources survey data G Bressanin (Telespazio S p A , Rome, Italy) In International Electronics Congress, 24th, Rome, Italy, March 28-30, 1977, Proceedings.

Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1977, p. 23-32.

An Italian ground facility for processing earth resources data from Landsat satellites and from weather satellites is described. The facility, which employs all-digital hardware components, monitoring the European and North African areas. The acquisition, monitoring and processing systems are considered, radiometric and geometric corrections, off-loaded to two high-speed processors operating in conjunction with a minicomputer, are also discussed. Products available from the facility include 70-mm black and white transparencies, 240-mm black and white or color transparencies, paper prints, computer-compatible tapes, digitally enlarged images and contrast-processed images.

A78-12928 # Earth Resources Management system for analyzing remotely sensed data E J Albuquerque (IBM Public Sector Industry Center, Brussels, Belgium) In International Electronics Congress, 24th, Rome, Italy, March 28-30, 1977, Proceedings Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1977, p 33-40 5 refs

Earth Resources Management, a software system for the analysis of remote sensing data from Landsat satellites, is described. The executive routine of the software system, which uses a menuoriented method, is examined, image loading, image manipulation and display, and image creation applications are discussed. The registration application of the system, which allows the user to remove image distortions, correlate data from different sensor types, and conduct multi-temporal analyses of the same scene, is considered. In addition, the pattern recognition application of the system, a set of programs which performs multivariate analysis of imagery data, is mentioned.

A78-12929 # The practical application of remote sensing for the purposes of resource assessment and resource management M O'Hagan (Centre for Industrial Development, Brussels, Belgium) In International Electronics Congress, 24th, Rome, Italy, March 28-30, 1977, Proceedings Rome, Rassegna Internazionale Electronica Nucleare ed Aerospaziale, 1977, p. 41-49

Assembling a multi-disciplinary team to interpret Landsat data is discussed, and the problems of obtaining useful interpretations of Landsat imagery for such underdeveloped areas as Africa are described. It is suggested that the resolution provided by Landsat imagery, while suited to agricultural monitoring where cropland is homogeneous, may need to be supplemented by airborne radar data when mixed croplands are analyzed. Narrow-band sensing and ground-truth assessments are also considered. The possible use of Landsat data for the detection of disease-prone areas, or for the location of subterranean water in arid regions, is mentioned.

A78-12935 # An application of numerical filtering and data compression to the elaboration of earth resources imagery (Applicazione del filtraggio numerico e della compressione dei dati alla elaborazione di immagini per risorse terrestri) V Cappellini and M Fondelli (Firenze, Università, Florence, Italy) In International Electronics Congress, 24th, Rome, Italy, March 28-30, 1977, Proceedings Rome, Rassegna Internazionale

Elettronica Nucleare ed Aerospaziale, 1977, p 91-99 5 refs In Italian

The general characteristics of images from aircraft and from satellites for earth resource investigation are considered. The importance of two digital image processing techniques - digital filtering and data compression - for this purpose is outlined. It is shown how through digital filtering efficient processing of the considered images can be obtained, performing correction operations, noise reduction, enhancement, edge extraction, while through data compression the amount of data representing the images can be appreciably reduced with neglegible information reduction for useful main earth-resource characterization and data bank implementation. The particular interest for agriculture resource investigation is shown. Some examples of processing images from aircraft and satellites by means of digital filtering and data compression are given.

(Author)

A78-12942 # Data acquisition in the specification of 'behavior models' (L'acquisizione dati nella individuazione dei 'modelli di comportamento') L Benetazzo (Lecce, Università, Lecce, Padova, Università, Padua, Italy) In International Electronics Congress, 24th, Rome, Italy, March 28-30, 1977, Proceedings

Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1977, p. 191-196. In Italian

The paper analyses the specifications of a computer-based acquisition system intended to provide a 'behavioural model' for an ecologic environment. The purpose of a behavioural model is to achieve a better knowledge, use and conservation of the earth's resources in order to supply a fairly reliable long-term forecast. The automatic data acquisition system must be able to modify its operating structure as a consequence of changes in the measured environment and according to results obtained from previous measurements. A few remarks are included about the best policy to be adopted in designing and implementing such a system. As an example a project is described which is presently in progress and whose aim is to study shore processes in the Adriatic sea by means of an off-shore data acquisition system.

A78-12944 # Earth remote sensing using microwave /radar/
techniques R W Okkes (ESA, European Space Research and
Technology Centre, Noordwijk, Netherlands) In International
Electronics Congress, 24th, Rome, Italy, March 28-30, 1977,
Proceedings Rome, Rassegna Internazionale
Elettronica Nucleare ed Aerospaziale, 1977, p 259-267

The paper focus on the application of active microwave (radar) techniques for remote sensing of the earth by low-orbiting satellites After a broad overview of the microwave sensing characteristics and user requirements, an outline is given of the radar system concept as presently envisaged by ESA (European Space Agency) to form part of the payload of European earth resources satellite. The resulting space-borne radar system is shown to require synthetic-aperture techniques, i.e., the coherent summation of radar returns to yield the required high range-independent azimuth resolution. Due to the very high data rates involved, the associated signal processing requirement, basically consisting of the transformation of the received radar signal on-board (target reflections) into a two-dimensional image, is an important aspect of the mission definition studies, their problem areas are further outlined. A promising system concept using CCD (charge couple devices) is presented as a possible solution. (Author)

A78-13113 Landsat, computers, and development projects. P -M Adrien (Inter-American Development Bank, Washington, D C) and M F Baumgardner (Purdue University, West Lafayette, Ind.) Science, vol. 198, Nov. 4, 1977, p. 466-470, 29 refs

The US satellites Landsat 1 and Landsat 2 scan the same area on the earth's surface once every 18 days. The data acquisition system can provide information at frequent intervals about the location, availability, and changing conditions of the natural resources of specific project areas. Attention is given to the development of remote sensing techniques, the use of Landsat data, the relevancy of Landsat data to development projects, Landsat improvements, and a broad range of technical modifications which are being

planned to bring about significant changes in both the data and distribution systems  $\mbox{\ \ G\ R}$ 

A78-13493 Composite sampling for digital terrain models B Makarovic (International Institute for Aerial Survey and Earth Sciences, Enschede, Netherlands) *ITC Journal*, no. 3, 1977, p 406-433

Composite techniques for Digital Terrain Model (DTM) data acquisition, involving both selective sampling of rough terrain and progressive sampling of more regular regions, are discussed. The decision logic of data analysis for progressive sampling is considered, two means of applying supplementary data (procured selectively) to the composite sample are examined. One alternative relies on the selective sampling of distinctive morphological features prior to progressive sampling. The other option involves the interruption of progressive sampling and the addition of selectively-acquired data, procured either before or after the progressive sampling. Digital computer applications to the high-speed data acquisition problems are also mentioned.

A78-13496 Primer for the production of Landsat colour-composites M A Romijn (International Institute for Aerial Survey and Earth Sciences, Enschede, Netherlands) *ITC Journal*, no. 3, 1977, p 545-556

Basic technical information for the production of Landsat color-composites is presented, together with comments on the selection of materials and equipment for the production process. Techniques for registration of the film positives and for determination of step-wedge density on the negatives are considered, the choice between use of the sixth or the seventh multispectral scanning band of the Landsat imagery is discussed. Production of positive paper prints from the false-color negatives is also reviewed.

A78-13686 # Predictions on future use of active microwave systems for all weather sensing of the earth J W Rouse, Jr (Texas A & M University, College Station, Tex.) In Satellite applications to marine technology, Conference, New Orleans, La, November 15-17, 1977, Collection of Technical Papers Conference sponsored by AIAA, AMS, AGU, IEEE, MTS, and SEG New York, American Institute of Aeronautics and Astronautics, Inc., 1977 6 p 5 refs (AIAA 77-1584)

Recent developments in microwave remote sensing have clearly established the utility of these techniques for global survey applications for a wide range of disciplines. Because of these encouraging research findings and several recent studies of the potential, NASA has accelerated its program in this area. Microwave systems have been approved for Seasat and early Shuttle flights and long range plans are being formulated to incorporate microwave sensing with the present visible/IR capabilities. The basis for these activities and a summary of the plans are presented in this paper along with a prediction of the technological and system developments expected during the next ten years.

(Author)

A78-14314 The microstructure of California coastal fog and stratus J Goodman (San Jose State University, San Jose, Calif) Journal of Applied Meteorology, vol 16, Oct 1977, p 1056-1067 24 refs NSF Grant No GA-42464

A78-14784 \* # Remote sensing data processing - Two years ago, today, and two years from today Q A Holmes (Michigan Environmental Research Institute, Ann Arbor, Mich.), D Good enough (Department of Energy, Mines and Resources, Canada Centre for Remote Sensing, Ottawa, Canada), and J D Erickson (NASA, Johnson Space Center, Houston, Tex.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p 125-135 15 refs

Certain technical problems arising in the recent past (1975) in the field of the processing of remote sensing data are reviewed including approaches to the analysis of Landsat MSS data and technical difficulties which must be overcome to achieve operational data processing. The current status of remote sensing data processing is then examined with emphasis on such current technical issues as training selection and labeling, sampling schemes and classification and mensuration. Hardware projections are made for the near future (1979) relative to the development of remote sensing data processing.

A78-14786 # A perspective on the state of the art of photographic interpretation J E Estes (California, University, Santa Barbara, Calif) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p. 161-177, 19 refs

The field of aerial photointerpretation is reviewed with attention given to such activities as identification, measurement and problem solving and to such elements of photointerpretation as tone or color, size, shape, shadow, texture, pattern, and resolution Techniques of photointerpretation are surveyed including the use of collateral material, stereoscopic viewing, methods of search, the use of multiple images, and the convergence of evidence

A78-14789 # Operational data processing - The first ten years are the hardest J A. Leese (NOAA, National Environmental Satellite Service, Washington, D C) and C L Bristor In. International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p. 201-219, 18 refs

The processing of meteorological satellite data is reviewed Attention is given to the exploratory years (Tiros 1), experimental operations involving ATS, TOS and ITOS, and initial quantitative operations with the NOAA satellites and GOES. The current and projected future status of the operational processing of meteorological satellite data (1975-1980) is then surveyed.

A78-14803 # Space radar system specifications F T Ulaby, T F Bush, and W H Stiles (University of Kansas Center for Research, Inc., Lawrence, Kan) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 407-425 10 refs

Specifications are developed for a spaceborne imaging radar whose primary objective is to provide surveys of hydrology, agriculture and geology. In particular, experimental measurements of soil moisture and snowpack wetness are reported, applications of radar to crop inventories are also mentioned. In addition, the advantages of using radar surveys for cartographic applications are considered. It is proposed that both a C-band and an X-band system be employed to create a versatile spaceborne radar sensor.

A78-14806 \* # Landsat-D thematic mapper simulation using aircraft multispectral scanner data J Clark and N A Bryant (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif ) In International Symposium on Remote Sensing

of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 483-491 Contract No NAS7-100

A simulation of imagery from the upcoming Landsat-D Thematic Mapper was accomplished by using selected channels of aircraft 24-channel multispectral scanner data. The purpose was to simulate Thematic Mapper 30-meter resolution imagery, to compare its spectral quality with the original aircraft MSS data, and to determine changes in thematic classification accuracy for the simulated imagery The original resolution of approximately 7.5 meters IFOV and simulated resolution of 15, 30, and 60 meters were used to indicate the trend of spectral quality and classification accuracy. The study was based in a 6.5 square kilometer area of urban Los Angeles having a diversity of land use. The original imagery was reduced in resolution by two related methods pixel matrix averaging, and matrix smoothing with a unity box filter, followed by matrix averaging. Thematic land use classification using training sites and a Bayesian maximum-likelihood algorithm was performed at three levels of standard deviation - 1 0, 2 0, and 3 0 sigma. Plots of relative standard deviation showed that for larger training sites with a normal distribution of data, as the resolution decreased, the distribution range of density values decreased. Also, the classification accuracies for three levels of standard deviation increased as resolution decreased. However, the indication is that a point of diminishing returns had been reached, and 30 meters IFOV should be the best for multispectral classification of urban scenes

A78-14807 # A study of suspended solids in the Requena Dam by remote sensing P Ruiz Azuara and L Lemus Hidalgo (Universidad Nacional Autónoma de México, Villa Obregón, Mexico) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 495-504 20 refs

Remote sensing was applied to a preliminary study of suspended solids in the Requena Dam Aerial and terrestrial photographs were analyzed by photointerpretation and microdensitometry. Field measurements and sampling were also made. A relationship between ground data for the concentration of suspended solids and the transmissibility of the aerial infrared film was suggested. (Author)

A78-14814 # On the photographic processing and digital texture for remote sensing of Kujukuri coast of Chiba in Japan H Genda, H Okayama, T Ishiyama (Chiba University, Chiba, Japan), and K Takeda (Science and Technology Agency, National Institute of Resources, Tokyo, Japan) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 571-578 5 refs

Remote sensing of various coastal phenomena on the Kujukuri Coast and Kashimanada Coast has been done by use of aircraft for the purpose of investigating the characteristics of shore reefs and floating sand, and the depth of the sea. A multispectral camera and a video ITV camera have been used as sensor. The first flight was over the Kashimanada and Kujukuri Coasts and the next flight was over the Katsuura Bay. The shape of shore reefs, the state of floating sand, the depth of the sea, etc., are represented by equidensitographs. The digital graphs are analyzed by a hybrid system and correlations between the textures represented by equidensitographs, digital graphs and analog display are estimated. (Author)

A78-14819 # Testing the accuracy of remote sensing land use maps J L Van Genderen, P A Vass (Fairey Surveys, Ltd., Maidenhead, Berks, England), and B F Lock (Salisbury College of Advanced Education, Adelaide, Australia) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 615-623, 12 refs

A sampling and statistical testing procedure for analyzing the accuracy of remote sensing data is presented. The procedure is distinguished from other studies of interpretation errors in that it assesses the probability of incorrect categorization for a particular ground truth sample size, instead of expressing interpretation errors as a percentage of a subjectively determined number of sample sites. Because it relies on a minimum number of sample points, the technique may save time and money, especially when high accuracy levels need to be guaranteed.

A78-14830 # Use of clear lakes as standard reflectors for atmospheric measurements F J Ahern, D G Goodenough, S C Jain, V R Rao (Department of Energy, Mines and Resources, Canada Centre for Remote Sensing, Ottawa, Canada), and G Rochon (Université Laval, Quebec, Canada) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 731-755 20 refs

A method is proposed using clear lakes as dark backgrounds against which the atmospheric path radiance can be determined from satellite observations. If the path radiance can be determined to sufficient accuracy, the atmospheric extinction can be inferred with suitable radiative transfer models. An extensive program of observation has been made to determine the magnitude and variability of the various contributors to the total radiance observed by a satellite. It is shown that the volume and surface reflectance contributions (in the absence of sunglint) are small, constant, and can be modeled accurately enough to make these an insignificant source of error. The sunglint radiance observed in this investigation may be a significant source of error. The individual sources of error in the path radiance and extinction coefficient estimates are determined, and the total error in these estimates is calculated, with and without sunglint.

(Author)

A78-14831 # A low-cost system for reception and processing of line-scan data from Landsat and other sources. D S Sloan, B C Isherwood, and J S MacDonald (MacDonald, Dettwiler and Associates, Ltd., Richmond, British Columbia, Canada) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1

Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p. 757-773

A low-cost receiving station for real-time processing of photographic and digital satellite data is described. The station is capable of processing line-scan image data from the Landsat and NOAA (Very High Resolution Radiometer) satellite series, as well as aircraft scanner data, and data from planned remote sensing and meteorological satellites such as Meteosat, Nimbus-G and Tiros-N. The system, which houses all the needed electronic and photographic equipment in a 3 by 12 m trailer, provides black and white images and computer-compatible tapes of the data. The possibility of upgrading the capabilities of the facility through the addition of equipment is also mentioned.

A78-14832 # The use of Landsat imagery to locate uncharted coastal features on the Labrador Coast E A Fleming (Depart ment of Energy, Mines and Resources, Topographical Survey Directorate, Ottawa, Canada) and D D Lelievre (Department of the Environment, Canadian Hydrographic Service, Dartmouth, Nova Scotia, Canada) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings. Volume 1 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 775-781

A78-14838 # The application of IR- and MSS-data in the Ruhr district, Germany. P Stock (Siedlungsverband Ruhr-kohlenbezirk, Essen, West Germany) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 837-847 23 refs

The paper presents a brief review of the land-use applications of IR and multispectral scanner remote sensing data by the Ruhr Planning Authority Survey techniques are described and special attention is given to the monitoring of surface temperature behavior (homogeneous surfaces and urban surfaces) and to the existence of an urban heat island in the Ruhr area

A78-14839 # Potential applications of digital, visible, and infrared data from geostationary environmental satellites. D. B. Miller, M P Waters, III, J D Tarpley, R N Green, and D C. Dismachek (NOAA, National Environmental Satellite Service, Washington, D C ) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p 849-858

The National Environmental Satellite Service (NESS) is experimenting with an hourly, digital data base from the Visible/Infrared Spin-Scan Radiometer (VISSR) instrument on the GOES-1 and SMS-2 geostationary satellites. The general characteristics of this experimental VISSR data base (VDB) are described. Several examples of developmental applications of these quantitative digital data are presented. These include a review of recent attempts to develop products that are of use to meteorologists who provide services to aviation, agriculture, forestry, hydrology, oceanography, and climatology. The sample products include high resolution thermal gradients of land and ocean surfaces, thermal change analyses, fruit frost/freeze application, cloud-top altitude analysis, analysis of hurricane characteristics, and analyses of solar insolation. (Author)

A78-14848 \* # View angle effect in Landsat imagery T Kaneko (IBM Corp , Federal Systems Div , Houston, Tex ) and J. L Engvall (NASA, Johnson Space Center, Houston, Tex ) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 945-951 6 refs Contract No NAS9-14350

The paper investigates the view angle effect in Landsat II imagery, using consecutive-day acquisition data collected over the same geographical location, acquired 24 h apart, with view angle changes of 7-8 deg at a latitude of 35-45 deg It is shown that there is approximately a 5% reduction in the average sensor response on the second-day acquisitions as compared with the first-day acquisitions, and that the view angle effect differs field to field and crop to crop On false infrared pictures, the view angle effect causes changes primarily in brightness and to a lesser degree in color (hue and saturation)

A78-14854 # Processing of satellite imagery at the National Environmental Satellite Service. M Crowe (NOAA, National Environmental Satellite Service, Washington, D.C.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p. 1015-1020 5 refs

Processing of scanning radiometer (SR), very high resolution radiometer (VHRR) and visible infrared spin scan radiometer (VISSR) data, obtained from polar orbiter and geostationary satellites, is described The processing, conducted by the National Environmental Satellite Service, includes creation of polar-stereographic mapped mosaics, mercator-mapped mosaics, time-composites of mapped data, pass-by-pass gridded images, as well as hydrologic charts (from VHRR data) and animated sequences of successive VISSR picture frames Meteorological analyses based on SR, VHRR and VISSR data are also mentioned

A78-14865 # Digital processing system for developing countries C Nanayakkara (Office of the Surveyor General of Sri Lanka, Colombo, Sri Lanka) and H Wagner (Michigan, Environmental Research Institute, Ann Arbor, Mich.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 1123-1126

The application of an experimental software package to the digital processing of Landsat computer-compatible tapes is described. The software package, capable of performing such basic processing tasks as level slicing, gray mapping and ratio processing, is used in small-scale general-purpose digital computers. The digital processing system will be employed for crop and irrigation network surveys in Sri Lanka.

A78-14866 \* # Remote sensing and geographically based information systems R C Cicone (Michigan, Environmental Research Institute, Ann Arbor, Mich ) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977 p 1127-1136 18 refs Contract No NAS9-14988

A structure is proposed for a geographically-oriented computer-based information system applicable to the analysis of remote sensing digital data. The structure, intended to answer a wide variety of user needs, would permit multiple views of the data, provide independent management of data security, quality and integrity, and rely on automatic data filing. Problems in geographically-oriented data systems, including those related to line encoding and cell encoding, are considered.

A78-14881 # Reducing Landsat data to parameters with physical significance and signature extension - A view of Landsat capabilities B C Salmon-Drexler (GeoSpectra Corp., Ann Arbor, Mich.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 1289-1299, 7 refs Research supported by the U.S. Bureau of Land Management, Contract No AT(05-1)-1635

Determination of color hue and color value (i.e., lightness) from Landsat multispectral scanning (MSS) data is discussed, and the limitations in using Landsat data for crop identification and mineral detection are considered. Color value, which is obtained by taking the ratio of MSS channel 5 to MSS channel 4, is employed in conjunction with MSS channel 7 data in an illustrative example involving the detection of limonite (hydrous ferric oxide) Ambiguities in Landsat analyses of ephemeral rangeland or desertification trends are also cited

A78-14882 # Aerial albedos of natural vegetation in southeastern Australia J A. Howard (United Nations, Food and Agriculture Organization, Rome, Italy) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings. Volume 2 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 1301-1307 6 refs Research supported by the Reserve Bank of Australia

70 mm black-and-white low-level photography was used to record the track of the aircraft, which was then plotted on conventional 1 80,000 23 cm photogrammetric photographs and referenced against simultaneous measurements of the beam albedos of vegetation. Using stereoscopic pairs of the 70 mm photographs, the vegetation was classified into subformations. Marked differences in the subformation albedos were observed. A two-way table using stand height and crown cover of the subformations clearly showed a very distinctive trend of albedos. This finding may be important in other vegetal studies. (Author)

A78-14883 \* # Blob · An unsupervised clustering approach to spatial preprocessing of MSS imagery R J Kauth, A P. Pentland,

and G S Thomas (Michigan, Environmental Research Institute, Ann Arbor, Mich.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 1309-1317 5 refs Contract No NAS9-14988

A basic concept of MSS data processing has been developed for use in agricultural inventories, namely, to introduce spatial coordinates of each pixel into the vector description of the pixel and to use this information along with the spectral channel values in a conventional unsupervised clustering of the scene. The result is to isolate spectrally homogeneous field-like patches (called 'blobs'). The spectral mean vector of a blob can be regarded as a defined feature and used in a conventional pattern recognition procedure. The benefits of use are ease in locating training units in imagery, data compression of from 10 to 30 depending on the application, reduction of scanner noise and consequently potential improvements in classification/proportion estimation performances. (Author)

A78-14884 \* # Multispectral system analysis through modeling and simulation W A Malila, J M Gleason, and R C Cicone (Michigan, Environmental Research Institute, Ann Arbor, Mich.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 1319-1328, 18 refs. Contract No. NAS9-14988

The design and development of multispectral remote sensor systems and associated information extraction techniques should be optimized under the physical and economic constraints encountered and yet be effective over a wide range of scene and environmental conditions. Direct measurement of the full range of conditions to be encountered can be difficult, time consuming, and costly. Simulation of multispectral data by modeling scene, atmosphere, sensor, and data classifier characteristics is set forth as a viable alternative. particularly when coupled with limited sets of empirical measurements. A multispectral system modeling capability is described. Use of the model is illustrated for several applications - interpretation of remotely sensed data from agricultural and forest scenes, evaluating atmospheric effects in Landsat data, examining system design and operational configuration, and development of information extraction techniques (Author)

A78-14885 # A 'digital' technique for manual extraction of data from aerial photography L B Istvan and M T Bondy (Michigan, Environmental Research Institute, Ann Arbor, Mich.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2
Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 1329-1336

The Environmental Research Institute of Michigan has developed a digital system for the manual interpretation of aerial photography data. The procedure uses a cell/point grid established on a base map, and identical grids matching the scale of the photographic frames. The technique corrects for photography distortions. The procedure is applicable to land use and land cover data used for local and regional planning and resource management.

A78-14886 # Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Friuli earthquake area. P Cardamone, G M Lechi (CNR, Istituto per la Geofisica della Litosfera, Milan, Italy), A Cavallin, C M Marino (Milano, Universita, Milan, Italy), and A Zanferrari (Padova, Università, Padua, Italy) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p. 1337-1353 7 refs

A78-14898 # Digital color analysis of color-ratio composite Landsat scenes G L Raines (U S Geological Survey, Denver, Colo.)

In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2
Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p. 1463-1472

A method is presented that can be used to calculate approximate Munsell coordinates of the colors produced by making a color composite from three registered images. Applied to the Landsat MSS data of the Goldfield, Nevada, area, this method permits precise and quantitative definition of the limonitic areas originally observed in a Landsat color ratio composite. In addition, areas of transported limonite can be discriminated from the limonite in the hydrothermally altered areas of the Goldfield mining district. From the analysis, the numerical distinction between limonitic and non-limonitic ground is generally less than 3% using the Landsat bands and as much as 8% in ratios of Landsat MSS bands. (Author)

A78-14905 # Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone, Egypt E M El Shazly, M A Abdel Hady, M A. Abdel Hafez, A B Salman, M A Morsy, M M El Rakaiby, I E E Al Aassy, and A F Kamel (Academy of Scientific Research and Technology, Remote Sensing Centre, Atomic Energy Establishment, Cairo, Egypt) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 1533-1542

Remote sensing airborne IR thermal and multispectral surveys of the Suez Canal Zone were used in combination with ground investigations to construct new geological, structural lineation, and drainage maps on a 1 20,000 scale A number of structural, lithological, drainage, and environmental features detected from the survey maps are discussed

A78-14908 \* # Quantification of soil mapping by digital analysis of Landsat data F R Kirschner (U.S. Department of Agriculture, Soil Conservation, Service, Washington, D.C.), S. A. Kaminsky, E. J. Hinzel, R. A. Weismiller (Purdue University, West Lafayette, Ind.), and H. R. Sinclair (U.S. Department of Agriculture, Soil Conservation Service, Indianapolis, Ind.). In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April. 25-29, 1977, Proceedings. Volume. 2

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 1567-1573 6 refs Grant No NGL-15-005-186

A78-14978 \* # Cold climate mapping using satellite high resolution thermal imagery J F Bartholic and R A Sutherland (Florida, University, Gainesville, Fla) In Conference on Aerospace and Aeronautical Meteorology, 7th, and Symposium on Remote Sensing from Satellites, Melbourne, Fla, November 16-19, 1976, Preprints Boston, Mass, American Meteorological Society, 1977, p. 137-140 NASA-supported research

In an attempt to improve cold climate mapping and freeze forecasting techniques, thermal imagery from the NOAA-2 and -3 satellites and the Synchronous Meteorological Satellite (SMS) were obtained and analyzed Enhanced image transparencies showed detailed temperature patterns over the peninsula of Florida. The analysis was superior to hand-drawn isotherms drawn from the 300 to 500 thermograph stations presently in use Satellite data on several cold nights with similar synoptic conditions showed that similar cold patterns existed. Thus, cold climate mapping is possible.

A78-15004 \* # Interactive image processing for meteorological applications at NASA/Goddard Space Flight Center J B Billingsley (NASA, Goddard Space Flight Center, Greenbelt, Md) In Conference on Aerospace and Aeronautical Meteorology, 7th, and Symposium on Remote Sensing from Satellites, Melbourne, Fla, November 16-19, 1976, Preprints Boston, Mass, American Meteorological Society, 1977, p. 268-275

The paper reviews the development of the AOIPS (Atmospheric and Oceanographic Information Processing System) system for the

interactive manipulation of meteorological satellite images. A block diagram of the system is presented, both software and hardware considerations are examined, and attention is given to the Image 100 processing system and to the interactive terminal. As a example the paper examines the functions of Metpak (the software package) which involve cloud tracking and wind vector generation.

A78-15010 \* # Thunderstorm monitoring from a geosynchronous satellite R F Adler (NASA, Goddard Space Flight Center, Greenbelt, Md) and D D Fenn (General Electric Co, Beltsville, Md) in Conference on Aerospace and Aeronautical Meteorology, 7th, and Symposium on Remote Sensing from Satellites, Melbourne, Fla, November 16-19, 1976, Preprints Boston, Mass, American Meteorological Society, 1977, p 307-311 6 refs

It has been shown that SMS digital IR data can be used to calculate parameters which appear to be related to cloud or thunderstorm growth rates and variations in cloud top structure. The data appear to be useful in examining both clearly defined single clouds and cold areas within mature cirrus anvils. The data used for this study were blackbody temperatures derived from digital IR data from SMS-2 for a series of storms over the midwest United States on May 6, 1975.

A78-15012 # Pulsed coherent lidar systems for airborne and satellite based wind field measurement R M Huffaker, D W Beran, and C G Little (NOAA, Wave Propagation Laboratory, Boulder, Colo) In Conference on Aerospace and Aeronautical Meteorology, 7th, and Symposium on Remote Sensing from Satellites, Melbourne, Fla , November 16-19, 1976, Preprints Boston, Mass , American Meteorological Society, 1977, p. 318-324 16 refs

A system description of a basic CO2 coherent infrared lidar system is given and some feasibility considerations in using this type of lidar for satellite global wind monitoring are discussed, taking account of such parameters as signal to noise, aerosol density, eye safety, and pointing accuracy. Potential problems associated with scanning modes for airborne and satellite applications are examined and some potential applications (e.g., airport wind shear measurements) of the lidar are considered.

A78-15330 Digital image processing G Kang (TRW Defense and Space Systems Group, Redondo Beach, Calif) Quest, vol 1, Autumn 1977, p 2-20 7 refs

The technology of image processing is concerned with a manipulation of the elements of a picture to enhance its information content. Digital image processing involves the use of a digital computer for the required operations. In the case of images transmitted from spacecraft, the images are received at ground stations in the form of a stream of binary-coded data bits which are recorded on magnetic tape. The data can be converted to pictures by means of a straightforward process involving a film recorder. However, the results are often unsatisfactory in connection with geometric, photometric, and other types of distortion. The elimination of distortion by means of data manipulations conducted with the aid of computers is discussed, taking into account photometric manipulation, geometric correction, precision registration, and image enhancement.

A78-15455 Waves and turbulence in the vicinity of a chinook arch cloud P F Lester (Calgary, University, Calgary, Alberta, Canada) and J I MacPherson (National Research Council, Flight Research Laboratory, Ottawa, Canada) Monthly Weather Review, vol 105, Nov 1977, p 1447-1457 11 refs Research supported by Environment Canada

Instrumental aircraft flights were made near a chinook arch cloud in the lee of the Rocky Mountains in Alberta, Canada. The aircraft data combined with satellite imagery have shown that the arch cloud, based near 5500 m MSL, extended about 50 km in the alongwind direction and more than 900 km in the crosswind direction and was embedded in the crest of a gravity wave 95 km in length. The wave displacement amplitude in the temperature field was about 800 m with estimated vertical motions of 1.6 m/s. The

wave persisted more than 10 h, moving eastward at a mean speed of about 6 m/s, somewhat slower than the wind speed at the same height. Light turbulence was found in the wave crests and troughs. The possibility that the wave was partially trapped is discussed with respect to the simultaneous observation of more than one long lee wave cycle in some of the temperature data. (Author)

A78-16364 # Role of cumulonimbus in the evolution of cyclonic disturbances in Mediterranean regions (Rôle des cumulonimbus dans l'evolution des perturbations cycloniques des regions mediterraneannes) R M Thepenier and D Cruette (Paris VI, Universite, Paris, France) La Metéorologie, June 1977, p 165-171 in French

Photographs transmitted by ESSA 8 and NOAA-2 were used to study cloud formations associated with above-average rain in the Mediterranean area. The photographs show in such circumstances the presence of essentially convective low pressure cloud systems with a typical form quite different from that of classical extratropical disturbances. The observed cloud system has in horizontal projection an approximately circular contour and is composed of a mass of stormy clouds arranged in an anarchic manner. A cyclonic eddy, characterized by an approximate coincidence of isohypses and horizontal isotherms, is associated with the cloud system. The observations suggest that the birth and maintenance of certain cyclonic eddies is a consequence of the intense convection associated with the advection of cold air on relatively warmer water or land masses. This hypothesis is discussed.

A78-16501 # The complex of optical-photographical transformation methods of aerial and space images used for study of natural resources Z G Efimova, V B Komarov, V F Nomokanova, and U V Uglev (National Committee of Photogrammetrists, Moscow, USSR) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 25 p

A variety of optical-photographic methods of processing and analyzing aerial and space photographic images for extracting desired information is characterized. A functional model of an elementary photographic filtering system realizing the transformation of images is given. The procedures of constructing graphical schemes of physical parameters in isolines is described. A method of obtaining and analyzing spatial spectra of photographic images with a coherent optical system is briefly described.

PT H

A78-16507 # The significance of an arc shaped dark patch on the Nimbus III /HRIR/ imagery of India V M D Kulkarni (K J Somaiya College of Science, Bombay, India) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 7 p 13 refs Research supported by K J Somaiya College of Science, Indian Space Research Organization, and Ministry of Education and Social Welfare of India

Night-time infrared imagery obtained from the US weather satellite Nimbus-III was employed to study a geothermal field in western India An arc-shaped dark area in the satellite imagery appeared to be the surface expression of a fault lying at some depth, along the curve of this fault line is found a series of hot springs. Results of the study suggested that a combination of thermal, photographic and gamma radiation surveys of the fault region may provide criteria for predicting crustal movements and volcanic disturbances

A78-16509 # A multiseries digital mapping system for positioning MSS and photographic remotely sensed data M Nasu and J M Anderson (California, University, Berkeley, Calif) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper. 31 p 8 refs

The multiseries remote sensing - which consists of multispectral, multiband, multistage, multidate remote sensing data - provides various kinds of spectral or radiometric information in different kinds of recording and image characteristics. Results are presented

for a study designed to develop and investigate the feasibility of a method for positioning multiseries remotely sensed data by means of geometric multistage sampling. The designed multiseries positioning system consists of point identification and measurement of images, geometric adjustment for determination of exterior orientation of data, and analytical image restitution. The key concept in this procedure is the capability of performing sequential or simultaneous adjustments with all photographic and scan data while using parametric constraints for specified orientation parameters. It is shown that positioning of multiseries data is feasible and yields improved results using sequential or simultaneous parametric adjustment of multistage imagery.

A78-16518 # Automated earth resources surveys using satellite and aircraft scanner data - A Finnish approach E Kilpela (Helsinki University of Technology, Helsinki, Finland), S Jaakkola, R Kuittinen (Technical Research Centre of Finland, Helsinki, Finland), and J Talvitie (Oulu, University, Oulu, Finland) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 19 p.

In the beginning of 1974, a three-year Earth Resources Remote Sensing Project was initiated at the Laboratory of Land Use, Technical Research Center of Finland. The ultimate objective of the project is to develop automated environment monitoring and resource inventory methods capable to meet Finnish needs and conditions. The fields of study involved in the multidisciplinary R & D effort are forestry, geology and hydrology. In addition to digital LANDSAT data, the priject also operates with digital aircraft scanner data from the altitude of 300-5000 m. Preliminary results are presented in the paper.

A78-16520 # Practical experience in the rectification of MSS-images G Otepka (Wild Heerbrugg AG, Vienna, Austria) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 13 p 8 refs

A procedure is described for determining the distortions of multispectral scan (MSS) images at all image points. The basic principle of this procedure involves defining a square reference grid in the desired image (i.e., the rectified MSS image) and determining the corresponding grid points in the original MSS image, the latter data are used together with the original image to produce a rectified image in an orthophoto system. Necessary measurements are discussed along with a computer program for interpolating distortions of the reference grid, some examples of rectified MSS imagery, orthophotos as optimum rectification masters, coordinate measurement, and differential rectification. The procedure is shown to be a completely operational and very economical method for rectifying MSS images.

A78-16526 # A compensation procedure in a block of simply overlapping photograms, for the case of flat terrain (Un procédé de compensation en bloc des photogrammes à recouvrement simple, pour le cas des terrains plans). L Turdeanu (Rumanian Committee of Photogrammetry, Bucharest, Rumania) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 7 p. In French

When flat terrain is studied, and stereoplotting is not required, the use of a compensation procedure for blocks of aerial photograms with about 20 percent horizontal and vertical overlap is proposed. The procedure is based on the in situ determination of a limited number of preparation points on both sides of the blocks so that the connection of photograms can be achieved by means of two connection points. An analysis of the procedure is provided, and the advantages and limitations are considered.

A78-16527 # Test on the mapping application of Landsat imagery. J C Trinder and S U Nasca (New South Wales, University, Sydney, Australia) International Society for Photogrammetry, Inter-

national Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 14 p 9 refs Research supported by the Australian Research Grants Committee

Tests have been made on the application of Landsat images to 1 250,000 mapping within Australia, using identifiable points on existing maps as control. Polynomial and affine formulae have been used to test the accuracy of transformation of image coordinates onto ground coordinates derived from available maps at scales of 1 250,000 and 1 100,000. The accuracies of the coordinates after both transformations approach the local map accuracy standards Based on the parameters derived from affine transformations of each quadrant of an image, rectified enlargements have been prepared at a scale of 1 250,000. It appears that the accuracy of such enlargements may satisfy the map accuracy standards for 1 250,000 maps.

(Author)

A78-16531 # Directional reflectances of terrain objects from B&W-aerial photos. J Sievers (Karlsruhe, Universitat, Karlsruhe, West Germany) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 16 p. Research supported by the Deutsche Forschungsgemeinschaft

A procedure for determining directionally dependent reflection features of horizontal flat-terrain objects, especially agricultural areas, from densities in black-and-white aerial photos is described Some factors, such as atmospheric haze, transfer characteristics of the camera lens, light fall off, photographic emulsion, photographic processing, and density measurement, are analyzed Directional reflectances are determined by photographing a uniform horizontal area from above so that the area covers the whole image plane An image with a variable density distribution is compared with the reflection properties of two reference areas

A78-16532 # Digital rectification of multispectral imagery W Schuhr (Hannover, Technische Universität, Hanover, West Germany) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper. 7 p. 6 refs Research sponsored by the Deutsche Forschungsgemeinschaft and Bundesministerium für Forschung und Technologie

Procedures for the computerized digital rectification of Landsat data and modular multispectral scanner data are described and compared. A direct method, which provides comparatively low accuracy, involves the calculation of the output position for every image coordinate of the unrectified two-dimensional image. In the number of the unrectified and the corresponding grey values are computed for every three-dimensional output position Collinearity equations are introduced, and the use of first- and second-order polynomials as well as spline functions for expressing changes in exterior orientation is described

A78-16533 # Analytical aerial triangulation - Its obtention through a simple algorithm. A Pérez Salas (Instituto Geografico Militar, Buenos Aires, Argentina) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 32 p

The paper discusses a method to derive analytical aerial triangulations. It employs the orthogonal projections of the homologous perspective rays on two reference instrumental coordinated planes. An iterative process changes the orientation of the pair's left beam while moving the right beam without changing its orientation. These iterations can thus form any number of independent models. An analytical assembly method, which spatially links the models, results in analytical aerial triangulation.

A78-16538 # Modulation transfer analysis of aerial imagery E L Gliatti (USAF, Avionics Laboratory, Wright-Patterson AFB, Ohio) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 24 p 5 refs

The edge gradient analysis (EGA) method of modulation transfer analysis was applied in the evaluation of aerial imagery of a

rural area A brief outline of the procedure is given, consisting in ensemble averaging, Fourier transforming, and using the D-log E curve for converting density values to exposure Selected edges were raster-scanned with a Mann data microanalyzer Cascading effects of micro-D MTF, film MTF, and the frequency response of the smoothing filter had to be removed The processed aerial MTFs were then compared with laboratory-measured lens MTFs. The plots for 23 different target edges scanned showed good correspondence with the expected MTFs.

A78-16541 # Aerial triangulation with Skylab photography M E O Ali (Université Laval, Quebec, Canada) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 18 p. 6 refs Research supported by the National Research Council and Department of Energy, Mines and Resources of Canada

A research program has been carried out in the Department of Photogrammetry, Laval University, Canada, to utilize the Skylab photography for aerial triangulation purposes. The appropriate applications for such photography are areas where there are no ground control as such except the coordinates of points obtained from small scale maps. An efficient algorithm has been developed and has been tested to adjust simultaneously the photogrammetric measurements and the coordinates of the ground control points. As an example, using one Skylab model (covering an area of 165 x 100 km) and seven ground control points whose coordinates are known to the nearest 500 m, it was possible to obtain RMS errors of 67 m and 136 m in planimetry and height respectively. (Author)

A78-16542 \* # Digital preprocessing and classification of multispectral earth observation data P E Anuta (Purdue University, West Lafayette, Ind) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper. 31 p 17 refs Grant No NGL-15-005-112, Contract No NAS9-14016

The development of airborne and satellite multispectral image scanning sensors has generated wide-spread interest in application of these sensors to earth resource mapping. These point scanning sensors permit scenes to be imaged in a large number of electromagnetic energy bands between 3 and 15 micrometers. The energy sensed in each band can be used as a feature in a computer based multi-dimensional pattern recognition process to aid in interpreting the nature of elements in the scene. Images from each band can also be interpreted visually. Visual interpretation of five or ten multispectral images simultaneously becomes impractical especially as area studied increases, hence, great emphasis has been placed on machine (computer) techniques for aiding in the interpretation process. This paper describes a computer software system concept called LARSYS for analysis of multivariate image data and presents some examples of its application.

(Author)

A78-16545 # Geometrical models for satellite scanner imagery H P Bahr (Hannover, Technische Universitat, Hanover, West Germany) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 12 p 10 refs

The best model (Model 213) for describing the geometry of satellite scanner imagery collinearity equations, while the adjustment parameters (in the form of polynomials) are kept variable along the flight path, is considered. This results in residual errors of about plus or minus 0.85 pixel, which improves by 46% the values of the constant adjustment parameters. The geometric conditions in a Landsat-1 image ('bulk', 234 points) are adequately described by simple second-order polynomials (plus or minus 0.54/0.83 pixel). Least-squares filtering does not improve the result significantly. Because of the absolute random pointing accuracy and the relative determination accuracy of ground control points, 0.5 pixel appear to be the limiting accuracy for all geometrical models.

A78-16547 # Analysis of MSS digital imagery with the aid of principal component transform N H W Donker and N J Mulder

(International Institute for Aerial Survey and Earth Sciences, Enschede, Netherlands) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 35 p. 6 refs

The principal component transform, a data compression technique, is applied to Landsat multispectral scanning (MSS) digital data in order to produce imagery best suited to visual interpretation. Histogram equalization and level by level display for various radiation values of the MSS data are employed to select the most important spectral classes for image production. The spectrally significant classes are then subjected to treatment by the principal component transform, and a color-coded picture is developed. Sample color imagery for an area having a wide variety of topographical features and land use classes is analyzed.

A78-16548 # A block adjustment for SLAR-imagery. G Dowideit (Hannover, Technische Universität, Hanover, West Germany). International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper 11 p. 15 refs

A computer program for the block adjustment of side-looking airborne radar imagery is described. The block adjustment program relies on a linear least squares technique with a simple inversion process. By formulating the image coordinates as functions of parameters valid for real sensors, aircraft and navigation systems, the dynamic problems of flight path and imaging process are taken into account. Results of the block adjustment process are found to be adequate for mapping in three coordinates if opposite side flight configurations with more than 60% overlap are analyzed.

J M B

A78-16549 # A mathematical model for digital rectification of remote sensing data H Ebner (Stuttgart, Universitat, Stuttgart, West Germany) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper. 10 p 7 refs

Digital rectification of remote sensing imagery is intended for the generation of an image that represents an orthogonal projection of the scanned terrain. A mathematical model based on collinearity equations is proposed, which describes the variation of the exterior orientation parameters with time by stochastic processes. This allows for a rather general description of the time-variable deformations of linewise generated remote sensing imagery. The proposed model is then used for digital rectification, where a least-squares adjustment is formulated for estimation of the time-dependent orientation parameters from the available control points. The feasibility of the approach is demonstrated by simulated examples.

A78-16554 # Landsat-radar synergism. G. Harris, Jr (U.S Geological Survey, Sioux Falls, S Dak) and L C Graham (Goodyear Aerospace Corp, Akron, Ohio) International Society for Photogrammetry, International Congress for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976, Paper. 27 p

US Geological Survery EROS Data Center and Goodyear Aerospace Corporation engineers, working independently at first and then in cooperation, have synergistically combined Landsat multispectral scanner data and airborne synthetic aperture radar imagery. This paper presents the techniques and procedures used in the experiments Examples of Landsat and radar images of the same terrain, separate and combined, are presented to show that providing the two types of data in a single image retains all the information available from each sensor system and additional detailed data resulting from the simultaneous viewing of the two in superposition.

A78-16730 \* # Vertical lifting of ionization during geomagnetic storms from satellite measurements of ion composition M K Goel, B C N Rao (National Physical Laboratory of India, New Delhi, India), S Chandra, and E J Maier (NASA, Goddard Space Flight Center, Greenbelt, Md) Journal of Geomagnetism and Geoelectricity, vol 29, no 3, 1977, p 143 151 21 refs

Magnetic-storm phenomena at low latitudes are discussed based on ion-composition /O(+), H(+), He(+)/ and electron- and ion-temperature measurements from the OGO 4 and Isis-2 satellites For the moderately severe storms considered, the effects of changes in the neutral composition and in the neutral and plasma temperatures are discussed, and it is shown that these changes would not produce the observed O(+) increase during storms at low latitudes. It is suggested that the observed increase in O(+) in the topside region is a manifestation of the vertical lifting is further substantiated by the observed changes in the F-region critical frequency and the height parameters.

(Author)

A78-17068 # Analysis of GATE radar data for a tropical cloud cluster in an easterly wave C A Leary and R A Houze, Jr (Washington, University, Seattle, Wash ) In Conference on Radar Meteorology, 17th, Seattle, Wash , October 26-29, 1976, Preprints Boston, Mass , American Meteorological Society, 1977, p 376-383 9 refs NSF-supported research, Grant No NOAA-OCD-14830

A78-17543 Clustering of ERTS data using various orthogonal transforms G W Zobrist (Toledo, University, Toledo, Ohio) In Imaginative engineering thru education and experience, Proceedings of the Southeast Region 3 Conference, Williamsburg, Va , April 4-6, 1977 New York, Institute of Electrical and Electronics Engineers, Inc., 1977, p. 205-207 6 refs

A78-18071 \* Some aspects of adaptive transform coding of multispectral data N Ahmed (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.) and T Natarajan (Texas Instruments, Inc., Dallas, Tex.) In Annual Asilomar Conference on Circuits, Systems, and Computers, 10th, Pacific Grove, Calif., November 22-24, 1976, Conference Record North Hollywood, Calif., Western Periodicals Co., 1977, p. 583-597 6 refs. Grant No. NCA2-OR363-601

This paper concerns a data compression study pertaining to multi-spectral scanner (MSS) data. The motivation for this undertaking is the need for securing data compression of images obtained in connection with the Landsat Follow-On Mission, where a compression of at least 6.1 is required. The MSS data used in this study consisted of four scenes. Tristate, consisting of 256 pels per row and a total of 512 rows - i.e., (256x512), (2) Sacramento (256x512), (3) Portland (256x512), and (4) Bald Knob (200x256). All these scenes were on digital tape at 6 bits/pel. The corresponding reconstructed scenes of 1 bit/pel (i.e., a 6.1 compression) are included.

A78-18103 Applications of remotely sensed data to wetland studies V Carter (U.S. Geological Survey, Reston, Va.) In Space research XVII, Proceedings of the Open Meetings of Working Groups on Physical Sciences, June 8-19, 1976 and Symposium on Minor Constituents and Excited Species, Philadelphia, Pa., June 9, 10, 1976 Oxford and New York, Pergamon Press, 1977, p. 19-23, 11 refs

Remotely sensed data from both aircraft and satellite platforms have been used for a variety of wetland studies. For example, identification of major vegetative associations with Landsat digital data made it possible to estimate primary productivity in a Virginia salt marsh. Both seasonal color infrared photographs and Landsat digital data are being used for inland wetland investigations. In co-operation with the Tennessee Valley Authority, wetlands in western Tennessee are being classified and mapped at 1 24,000 scale using color infrared photographs which show both boundary dynamics and vegetation. The US Geological Survey and the US Fish and Wildlife Service are using color infrared photographs to aid in a hydrologic study and to map vegetation at 1 24,000 and 1 100,000 scales in the Great Dismal Swamp of Virginia and North Carolina. In each case the base maps are being used to evaluate the accuracy of Landsat analyses with the objective of using Landsat data for monitoring vegetative change and for updating maps (Author) A78-18104 \* Application of aircraft multispectral scanners to quantitative analysis and mapping of water quality parameters in the James River, Virginia R W Johnson (NASA, Langley Research Center, Hampton, Va) In Space research XVII, Proceedings of the Open Meetings of Working Groups on Physical Sciences, June 8-19, 1976 and Symposium on Minor Constituents and Excited Species, Philadelphia, Pa, June 9, 10, 1976 Oxford and New York, Pergamon Press, 1977, p 25-31 9 refs

A78-18241 Computer elaboration and visualization of remote-sensing data D J David (Paris I, Universite, Paris, France), G Joly (CNRS, Laboratoire d'Information et de Documentation en Géographie, Paris, France), and F Verger (Ecole Nationale Supérieure, Montrouge, Hauts-de-Seine, France) British Interplanetary Society, Journal (Remote Sensing), vol 31, Jan 1978, p 16-20 7 refs

A set of computer programs designed to produce fully automatic cartography from Landsat data is described. The data elaboration and image processing capacities of the programs are linked to a graph plotter, which produces master maps suitable for publication, these full-color master's unlike line printer maps, take into account deviation angle due to the earth's rotation. Diachronic mapping (i.e., mapping that distinguishes features on the basis of their time-varying spectral signatures), smoothing of distortions in the raw data, and acceleration of the drawing process are also included in the automatic cartography programs. Furthermore, drawing problems and data elaboration problems are completely distinct in the automatic cartography system, permitting introduction of other data analysis, pattern recognition and automatic classification schemes as desired.

A78-18244 The use of Landsat imagery for terrain analysis B J Chandler and E S Owen-Jones (Bedford College, London, England) British Interplanetary Society, Journal (Remote Sensing), vol 31, Jan 1978, p 37-40 Research supported by the Department of Industry

A terrain mapping system which uses Landsat computer compatible tapes to produce lineprinter images, microfilm gray level images (and thence color composites), or microfilm symbolic shading images is described. The level slicing technique employed by the mapping system is a modified equal interval slice, rather than an equal population slice, which causes excessive contrast in color composites. Pixel classification programs, which may produce useful classifications after about three iterations of the processing, are also mentioned. Sample gray level imagery and symbolic shading imagery for a region of Queensland, Australia are given.

A78-18271 # Photo interpretative procedures in assessing river recreation potential S M Nor and R Hill Rowley (Michigan State University, East Lansing, Mich.) Scenic Rivers Symposium, Louisiana State University, Baton Rouge, La., June 1977, Paper 8 p.

The photo interpretative procedures were employed in connection with two types of imagery, including black and white modified infrared prints (BWIR) at 1 15,840 dated September 1974 from the U.S. Forest Service, and color infrared transparencies (CIR) at 1 36,000 dated March 1973 from the Michigan Department of State Highways and Transportation. The classification system used in the interpretation can be divided into three basic categories related to a description of nature of river and landscape, the numerical count of features, and subjective evaluations. The BWIR imagery had some inherent characteristics which made interpretation more difficult than with the CIR. Water and shadows both appeared dark, and tree shadows obscured details of the river, river banks, and other water bodies. Use of CIR imagery seemed to allow better shadow penetration. Identification of waterways, sandy beaches, and roads was much easier.

A78-18440 Remote sensing experiment for magnetospheric electric fields parallel to the magnetic field K Wilhelm (Max-Planck-Institut fur Aeronomie, Katlenburg, West Germany)

Journal of Geophysics - Zeitschrift fur Geophysik, vol 43, no 5-6,

1977, p 731-750 37 refs Bundesministerium für Forschung und Technologie Contracts No WRT-1074, No WRK-274/3

A procedure for studying the magnetospheric electric fields parallel to the magnetic field is proposed. In this procedure, test particles would be injected into the magnetosphere and detected as fast echoes. Means of observing these echoes are discussed with particular emphasis on the determination of transit times as functions of the magnetic moment and energy. It is shown that the transit time function, obtained by integrating the equation of motion of the guiding center of a test particle, is distinctly different for different electric field configurations. The use of Abel's integral equation permits the approximate determination of the electric field along the magnetic field line.

A78-18649 \* Data handling for the geometric correction of large images H K Ramapriyan (Computer Sciences Corp., Silver Spring, Md.) IEEE Transactions on Computers, vol. C-26, Nov. 1977, p. 1163-1167 6 refs. Contract No. NAS8-21805

Several geometric distortions are present in remotely sensed images depending on the type of sensors and the object being observed. It is often desirable to compensate for these distortions and store the images in reference to a standard coordinate system. Digital techniques for correction are versatile and introduce a minimum of radiometric errors. The main problems to be considered in this area are the determination of the corrective transformation, resampling, and the management of the large quantities of data. It is shown that, by a judicious rearrangement of the input data, considerable reductions in the required memory capacity can be achieved. The rearrangement can be accomplished in several stages. The method presented here is amenable to pipeline implementation for processing a continuous stream of images. (Author)

A78-18730 \* Dependence of substorm occurrence probability on the interplanetary magnetic field and on the size of the auroral oval Y Kamide (Cooperative Institute for Research in Environmental Sciences, Boulder, Colo , Kyoto Industrial University, Kyoto, Japan), P D Perreault (Stanford Research Institute, Menlo Park, Calif), S-I Akasofu (Alaska, University, Fairbanks, Alaska), and J D Winningham (Texas, University, Richardson, Tex) Journal of Geophysical Research, vol 82, Dec 1, 1977, p 5521-5528 45 refs NSF Grant No ATM-74-23832, Contracts No F19628-76-C-074, No F19628-76-C-005, Grants No NGL-44-004-130, No NGR-44-004-150

A78-18749 Aerial photography and remote sensing for soil survey L P White Oxford and New York, Clarendon Press, 1977 118 p. 43 refs \$13.95

The present work outlines the use of aerial photography for soil mapping. Attention is directed at the working principles of cameras and other devices that obtain images within and beyond the visible spectrum, the ways in which the images are produced and processed, and how they are used in soil survey. A detailed discussion is presented of linescanners, the side looking radar, imagery from space platforms such as Landsat and Skylab, and image enhancement and automatic image analysis. Several black-and-white and color aerial photographic plates are provided.

A78-18910 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses Y M Chen and D S Tsien (New York, State University, Stony Brook, N Y ) Journal of Computational Physics, vol 25, Dec 1977, p 366-385 30 refs Contract No N00017-76-C-0804

An iterative algorithm is developed for solving nonlinear inverse problems in the remote sensing of density profiles of a simple ocean model by means of acoustic impulses. The adiabatic sound velocity is assumed to be proportional to the inverse square root of the density. The original pulse problem in the time domain is reduced to a continuous wave problem in the frequency domain after which the nonlinear inverse problem in the frequency domain is solved by a hybrid of a Newton-like iterative method, Backus and Gilbert linear inversion technique, and the finite difference method. Algorithm

validity is confirmed by numerical simulations. The effects of data frequency range and background noise are investigated, low-frequency data are found to be preferable to high-frequency data. Error estimates are provided.

A78-19114 # Influence of temperature on the emissivity of moist soil in the microwave range (Vliianie temperatury na izluchateľ nuiu sposobnosť vlazhnoi pochvy v SVCh diapazone) L M Mitnik and I A Aframeeva (Leningradskii Gidrometeorologicheskii Institut, Leningrad, USSR) Meteorologia i Gidrologiia, Aug 1977, p 16-22 21 refs In Russian

In the study described, the influence of temperature on the emissivity of moist soils (clay, silt) was assessed on the basis of the temperature dependence of the real and imaginary parts of the permittivity of the soils at wavelengths between 1.15 and 150 cm. To determine their permittivity, the soil samples were frozen to -20 C and reheated to +24 C. The permittivity values were used to calculate, on the basis of Fresnel formulas, the emissivity of the soils in horizontal and vertical polarization, the degree of polarization, and the penetration depth of electromagnetic waves. The results are presented in the form of graphs.

A78-19241 # Methods of analytic processing of various aerocosmic photoimages (Metody analiticheskoi obrabotki razlichnykh aerokosmicheskikh fotoizobrazhenii) B A Novakovskii (Moskovskii Institut Inzhenerov Geodezii, Aerofotos'emki i Karto grafii, Moscow, USSR) Geodeziia i Aerofotos'emka, no 4, 1977, p 87-90 In Russian

A78-20168 # Four metre antenna system for Landsat and NOAA reception R L Irwin (Canada Centre for Remote Sensing, Prince Albert Satellite Station, Canada) (Canadian Remote Sensing Society, Remote Sensing Science and Technology Symposium, Ottawa, Canada, Feb 21-23, 1977) Canadian Journal of Remote Sensing, vol 3, Dec 1977, p 21-27

The paper discusses the design of an antenna that can be used for reception from both Landsat (1690-1700 MHz) and NOAA-Very High Resolution Radiometer (2200-2300 MHz) systems A 4-meter parabolic antenna with a feed providing 50% efficiency is described. The block diagram is portrayed, system performance specification and margin calculations are presented, and real time MSS and VHRR downlink margin calculations are considered. The small antenna is needed to supplement the large 26-meter antenna which sometimes must be used to monitor Landsat at times when desired NOAA data are also available. The antenna can receive high-azimuth data from Landsat which the large antenna, as a result of its slow slewing, can not receive.

A78-20171 # HRPT ground station R J Welsh (Department of the Environment, Atmospheric Environment Service, Downsview, Ontario, Canada) (Canadian Remote Sensing Society, Remote Sensing Science and Technology Symposium, Ottawa, Canada, Feb 21-23, 1977) Canadian Journal of Remote Sensing, vol 3. Dec 1977, p 46-52

The paper describes the high resolution picture transmission (HRPT) direct readout station which is operated by the Aerospace Meteorology Division of Canada. The data for HRPT are obtained from the very high resolution radiometer (VHRR) on the NOAA series of polar orbiting meteorological satellites. The station uses an auto-tracking ten-foot diameter solid parabolic dish antenna system Information on station components is provided, and the computer system, both in its present form and in a possible expanded form, is discussed.

A78 20173 # Homomorphic processing of Landsat data S Carrol and J E Robinson (Union Oil Company of Canada, Canada) Canadian Journal of Remote Sensing, vol 3, Dec 1977, p 66-75 25 refs

Homomorphic transforms that permit realistic linear enhance ment of Landsat images are described. Usually the product is a false color picture with the information content of all four bands compressed into three corrected and enhanced images that are combined for full color display. The advantages of this technique include scene to scene continuity, one disadvantage is that homomorphic processing requires multi-processing of each band of each scene. Image processing, homomorphic principles, and applications to Landsat data are discussed, and, as an example, the generalized geology of the Sudbury Basin in northern Ontario is illustrated. M.L.

N78-10341\*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md MONTE CARLO SIMULATION OF WAVE SENSING WITH A SHORT PULSE RADAR

D M LeVine, L D Davisson (Maryland Univ , College Pk ), and R L Kutz Oct 1977 23 p refs (NASA-TM-X-71412, X-953-77-239) Avail NTIS HC A02/MF A01 CSCL 17I

A Monte Carlo simulation is used to study the ocean wave sensing potential of a radar which scatters short pulses at small off-nadir angles in the simulation, realizations of a random surface are created commensurate with an assigned probability density and power spectrum. Then the signal scattered back to the radar is computed for each realization using a physical optics analysis which takes wavefront curvature and finite radar-to-surface distance into account. In the case of a Pierson-Moskowitz spectrum and a normally distributed surface, reasonable assumptions for a fully developed sea, it has been found that the cumulative distribution of time intervals between peaks in the scattered power provides a measure of surface roughness. This observation is supported by experiments.

# N78-10528 Pennsylvania State Univ , University Park FLOODPLAIN DELINEATION USING MULTISPECTRAL SCANNER DATA Ph.D. Thesis

Donald Lee Henninger 1976 110 p

Avail Univ Microfilms Order No 77-9769

Computer analysis techniques were applied to aircraft- and satellite-collected digital multispectral scanner (MSS) data to determine if floodplain boundaries could be accurately and quickly delineated in Pennsylvania. The criteria used to distinguish floodplain areas were natural indicators such as differences in vegetation and soils. Aircraft MSS data in the visible, the near infrared, and the intermediate infrared regions of the electromagnetic spectrum were analyzed for detection of natural features which could be associated with a floodplain boundary. Satellite (LAND SAT 1) MSS data in four spectral regions of the electromagnetic spectrum were also analyzed. Results indicate that computer analysis of remotely sensed digital MSS data has the potential of playing a prominent role in the identification and mapping of floodplain boundaries.

N78-10530\* Department of the Northern Territory, Darwin (Australia)

## ERTS B IMAGERY TO MONITOR LARGE SCALE CLEARING AND DEVELOPMENT PROGRAMMES IN THE DALY BASIN, NORTHERN TERRITORY

Blair G Wood, Principal Investigator 26 Oct 1977 2 p Sponsored by NASA ERTS (E78-10002 NASA-CR-155206) Avail NTIS HC A02/MF A01 CSCL 02C

N78-11451\*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md

### AIRCRAFT SENSOR ANALYSIS PACKAGE SYSTEM DESCRIPTION

 $\boldsymbol{M}$  L Forman Sep 1977 28 p refs Submitted for publication

(NASA-TM-78038 X-933-77-236) Avail NTIS HC A03/MF A01 CSCL 14B

An overview of the capabilities of the Aircraft Sensor Analysis Package (ASAP) is presented. The approach is non-technical and several output products are illustrated. The major features of the system are described in more detail than is found in the User's Guide to a potential user, or to a user looking for a specific capability to be incorporated in another system.

N78-11561# Lockheed Missiles and Space Co , Palo Alto Calif Research Lab

# IONOSPHERIC IRREGULARITIES OPTICAL SUPPORT OF HAES SCINTILLATION EXPERIMENTS Final Report, 15 Dec 1975 - 31 Jan 1977

Robert D Sears 31 Jan 1977 89 p refs

(Contract DNA001-76-C-0182)

(AD-A043666 DNA-4240F) Avail NTIS HC A05/MF A01 CSCL 04/1

Photometric measurements of auroral spectral emission features and of the horizontal phase velocity of auroral motions were conducted at Chatanika Alaska during several observing periods in 1976. These experiments provided ground-based optical support for the DNA HAES (High Altitude Effects Simulation) rocket experiments launched from Poker Flat Multispectral data on the auroral emission intensities at 4278A and 6300A and the intensity ratio was analyzed in terms of the mean energy parameter for an assumed Maxwellian flux of precipitating electrons Comparison between photometric determination of the mean energy parameter and that derived from incoherent scatter radar data provided a useful cross calibration of the two measurement techniques. This agreement also tends to confirm the theoretical predictions for the intensity ratio R sub 64 1(6300)/1(4278) as a function of the mean energy parameter Additional analytical work was conducted to improve the three beam analysis code which allows inference of auroral E-fields and associated quantities from the auroral motion and intensity data Results of the improved code are presented for the WIDEBAND rocket support experiment

# N78-12486 Catholic Univ of America, Washington, D C APPLICATION OF DIGITAL FILTERING TO SATELLITE GEODESY Ph.D. Thesis

Clyde Clarenton Goad 1977 85 p

Avail Univ Microfilms Order No 77-16801

Accurate measurements of satellite orbits were used to deduce the value of the lunar semi-diurnal (M2) ocean tide. Since the ocean tides cause periodic perturbations with periods greater than a week in the evolution of the Keplerian elements of a satellite, the mean Keplerian elements (osculating Keplerian elements less all short period oscillations) are studied. Approximate analytical transformations were applied which account for large first-order effects. Elimination of very high frequency effects was accomplished with the aid of an ideal low-pass filter. Two terms in the harmonic expansion of the M2 global tide height can be observed These estimates are somewhat smaller than recent publicized coefficients obtained from numerical solutions of Laplace tidal equations. Using this value of M2 to calculate the deceleration of the lunar mean longitude yields an estimate in close agreement with recent analyses of ancient eclipses and modern transit data Dissert Abstr

#### N78-12487 Ohio State Univ , Columbus

### ANALYSIS OF PHOTOGRAMMETRIC AERIAL CAMERA CALIBRATIONS Ph.D Thesis

Wicha Jiwalai 1977 213 p

Avail Univ Microfilms Order No 77-17103

A pair of reseau type aerial cameras were calibrated by using goniometer collimator bank and stellar calibration methods. This information was applied to unconstrained exterior orientation positional constraints rotational constraints, and fully constrained exterior orientation. The calibration data provided significantly different results in all cases except single photo resection with no constraint on the exterior orientation. The results of block adjustment indicated the presence of some types of systematic errors. Moreover, they yielded such different results that it was not possible to group them together. Out of six calibrations, in block triangulations, only one provided satisfactory results on both planimetry and height while another one provided a satisfactory result only in planimetry.

#### N78-12489 California Univ Berkeley

### GEOMETRIC PROCESSING FOR DIGITAL MAPPING WITH MULTISERIES REMOTE SENSING DATA Ph D Thesis

Mitsuru Nasu 1976 198 p

Avail Univ Microfilms Order No 77-15799

Digital geometric procedures for positioning multiseries remote sensing data have been studied for digital cartographic mapping purposes. Tests with simulated and real data show that the digital approach is feasible Improvement of sensor exterior orientation by multistage geometric sampling and improved point identification by digital image matching result in higher positioning accuracy.

#### N78-12491 Purdue Univ , Lafayette, Ind IMAGE MODELING WITH APPLICATION TO MEASURE-MENT Ph.D Thesis

James William Burnett 1976 89 p

Avail Univ Microfilms Order No 77-15386

A fast and efficient algorithm was developed for pulse width estimation from blurred and nonlinear observation in the presence of signal dependent noise. The problem is approached by modeling the signal (reflected light intensity) as a discrete position finite state Markov process. Sample functions of such a process are graphically represented by a path through a trellis. By assigning a cost or length to each branch of the trellis. By assigning a cost or length to each branch of the trellis. By sequence estimate of the signal is computed by finding the minimum cost or minimum length path through the trellis. The Viterbialgorithm is introduced as an efficient means of finding the minimum cost path through the trellis. When the possible states are known a-priori, the algorithm is shown to produce asymptotically unbiased, minimum variance discrete width estimates. Computer simulation results show the variance of discrete estimates is close to the Cramer-Rao bound.

N78-12493\*# Geological Survey Iowa City, Iowa Research

# LAND CLASSIFICATION OF SOUTH-CENTRAL IOWA FROM COMPUTER ENHANCED IMAGES Progress Report, 3 Feb. - 3 Apr 1976

James R Lucas Principal Investigator (Technicolor Graphic Services, Inc Sioux Falls South Dakota), James V Taranik (EROS Data Center, Sioux Falls South Dakota), and Frederic C Billingsley JPL) 3 May 1976 90 p refs Original contains color imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D ERTS

(Contract NAS5-20832)

(E78-10005, NASA-CR-155209, PR-5) Avail NTIS HC A05/MF A01 CSCL 08B

The author has identified the following significant results. The lowa Geological Survey developed its own capability for producing color products from digitally enhanced LANDSAT data. Research showed that efficient production of enhanced images required full utilization of both computer and photographic enhancement procedures. The 29 August 1972 photo-optically enhanced color composite was more easily interpreted for land classification purposes than standard color composites.

N78-12495\*# International Business Machines Corp., Gaithers-burg Md

#### RESAMPLING STUDY Final Report

D G Ferneyhough, Principal Investigator and C W Niblack Mar 1977 175 p Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls S D ERTS

(Contract NAS5-21865)

(E78-10014 NASA-CR-156643, FSD-7700-01) Avail NTIS HC A08/MF A01 CSCL 05B

The author has identified the following significant results. The nearest neighbor and cubic convolution resampling algorithms were applied to a variety of images extracted from LANDSAT MSS data. A comparison of the results demonstrated that (1) cubic convolution can cause spreading of small features and can introduce noticeable overshoot (ringing) into the data (2) cubic convolution attenuates the high spatial frequencies compared to the original and nearest neighbor resampled data, and (3) cubic convolution generally produces photographic products of superior visual quality. The effects of the resampling algorithms on multispectral classification were not conclusively determined due to the small number of images tested.

N78-12497\*# Purdue Univ , Lafayette, Ind Lab for Applications of Remote Sensing

#### COMPUTER-AIDED ANALYSIS OF LANDSAT DATA FOR SURVEYING TEXAS COASTAL ZONE ENVIRONMENTS

Stevan J Kristof, Principal Investigator and Richard A Weismiller 6 Sep 1977 33 p refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D EREP

(Contracts NAS9-14016, NAS9-14970)

(E78-10018, NASA-CR-151536, LARS-TR-090677) Avail

NTIS HC A03/MF A01 CSCL 08J

The author has identified the following significant results The study areas were Pess Cavallo and Port O'Connor The following terrestrial and aquatic environments were discriminated alternating beach ridges, swales, sand dunes, beach birms, deflation surfaces, land-water interface, urban, spoil areas, fresh and salt water marshes grass and woodland, recently burned or grazed areas, submerged vegetation, and waterways

N78-12498\*# Environmental Research Inst. of Michigan, Ann. Arbor Infrared and Optics Div

EVALUATION OF SIGNATURE EXTENSION ALGORITHMS Interim Technical Report, 15 May 1976 - 31 Aug 1977

R F Nalepka, Principal Investigator and Alex P Pentland Sep. 1977 76 p refs EREP (Contract NAS9-14988)

(E78-10021, NASA-CR-151537, ERIM-122700-29-T) Avail NTIS HC A05/MF A01 CSCL 05B

The author has identified the following significant results One of the major findings was that nearly all of the bias in the proportion estimates of the multisegment training and classification procedure resulted from the particular configuration of the signature set used for classification rather than from peculiarities of the recognition sample segments. This meant that the proportion estimation bias could be accurately corrected simply by estimating the bias on the original six training segments The bias corrected proportion estimates of the multisegment training and classification procedure were extremely accurate and had a low variance when compared to local training and classification. This finding may have important ramifications for reducing the cost and increasing the accuracy of bias correction procedures

#### N78-12499\*# Control Data Corp., Minneapolis Minn DIGITAL IMAGE CORRELATION TECHNIQUES APPLIED TO LANDSAT MULTISPECTRAL IMAGERY

L O Bonrud, Principal Investigator and W J Miller Jan 1976 118 p refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D ERTS

(Contract NAS5-20570)

NASA-CR-156647) NTIS (E78-10022,

HC A06/MF A01 CSCL 05B

The author has identified the following significant results Automatic image registration and resampling techniques applied to LANDSAT data achieved accuracies, resulting in mean radial displacement errors of less than 0.2 pixel. The process method utilized recursive computational techniques and line-by-line updating on the basis of feedback error signals. Goodness of local feature matching was evaluated through the implementation of a correlation algorithm. An automatic restart allowed the system to derive control point coordinates over a portion of the image and to restart the process, utilizing this new control point information as initial estimates

#### N78-12502\*# Atomic Energy Commission, Dacca (Bangladesh) INVESTIGATIONS USING DATA FROM LANDSAT-2 Quarterly Report, Jul. - Sep 1977

Anwar Hossain, Principal Investigator Nov 1977 4 p refs Sponsored by NASA ERTS

(E78-10026, NASA-CR-155251) NTIS

HC A02/MF A01 CSCL 05B
The author has identified the following significant results A land use map was prepared of Dacca-Narayanganj-Demra area on a scale of 1 50,000 LANDSAT imageries of Dinajpur and Rangpur districts were studied. The difference between the exposed Pleistocene red clay this clay under alluvial cover and recent alluvium was noted Different types of soils, crops, etc. were delineated on the ERTS imagery

N78-12504\* # Purdue Univ , Lafayette Ind Lab for Applications of Remote Sensing

#### A CASE STUDY USING ECHO(EXTRACTION AND CLAS-SIFICATION OF HOMOGENEOUS OBJECTS) FOR ANALY-SIS OF MULTISPECTRAL SCANNER DATA

Donna Scholz, Principal Investigator, James Russell John Lindenlaub, and Philip Swain 1 Sep 1977 94 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sloux Falls, S. D. EREP. (Contract NAS9-14970)

(E78-10030, NASA-CR-151532, LARS-Publ-090177) Avail NTIS HC A05/MF A01 CSCL 05B

N78-12511\* Wolf Research and Development Corp., Pocomoke City, Md

#### SEAHT A COMPUTER PROGRAM FOR THE USE OF INTERSECTING ARCS OF ALTIMETER DATA FOR SEA SURFACE HEIGHT REFINEMENT

C P Allen and C F Martin Nov 1977 119 p refs (Contract NAS6-2639)

(NASA-CR-141432) Avail NTIS HC A06/MF A01 CSCL -

The SEAHT program is designed to process multiple passes of altimeter data with intersecting ground tracks with the estimation of corrections for orbital errors to each pass such that the data has the best overall agreement at the crossover points Orbit error for each pass is modeled as a polynomial in time, with optional orders of 0, 1, or 2. One or more passes may be constrained in the adjustment process, thus allowing passes with the best orbits to provide the overall level and orientation of the estimated sea surface heights. Intersections which disagree by more than an input edit level are not used in the error parameter estimation. In the program implementation, passes are grouped into South-North passes and North-South passes with the North-South passes partitioned out for the estimation of orbit error parameters. Computer core utilization is thus dependent on the number of parameters estimated for the set of South-North arcs, but is independent on the number of North-South passes Estimated corrections for each pass are applied to the data at its input data rate and an output tape is written which contains the corrected data Author

N78-12515# Environmental Research Inst. of Michigan, Ann.

BASIC REMOTE SENSING INVESTIGATION FOR BEACH RECONNAISSANCE Interim Report, 1 Jan. - 31 Dec. 1976 David Lyzenga, Robert Shuchman, Fred Thomson Carl F Davis, and Gwynn H Suits Sep 1977 77 p refs

(Contract NO0014-74-C-0273)

(AD-A044836, ERIM-108900-9-P) NTIS

HC A05/MF A01 CSCL 14/5

Progress is reported on two tasks designed to develop remote sensing beach reconnaissance techniques applicable to benthic and beach intertidal zones. In Task1--whose goal is to develop remote sensing algorithms for important beach composition and physical parameters--results of radiative transfer model development and application are reported. The model calculates the radiance of a beach, given physical and compositional information In Task 2--whose goal is to develop remote sensing algorithms for mapping of bottom features in the benthic zone--results of radiative transfer model calculations and an evaluation of the modified ratio algorithm (MRA) performance in scattering waters Author (GRA) are presented

#### N78-12516# Systems Research Labs , Inc , Dayton, Ohio RESEARCH AND SIMULATION IN SUPPORT OF NEAR REALTIME/REALTIME RECONNAISSANCE RPV SYSTEMS Progress Report, Dec 1975 - Jun. 1976

Gilbert Kuperman, William N Kama, Joseph Fraggiotti, and John Kettlewell Jun 1977 262 p refs (Contract F33615-75-C-0127, AF Proj 7184)

AMRL-TR-77-33) NTIS (AD-A044598.

HC A12/MF A01 CSCL 15/4

A facility was developed for assessing operator performance in target recognition and interpretation tasks using real time and near real time electrooptical sensor imagery. A programmable image scanner was upgraded to generate simulated sensor imagery

under operational flight profiles. A study was performed to compare operator performance against three candidate sensors. The study utilized two V/H levels, the operationally preferred and the minimum commensurate with RPV survivability. Significant findings were developed for the dependent measures of percent of targets detected, time on display until detection, ground range at detection, slant range at detection, and displayed image scale at detection. Accuracy of interpretation and interpreter confidence did not yield significant results. These results were combined with analytically based performance measures to produce a sensor comparison table in which twelve criteria, weighted by their respective operational impact, were used A slewable television camera, equipped with zoom optics, and supported by a near real time playback capability achieved the highest performance score Additionally, seventeen areas were identified in which future investigations could provide operationally important findings to the RPV Special Project Office Author (GRA)

 $\mbox{N78-12586*}\#$  National Aeronautics and Space Administration, Washington, D  $\mbox{\ C}$ 

### INVERSION METHODS IN ATMOSPHERIC REMOTE SOUNDING

Adarsh Deepak, ed 1977 609 p refs Workshop held at Hampton, Va 15-17 Dec 1976 Sponsored in part by Old Dominion Univ

(NASA-CP-004) Avail NTIS HC A99/MF A01 CSCL 04A
The mathematical theory of inversion methods is applied to
the remote sounding of atmospheric temperature, humidity, and
aerosol constituents

### N78-12587\*# Leiden Univ (Netherlands) HYBRID METHODS ARE HELPFUL

H C VanDeHulst In NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 1-19 ref

#### Avail NTIS HC A99/MF A01 CSCL 04A

Multiple scattering problems in a plane layer often permit the convenient use of different methods joined together. Sample numerical results to illustrate this point refer to X- and Y-functions, seymptotic fitting, the small-loss approximations, polarization in high orders, and photon path distribution.

N78-12588\*# Université des Sciences et Techniques de Lille (France)

#### REVIEW OF RADIATIVE TRANSFER METHODS IN SCAT-TERING ATMOSPHERES

Jacqueline Lenoble In NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 21-40

Avail NTIS HC A99/MF A01 CSCL 04A

The radiative transfer in a scattering plane-parallel atmosphere is discussed, considering the exact analytical, the computational and the approximate methods. Some results of numerical comparisons are given. Finally, the difficulties of realistic atmospheric models are emphasized.

### N78-12589\*# Arizona Univ, Tucson

### SOME ASPECTS OF THE INVERSION PROBLEM IN REMOTE SENSING

S Twomey In NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 41-65 refs

#### Avail NTIS HC A99/MF A01 CSCL 04A

Several commonly used methods for inversion--constrained linear inversion, synthesis (Backus-Gilbert) methods and nonlinear iterative techniques for the Chanine type--are discussed It is demonstrated that a very close connection exists between Backus-Gilbert solutions and those given by constrained linear inversion. A number of examples of the application of such methods are presented, showing that resolution is not greatly different for quite different algorithms, a result quite in accord with general theoretical considerations more resolution can be achieved at the expense of introducing greater a priori bias in the procedure.

N78-12590\*# Jet Propulsion Lab , Calif Inst of Tech , Pasadena GENERALIZATION OF THE RELAXATION METHOD FOR

### THE INVERSE SOLUTION OF NONLINEAR AND LINEAR TRANSFER EQUATIONS

Moustafa T Chahine In its Inversion Methods in Atmospheric Remote Sounding 1977 p 67-116 refs

(Contract NAS7-100)

Avail NTIS HC A99/MF A01 CSCL 04A

A mapping transformation is derived for the inverse solution of nonlinear and linear integral equations of the types encountered in remote sounding studies. The method is applied to the solution of specific problems for the determination of the thermal and composition structure of planetary atmospheres from a knowledge of their upwelling radiance.

### N78-12591\*# Oxford Univ (England) Clarendon Lab STATISTICAL PRINCIPLES OF INVERSION THEORY

C D Rodgers In NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 117-138 refs

Avail NTIS HC A99/MF A01 CSCL 04A

Statistical methods are used to deal with the inverse problem of radiative transfer All the available information about an unknown profile can be expressed in the form of values of functions of that profile and error estimates of these values Estimation theory shows how these values are combined to give an estimate of the unknown profile and its error covariance Many inversion methods are expressed in this form although the error estimate is not usually carried out Practical applications are described, both for inversion of individual profiles, and the global analysis of satellite data

Author

N78-12592\*# Air Force Geophysics Lab , Hanscom AFB, Mass INVERSE SOLUTION OF THE PSEUDOSCALAR TRANSFER EQUATION THROUGH NONLINEAR MATRIX INVERSION Jean I F King /n NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 139-153 refs

Avail NTIS HC A99/MF A01 CSCL 04A

Nonlinear matrix inversion operators have been developed which, applied to observed radiances, infer maximal information regarding atmospheric scattering parameters and vertical distribution of radiant sources and sinks. The algorithm has the attractive feature of noise discrimination, attributing instrumental errors to extra-atmospheric sources.

Author

N78-12593\*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md BACKUS-GILBERT THEORY AND ITS APPLICATION TO RETRIEVAL OF OZONE AND TEMPERATURE PROFILES Barney J Conrath /n its Inversion Methods in Atmospheric Remote Sounding 1977 p 155-193 refs

Avail NTIS HC A99/MF A01 CSCL 04A

The inversion method provides a quantitative evaluation of the trade-off between vertical resolution of a retrieved profile and formal root-mean-square (rms) error due to measurement noise propagation. The problem of retrieving the top-side ozone profile from backscattered ultraviolet (BUV) measurements is considered. For measurements of the type currently being obtained with the Nimbus 4 and AE-E BUV experiments, it is found that a vertical resolution of approximately 0.75 scale height can be achieved for a formal volume mixing ratio profile error of 10%. Other examples include treatments of the retrieval of temperature profiles from measurements in the 15 micron CO2 absorption band for both the terrestrial and Martian atmospheres. Finally, the method is applied to the problem of retneving temperature profiles of the Jovian planets from measurements in the far infrared pressure induced H2 lines to be obtained from the Mariner Jupiter/Saturn fly-by missions

N78-12594\*# National Center for Atmospheric Research, Boulder, Colo

INVERSION OF INFRARED LIMB EMISSION MEASURE-MENTS FOR TEMPERATURE AND TRACE GAS CONCEN-TRATIONS

John C Gille and Paul L Bailey In NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977

p 195-216 refs Sponsored by NSF

Avail NTIS HC A99/MF A01 CSCL 04A

Limb emission measurements are characterized by sharp weighting functions at high altitudes, and for temperature determinations, strongly nonlinear dependence of the weighting function on the temperature Several methods for inverting this type of measurement have been described and used, including iterative, statistical, nonlinear and approximate direct approaches. These approaches are described and advantages and disadvantages of each are outlined.

N78-12595°# Draper (Charles Stark) Lab , Inc , Cambridge, Mass

INVERSION OF SCATTERED RADIANCE MORIZON PROFILES FOR GASEOUS CONCENTRATIONS AND AEROSOL PARAMETERS

Harvey L. Malchow and Cynthia K Whitney In NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 217-263 refs (Contract NAS1-14150)

Avail NTIS HC A99/MF A01 CSCL 04A

Techniques have been developed and used to invert limb scan measurements for vertical profiles of atmospheric state parameters. The parameters which can be found are concentrations of Rayleigh scatters, ozone, NO2, and aerosols, and aerosol physical properties including a Junge-size distribution paramoter and real and imaginary parts of the index of refraction. Author

N78-12596°# Old Dominion Univ. Norfolk, Va INVERSION OF SOLAR AUREOLE MEASUREMENTS FOR DETERMINING AEROSOL CHARACTERISTICS

Adarsh Deepak In NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 265-295 refs Prepared in cooperation with Inst for Atmospheric Optics and Remote Sensing, Hampton Va

(Grant NsG-1252)

Avail NTIS HC A99/MF A01 CSCL 04A

Solar aureole radiance is very sensitively dependent on the aerosol size distributions. The photographic solar aureole isophote (PSAI) measurement technique for determining the aerosol size distribution and other characteristics takes advantage of this sensitivity. Single scattering theory of the solar aureole is given. The assumptions and conditions imposed on the single scattering theory to make it tractable to inversion are discussed. The important role of the almucantar measurements is also discussed.

Comparison of Linear Inversion methods by Examination of the Duality Between Iterative And Inverse Matrix methods

Henry E Fleming *In* NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 325-360 refs

Avail NTIS HC A99/MF A01 CSCL 04A

Linear numerical inversion methods applied to atmospheric remote sounding generally can be categorized in two ways (1) iterative, and (2) inverse matrix methods. However, these two categories are not unrelated a duality exists between them In other words, given an iterative scheme, a corresponding inverse matrix method exists, and conversely. This duality concept is developed for the more familiar linear methods. The iterative duals are compared with the classical linear iterative approaches and their differences analyzed. The importance of the initial profile in all methods is stressed. Calculations using simulated data are made to compare accuracies and to examine the dependence of the solution on the initial profile.

N78-12599°# Massachusetts Inst of Tech Cambridge INVERSION OF PASSIVE MICROWAVE REMOTE SENSING DATA FROM SATELLITES

David H Staelin In NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 361-394 refs

(Contracts NAS5-21980 F19628-75-C-0122) Avail NTIS HC A99/MF A01 CSCL 04A

Global passive microwave observations from earth-orbiting satellites have mapped humidity and liquid water over ocean, temperature profiles, ice and snow, and other geophysical parameters in most applications, the inversion problem is adequately approximated as linear with jointly Gaussian statistics and thus, a linear retrieval performs well in some cases, the problem is typically factored into a decision process followed by appropriate linear or quasilinear processes. Certain problems, however, require more powerful nonlinear or nonstationary procedures, such as Kalman filtering.

N78-12600° # National Oceanic and Atmospheric Administration, Boulder. Colo Wave Propagation Lab

Application of statistical inversion to groundbased microwave remote sensing of temperature and water vapor profiles

E R Westwater and M T Decker In NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 395-427 refs

Avail NTIS HC A99/MF A01 CSCL 04A

Surface-based observations of downwelling microwave thermal emission are related to temperature and humidity profiles via a standard integral equation of radiative transfer. Both in clear and in cloudy atmospheres, statistical inversion techniques are used to retrieve profiles from a data vector of brightness observations and surface meteorological constraints. For the clear case, accuracy predictions and profile retrievals are illustrated for (1) single frequency angular scanned data, and (3) multi-frequency zenith data. For the last case predicted and achieved accuracies were compared in a recently conducted radiometric experiment. Retrievals of cloud contaminated radiometric data are elaborated.

N78-12G01\*# Jet Propulsion Lab Calif Inst of Tech, Pasadena INVERSION METHODS IN TEMPERATURE AND AEROSOL REMOTE SOUNDING. THEIR COMMONALITY AND DIFFERENCES, AND SOME UNEXPLORED APPROACMES Alain L. Fymat In its Inversion Methods in Atmospheric Remote Sounding 1977 p 429-467 refs

(Contract NAS7-100)

Avail NTIS HC A99/MF A01 CSCL 04A

The two remote sensing problems of temperature profiling and aerosol characterization (complex refractive index size distribution) are considered. These problems differ only in the explicit form of the source function which for aerosols, includes contributions from both single and multiple scattering processes When the observables are the spectral extinction or the single scattering of the source radiation, the associated problem is completely analogous to the linearized temperature inversion problem. Methods for obtaining the solution of the linear problem. are classified following three main categories (1) derivation of properties that all solutions satisfy, which must then be properties of the actual solution, (2) regularization of the ill-posed problem, and (3) data changes within their domain of uncertainty in order to avoid the basic instability. A number of unexplored methods are indicated Author

원78-12602\*# Arizona Univ , Tucson

Application of modified twomey techniques to invert Lidar angular scatter and solar extinction data for determining aerosol size distributions

B M Herman In NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 469-503 refs

Avail NTIS HC A99/MF A01 CSCL 04A

Polarization properties of the angularly scattered laser light from a volume of air are used to determine the size distribution of the aerosol particles within the volume by the use of appropriate inversion techniques. Similar techniques are employed to determine a mean size distribution of the particulates within a vertical column through the atmosphere from determinations of the aerosol optical depth as a function of wavelength. In both of these examples, a modification of an inversion technique originally described by Twomey has been employed.

this method are presented as well as results from actual measurements employing bistatic lidar and solar radiometer

N78-12603\*# Old Dominion Univ Norfolk, Va

#### THE INVERSION OF STRATOSPHERIC AEROSOL AND OZONE VERTICAL PROFILES FROM SPACECRAFT SOLAR **EXTINCTION MEASUREMENTS**

William P Chu In NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 505-527

Avail NTIS HC A99/MF A01 CSCL 04A

The inversions of multi-channel solar extinction measurements have been analyzed for the 0.35-1.0 micron wavelength region to retrieve stratospheric aerosol and ozone vertical profiles using both the constrained linear inversion scheme and the iterative scheme The inversions of the multi-wavelength solar extinction data obtained from spacecraft have been analyzed based on the inversion of computer simulated data using various atmospheric models with differing amounts of aerosol and ozone in the stratosphere. The sensitivities of the inversion schemes to different experimental errors are discussed in terms of accuracy and resolution of the retrieved profiles Author

N78-12604\*# Wyoming Univ , Laramie

#### INVERSION OF SOLAR EXTINCTION DATA FROM THE APOLLO-SOYUZ TEST PROJECT STRATOSPHERIC AER-

OSOL MEASUREMENT (ASTP/SAM) EXPERIMENT
Theodore J Pepin In NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 529-554

(Contract NAS1-3213)

Avail NTIS HC A03/MF A01 CSCL 04A

The inversion methods are reported that have been used to determine the vertical profile of the extinction coefficient due to the stratospheric aerosols from data measured during the ASTP/SAM solar occultation experiment Inversion methods include the onion skin peel technique and methods of solving the Fredholm equation for the problem subject to smoothing constraints. The latter of these approaches involves a double inversion scheme Comparisons are made between the inverted results from the SAM experiment and near simultaneous measurements made by lidar and balloon born dustsonde. The results are used to demonstrate the assumptions required to perform the inversions for aerosols Author

#### N78-12605\*# California Univ Berkeley EFFECTIVE AEROSOL OPTICAL PARAMETERS FROM **POLARIMETER MEASUREMENTS**

Jacob G Kuriyan In NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 555-575

(Grants NGR-05-007-328, NsG-1270) Avail NTIS HC A99/MF A01 CSCL 04A

The theory underlying the interpretation of polarimeter measurements is described. The assumptions of the model are carefully stated so that the results obtained from the ground-based experiment can be understood without ambiguity. The meteorological significance of the parameters is also deduced. With a satellite-borne polarimeter that monitors the upwelling radiation field, the effect of the ground must be taken into account in order to obtain the aerosol parameters. Two methods that hold promise are described Author

N78-12606\*# Atmospheric Environment Service, Ottawa (Ontario)

#### EXPERIENCE WITH THE INVERSION OF NIMBUS 4 BUV MEASUREMENTS TO RETRIEVE THE OZONE PROFILE

Carleton L Mateer In NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 577-597

Avail NTIS HC A99/MF A01 CSCL 04A

The relative merits of pressure increment and partial derivative formulations of the ozone inversion problem are discussed briefly The height range of validity of the retrieved ozone profile and the effects of adding wavelengths to or of dropping wavelengths from the inversion system are indicated. Illustrative results

are presented for profiles retrieved from BUV data using Backus-Gilbert, minimum information (Twomey) and quasioptimum procedures Author

#### N78-12607\*# Chicago Univ. III

#### TEMPERATURE SENSING. THE DIRECT ROAD TO INFORMATION

Lewis D Kaplan In NASA Langley Res Center Inversion Methods in Atmospheric Remote Sounding 1977 p 599-615

(Grant NSF ATM-72-01381)

Avail NTIS HC A99/MF A01 CSCL 04A

The retrievability of detailed temperature soundings from remote measurements of emission spectra depends not so much on how the data are treated as on what the data are It is shown that the shape of the weighting functions depends on the nature of the pressure and temperature dependence of the transmittance, which differ from one part of the spectrum to another as well as with spectral resolution. It is shown that careful selection of channels results in much narrower weighting functions than those corresponding to channels that have actually

N78-12608\*# College of William and Mary, Williamsburg Va ATLAS OF INFRARED ABSORPTION LINES Final Report Jae H Park Nov 1977 71 p refs Supersedes NASA-CR-144976, N76-22719

(Grant NsG-1203)

(NASA-CR-2925 NASA-CR-144976) NTIS

HC A04/MF A01 CSCL 04A

Infrared absorption line parameters (line strength vs wavenumber) are presented from 500 to 7000 cm/1 for 15 gases H2O, CO2, O3 N2O CO CH4, O2, SO2 NO, NO2, NH3, HCI HF HNO3 and CH3CI

#### N78-13412# State Univ of New York, Binghamton TEXTURE TONE FEATURE EXTRACTION AND ANALYSIS Final Technical Report, Apr 1976 - May 1977 Shin-yi Hsu and Eugene Klimko Aug 1977 50 p refs

(Contract F30602-76-C-0211)

(AD-A045542, RADC-TR-77-279) Avail NTIS

HC A03/MF A01 CSCL 14/5

A new texture measurement and the Mahalanobis classifier with a generalized inverse scheme were developed to generate decision maps of terrain features with digitized B/W photographs on a pixel by pixel basis. Eight scenes within the Northeast test area, four low altitude and four high altitude, were analyzed yielding a hit-rate of about 90% with properly digitized image data. To determine the degree of non-normal behavior of the texture variables, the stable distribution models were utilized Methods of estimating the stable parameters of the texture variables were developed. It is found that fifty % of the texture variables are not normally distributed. Since the stable distribution models are capable of incorporating the skewness parameters into the classification process, it is recommended as a new classifier for image data analysis GRA

#### N78-13497 Pennsylvania State Univ , University Park A REMOTE DISPLAY SYSTEM UTILIZING COMPRESSED DATA TRANSMISSION Ph.D Thesis

Edsel Glen Crenshaw 1977 163 p

Avail Univ Microfilms Order No 77-17681

The design, implementation and evaluation of a color display system for use in image analysis is described. The system design is compatible with the satellite and aircraft image processing requirements of the Office for Remote Sensing of Earth Resources Potential system configurations were defined and evaluated. The selected configuration consisted of a minicomputer, a modem, color television display hardware and an operator terminal A telephone connection to an IBM 370/168 computer was used to receive images which conformed to standard remote job entry data formats. Because of the relatively slow transmission speeds possible and the large data content of the images, data Dissert Abstr compression was necessary

N78-13498 Cornell Univ , Ithaca, N Y ANALYTICAL AERIAL TRIANGULATION WITH CORREC-TIONS FOR SYSTEMATIC ERRORS Ph D Thesis

Bahartin Coskun 1976 172 p

Avail Univ Microfilms Order No 77-19993

It was shown that a portion of systematic image deformations can successfully be compensated for by the introduction of unknown additional parameters into the colinearity equations. A model consisting of 29 additional parameters was incorporated into the bundle adjustment. The additional parameters were treated as observations to avoid the ill conditioning of the normal equations arising from the fact that some of the parameters are correlated with one another and/or with orientation unknowns. It was not generally necessary to justify the physical meaning of each parameter, though the terms should be effective and significant in compensating for the systematic errors. The correction model incorporated a combination of the sources of systematic errors as well as some empirical terms to account for persistent sources of systematic errors.

# N78-13951# Battelle Pacific Northwest Labs, Richland, Wash COMPREHENSIVE INFORMATION RETRIEVAL AND MODEL INPUT SEQUENCE (CIRMIS)

D R Friedrichs Apr 1977 82 p ref (Contract EY-76-C-06-1830)

(BNWL-2235) Avail NTIS HC A05/MF A01

A computer system developed to increase data storage and retrieval capabilities and ground-water model control is described. The overall configuration, however, can be used in other areas to provide the user with three major functions retrieval of well-based data, special application for manipulating surface data or background maps, and the manipulation and control of ground-water models. These programs comprise only a portion of the entire comprehensive information retrieval and model input sequence system.

N78-14457\* Environmental Research Inst of Michigan, Ann Arbor Infrared and Optics Div

### SIGNATURE EXTENSION PREPROCESSING FOR LANDSAT MSS DATA Final Report, 15 May 1976 - 14 Nov. 1977

Richard F Nalepka, Principal Investigator and Peter F Lambeck Nov 1977 69 p refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D EREP

(Contract NAS9-14988)

(E78-10040, NASA-CR-151563, ERIM-122700-32-F) Avail NTIS HC A04/MF A01 CSCL 05B

N78-14460\*# Purdue Univ , Lafayette Ind Lab for Applications of Remote Sensing

TEST OF SPECTRAL/SPATIAL CLASSIFIER Final Report D A Landgrebe Principal Investigator J L Kast, and B J Davis Nov 1977 168 p refs EREP (Contract NAS9-14970)

(E78-10044 NASA-CR-155344, LARS-112877 T-1314/4 MA-129TA) Avail NTIS HC A08/MF A01 CSCL 05B

The author has identified the following significant results. The supervised ECHO processor (which utilizes class statistics for object identification) successfully exploits the redundancy of states characteristic of sampled imagery of ground scenes to achieve better classification accuracy, reduce the number of classifications required, and reduce the variability of classification results. The nonsupervised ECHO processor (which identifies objects without the benefit of class statistics) successfully reduces the number of classifications required and the variability of the classification results.

N78-14461\*# Purdue Univ , Lafayette, Ind Lab for Applications of Remote Sensing

PROCESSING TECHNIQUES DEVELOPMENT Final Report
D A Landgrebe, Principal Investigator B J Davis T L Phillips
C R Sand, and P E Anuta Nov 1977 57 p refs EREP
(Contract NAS9-14970)

(E78-10045, NASA-CR-155345, LARS-112777, T-1314/4, MA-129TA) Avail NTIS HC A04/MF A01 CSCL 05B

# N78-14486\* # Jet Propulsion Lab , Calif Inst of Tech , Pasadena TECHNOLOGY ADVANCES IN ACTIVE AND PASSIVE MICROWAVE SENSING THROUGH 1985

Frank T Barath In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 51-54 refs

(Contract NAS7-100) Avail NTIS HC A99/MF A01 CSCL 17E

The capabilities of passive and active microwave sensors are discussed The Nimbus-G and Seasat-A scanning multichannel microwave spectrometer, the Seasat-A radar altimeter, scatterometer and synthetic aperture radar represent the first systematic attempt at exploring a wide variety of applications utilizing microwave sensing techniques and are indicators of the directions in which the pertinent technology is likely to evolve The trend is toward high resolution multi-frequency imagers spanning wide frequency ranges and wide swaths requiring sophisticated receivers, real-time data processors and most importantly, complex antennas

N78-14471\*# Environmental Research Inst. of Michigan, Ann Arbor

### REMOTE SENSING DATA PROCESSING TWO YEARS AGO, TODAY, AND TWO YEARS FROM TODAY

Quentin A Holmes David Goodenough (Canada Centre for Remote Sensing, Ottawa), and Jon D Erickson (NASA Johnson Space Center) *In its* Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 125-135 refs

Avail NTIS HC A99/MF A01 CSCL 08F

Beginning with a survey of the state-of-the-art of processing remotely sensed data in early 1975, significant developments between that time and the present are chronicled, and technologies for early 1979 are projected. Current technical issues discussed include training selection and labeling, classification and mensuration, use of satellite indicators to supplement predictions, small scale field structures physical factors, ancillary data, geometric quality, and the cost of processing.

N78-14472\*# Environmental Research Inst. of Michigan, Ann Arbor

### A SURVEY OF SAR IMAGE-FORMATION PROCESSING FOR EARTH RESOURCES APPLICATIONS

Robert W Bayma, Rolando L. Jordan (JPL), and Bob N Manning (Goodyear Aerospace Corp., Litchfield Park, Ariz.) In its Proc of the 11th Intern. Symp on Remote Sensing of Environment, Vol. 1. 1977. p. 137-159. refs.

Avail NTIS HC A99/MF A01 CSCL 171

Currently there is considerable interest in active microwave sensors for earth resources applications, such as the SEASAT-A radar However, to obtain spatial resolutions comparable to optical sensors at radar frequencies, sophisticated image formation processing techniques must be applied to the raw data Processing requirements for non-coherent optical and coherent radar imaging systems are compared. The image formation processing requirements for synthetic aperture radar (SAR) systems are discussed. Both optical and digital techniques are addressed, and examples of hardware and imagery for each processing technique are presented.

N78-14473\*# California Univ., Santa Barbara Dept of Geography

### A PERSPECTIVE ON THE STATE OF THE ART OF PHOTOGRAPHIC INTERPRETATION

John E Estes *In* ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol. 1 1977 p 161-177 refs

Avail NTIS HC A99/MF A01 CSCL 14E

Aerial photography and photographic interpretation are the cornerstone of remote sensing. Many interpretative techniques used on data from these more advanced or unconventional imaging systems are essentially extensions of techniques originally developed for the analysis of aerial photographic data. As research on the analysis and application of data from other than photographic imaging systems progresses, the role of the interpretation of aerial photography becomes more important. Any individual who wishes to practice the art of remote sensing data analysis must gain a thorough knowledge of the activities elements and techniques of manual photographic/image interpretation. While the activities and elements of photo interpretation have remained essentially the same, technique development

has continued to progress. Additional studies are proposed dealing with the basics of interactive processes Author

N78-14476\*# National Environmental Satellite Service, Washing-

#### METEOROLOGICAL SENSORS AND RELATED TECHNOL-OGY FOR THE EIGHTIES

E L Heacock In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 189-199

Avail NTIS HC A99/MF A01 CSCL 04B

The sensors currently projected for the new generation of meteorological satellites which will be in operation during the First Global Atmospheric Research Program [GARP] Global Experiment (FGGE) are described. The closely related subject of on-board data processing is treated briefly as well as efforts by the countries/agencies responsible for these satellites to make useful products available to developing countries at low cost

Author

N78-14476\* National Environmental Satellite Service Washington, D C

#### OPERATIONAL DATA PROCESSING YEARS ARE THE HARDEST

John A Leese and Charles L Bristor In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 201-219 refs

Avail NTIS HC A99/MF A01 CSCL 05B

A historical perspective of operational data processing and its development in the National Environmental Satellite Service is presented. The types of sensor data to be used in operational data processing are specified through the time period of the 1980's Features that are essential for the design and implementation of a good data base system are outlined Realistic standards for optimal data productions are discussed

N78-14494\* Massachusetts Inst of Tech , Cambridge Dept of Electrical Engineering and Computer Science

### ATMOSPHERIC SOUNDING WITH PASSIVE MICRO-WAVES- REVIEW AND PROGNOSIS David H Staelin In ERIM Proc of the 11th Intern Symp on

Remote Sensing of Environment, Vol 1 1977 p 401-406

(Contracts NAS5-21980, NAS5-23677)

Avail NTIS HC A99/MF A01 CSCL 04A

Global maps of temperature profiles from 0 to 20 km altitude and of total water vapor and liquid water over the ocean were obtained from satellite-borne microwave spectrometers. Future satellites will extend the altitude range above 100 km and permit monitoring of H2O, O3, CO, N2O, and other trace constituents Operational microwave temperature sounding spectrometers are scheduled for launch on both military and civilian U.S. satellites, and future improvements can be expected Author

#### N78-14498\* Jet Propulsion Lab , Calif Inst of Tech , Pasadena LANDSAT-D THEMATIC MAPPER SIMULATION USING AIRCRAFT MULTISPECTRAL SCANNER DATA

Jerry Clark and Nevin A Bryant In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 339-351

(Contract NAS7-100)

Avail NTIS HC A99/MF A01 CSCL 08B

A simulation of imagery from the upcoming LANDSAT-D thematic mapper was accomplished by using selected channels of 24-channels aircraft multispectral scanner data. The purpose was to simulate thematic mapper 30-meter resolution imagery and compare its spectral quality with the original aircraft MSS data and determine changes in thematic classification accuracy for the simulated imagery. The original resolution of approximately 7.5 meters IFOV and simulated resolution of 15, 30, and 60 meters were used to indicate the trend of spectral quality and classification accuracy. The study was based in a 6.5 square kilometer area of urban Los Angeles having a diversity of land

N78-14505\*# Environmental Research Inst. of Michigan, Ann. Arbor

#### DIGITAL EXPLOITATION OF SYNTHETIC APERTURE RADAR

H L Wagner and R A Shuchman In its Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 563-570 refs Avail NTIS HC A99/MF A01 CSCL 171

A digital processing and analysis scheme for use with digitized synthetic aperture radar data was developed. Using data from a four channel system, the imagery is preprocessed using specially designed software and then analyzed using preexisting facilities originally intended for use with MSS type data. Geometric and radiometric correction may be performed if desired, as well as classification analysis. Fast Fourier transform, filtering and level slice and display functions. The system provides low cost output in real time, permitting interactive imagery analysis. System information flow diagrams as well as sample output products are shown

N78-14518\*# National Aeronautics and Space Administration Lyndon B Johnson Space Center Houston, Tex

#### INVESTIGATION OF THEMATIC MAPPER SPATIAL. RADIOMETRIC. AND SPECTRAL RESOLUTION

James P Morgenstern (ERIM, Ann Arbor), Richard F Nalepka (ERIM Ann Arbor), and Jon D Erickson In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 693-701 refs (Contract NAS9-14819)

Avail NTIS HC A99/MF A01 CSCL 08B

Empirical evidence was provided for the definition of system specifications for the LANDSAT Follow-On Thematic Mapper (TM) and other future space Multispectral Sensor (MSS) systems Specific sensor parameters addressed were spatial resolution, radiometric sensitivity, and to a lesser degree spectral bandwidths and locations. The study used selected available aircraft MSS data, characterized by narrow spectral bands, fine spatial resolution, and high signal-to-noise, as the basis for simulating spacecraft TM data of various spatial resolutions, radiometric sensitivities, and sets of spectral bands. The primary measure used in evaluating the effects of varying spatial and radiometric resolutions was agricultural crop mensuration accuracy using automatic (computer) information extraction techniques

#### N78-14520\*# Michigan State Univ East Lansing ESTIMATION OF OLD FIELD ECOSYSTEM BIOMASS USING LOW ALTITUDE IMAGERY

Salleh Mohd Nor Gene Safir T M Burton J E Hook, and G Schultink In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 711-718 refs

(Grant NGL-23-004-083)

Avail NTIS HC A99/MF A01 CSCL 08H

Color-infrared photography was used to evaluate the biomass of experimental plots in an old-field ecosystem that was treated with different levels of waste water from a sewage treatment facility Cibachrome prints at a scale of approximately 1 1 600 produced from 35 mm color infrared slides were used to analyze density patterns using prepared tonal density scales and multicell grids registered to ground panels shown on the photograph Correlation analyses between tonal density and vegetation biomass obtained from ground samples and harvests were carried out Correlations between mean tonal density and harvest biomass data gave consistently high coefficients ranging from 0 530 to 0 896 at the 0 001 significance level Corresponding multiple regression analysis resulted in higher correlation coefficients. The results of this study indicate that aerial infrared photography can be used to estimate standing crop biomass on waste water irrigated old field ecosystems. Combined with minimal ground truth data, this technique could enable managers of wastewater irrigation projects to precisely time harvest of such systems for maximal removal of nutrients in harvested biomass Author

N78-14522\*# Canada Centre for Remote Sensing, Ottawa (Ontario)

#### USE OF CLEAR LAKE AS STANDARD REFLECTORS FOR ATMOSPHERIC MEASUREMENT

F J Ahern D G Goodenough, S C Jain, V R Rao, and G Rochon (Universite Laval, Quebec Canada) In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 731-755 refs

#### Avail NTIS HC A99/MF A01 CSCL 04A

A method is proposed for using clear lakes as dark backgrounds against which the atmospheric path radiance can be determined from satellite observations. If the path radiance can be determined to sufficient accuracy, the atmospheric extinction can be inferred with suitable radiative transfer models. An extensive program of observation was made to determine the magnitude and variability of the various contributors to the total radiance observed by a satellite. It is shown that the volume and surface reflectance contributions (in the absence of singlint) are small, constant, and can be modeled accurately enough to make these an insignificant source of error. The sunglint radiance observed in this investigation may be a significant source of error. It is shown that atmospheric extinction can be inferred from the path radiance observation after systematic differences between the model and observations are removed.

N78-14523\*# MacDonald, Dettwiler and Associates Ltd Richmond (British Columbia)

#### A LOW-COST SYSTEM FOR RECEPTION AND PROCESSING OF LINE-SCAN DATA FROM LANDSAT AND OTHER SOURCES

D S Sloan B C Isherwood and J S MacDonald *In* ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 757-773

Avail NTIS HC A99/MF A01 CSCL 05B

A low-cost transportable earth resources ground station was built in Canada and installed to operational status at Shoe Cove, Newfoundland The system concepts developed for this station provide timely availability of data in both photographic and digital form The system was designed with several objectives in mind (1) to provide a system which could receive store and process line-scan image data from a wide variety of satellites, most especially the LANDSAT and NOAA (VHRR) series as well as aircraft scanner data, and data from future remote sensing and meteorological satellites (2) the system has been designed to be operated by a small staff and to produce black and white images and computer-compatible tapes (CCTs) of all relevant data (3) the system is compact in its physical design so that it is possible to configure it as a self-contained ground station, housed in a 3 x 12 meter trailer (4) the system is designed to process all data at real-time rates or better and is designed in a modular fashion so that it can be easily upgraded to do further processing of the data and/or to handle new satellites and sensors Author

 $N78-14524^*\#$  Department of Energy, Mines and Resources, Ottawa (Ontario)

### THE USE OF LANDSAT IMAGERY TO LOCATE UNCHARTED COASTAL FEATURES ON THE LABRADOR COAST

E A Fleming and D D Lelievre (Canadian Hydrographic Service, Dartmouth Nova Scotia) In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 775-781

Avail NTIS HC A99/MF A01 CSCL 08B

A survey of several offshore islands rocks and shoals on the Labrador Coast was performed using LANDSAT imagery to assist in the location of uncharted hydrographic features. Several satellite coverages of the coast were studied prior to the survey, and suspected shoal points identified. Using map-derived control points and monocomparator measurements of the LANDSAT images the positions of these points were determined by mathematical adjustment to an estimated position accuracy of 150 meters. As a result, on the survey an uncharted island and eight uncharted drying rocks, which might easily have escaped detection from a survey ship were verified and positioned. To check the accuracy of the coordinates derived from LANDSAT three islands were positioned by standard ground survey methods The positional differences, all less than 150 meters are not plottable at the scale of the existing offshore charts. The LANDSAT positions were also used to control aerial photography of a shoal area for office compilation of a hydrographic chart

# N78-14531\*# Ruhr Planning Authority, Essen (West Germany) THE APPLICATION OF IR- AND MSS-DATA IN THE RUHR DISTRICT, GERMANY

P Stock In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 837-847 refs

#### Avail NTIS HC A99/MF A01 CSCL 08B

The methods used by Ruhr Planning Authority to interpret IR pictures are described along with production of maps indicating the thermal distribution in the conurbation Topics studied with the IR data include thermal loading of the Rhine and climatology of the urban and surrounding country areas

Author

# N78-14542\*# National Aeronautics and Space Administration Lyndon B Johnson Space Center Houston, Tex VIEW ANGLE EFFECT IN LANDSAT IMAGERY

Toyohisa Kaneko (IBM Corp., Houston Tex.) and John L Engvall In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol. 2 1977 p. 945-951 refs

(Contract NAS9-14350)

Avail NTIS HC A99/MF A01 CSCL 20F

The view angle effect in LANDSAT 2 imagery was investigated The LANDSAT multispectral scanner scans over a range of view angles of -5 78 to 5 78 degrees. The view angle effect. which is caused by differing view angles could be studied by comparing data collected at different view angles over a fixed location at a fixed time. Since such LANDSAT data is not available. consecutive day acquisition data were used as a substitute they were collected over the same geographical location acquired 24 hours apart with a view angle change of 7 to 8 degrees at a latitude of 35 to 45 degrees. It is shown that there is approximately a 5% reduction in the average sensor response on the second-day acquisitions as compared with the first-day acquisitions, and that the view angle effect differs field to field and crop to crop On false infrared color pictures the view angle effect causes changes primarily in brightness and to a lesser degree in color (hue and saturation). An implication is that caution must be taken when images with different view angles are combined for classification and a signature extension technique needs to take the view angle effect into account

N78-14548\*# National Oceanic and Atmospheric Administration, Washington, D C

### PROCESSING OF SATELLITE IMAGERY AT THE NATIONAL ENVIRONMENTAL SATELLITE SERVICE

M Crowe In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1015-1020 refs

#### Avail NTIS HC A99/MF A01 CSCL 05B

The National Environmental Satellite Service (NESS) image product processing system is described. Other topics discussed include (1) image processing of polar-orbiter satellite data, (2) image processing of geostationary satellite data, and (3) quality assurance and product monitoring.

N78-14558\*# Lockheed Electronics Co Houston Tex Systems and Services Div

#### LANDSAT IMAGE INTERPRETATION AIDS

R A Abotteen and H Malek /n ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1117-1121 refs (Contract NAS9-15200)

Avail NTIS HC A99/MF A01 CSCL 05B

In the Large Area Crop Inventory Experiment image interpretation aids were produced to assist in selecting and/or identifying representative samples of signatures in a given LANDSAT scene. The three methods employed are based on clustering techniques, information extraction and aggregation of like spectral information on a two dimensional spectral plot

Author

N78-14559\*# Environmental Research Inst of Michigan Ann Arbor

DIGITAL PROCESSING SYSTEM FOR DEVELOPING COUNTRIES

Chris Nanayakkara and Harvey Wagner In its Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 5 1977 p 1123-1126 refs

Avail NTIS HC A99/MF A01 CSCL 05B

An effort was undertaken to perform simple digital processing tasks using pre-existing general purpose digital computers. An experimental software package. LIGMALS was obtained and modified for this purpose. The resulting software permits basic processing tasks to be performed including level slicing gray mapping and ratio processing. The experience gained in this project indicates a possible direction which may be used by other developing countries to obtain digital processing capabilities.

N78-14560\*# Environmental Research Inst of Michigan, Ann Arbor Information Systems and Analysis Dept

### REMOTE SENSING AND GEOGRAPHICALLY BASED INFORMATION SYSTEMS

Richard C Cicone *In its* Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1127-1136 refs

(Contract NAS9-14988)

Avail NTIS HC A99/MF A01 CSCL 08F

The incorporation of remotely sensed digital data in a computer based information system is seen to be equivalent to the incorporation of any other spatially oriented layer of data. The growing interest in such systems indicates a need to develop a generalized geographically oriented data base management system that could be made commercially available for a wide range of applications. Some concepts that distinguish geographic information systems were reviewed and a simple model which can serve as a conceptual framework for the design of a generalized geographic information system was examined.

Author

N78-14569\*# Purdue Univ Lafayette, Ind Laboratory for Applications of Remote Sensing

### EVALUATION OF CHANGE DETECTION TECHNIQUES FOR MONITORING COASTAL ZONE ENVIRONMENTS

R A Weismiller, S J Kristof, D K Scholz P E Anuta, and S M Momin In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1229-1238 refs

(Contract NAS9-14016)

Avail NTIS HC A99/MF A01 CSCL 08C

Development of satisfactory techniques for detecting change in coastal zone environments is required before operational monitoring procedures can be established In an effort to meet this need a study was directed toward developing and evaluating different types of change detection techniques based upon computer aided analysis of LANDSAT multispectral scanner (MSS) data, to monitor these environments. The Matagorda Bay estuarine system along the Texas coast was selected as the study area Four change detection techniques were designed and implemented for evaluation (1) post classification comparison change detection, (2) delta data change detection (3) spectral/temporal change classification, and (4) layered spectral/temporal change classification. Each of the four techniques was used to analyze a LANDSAT MSS temporal data set to detect areas of change of the Matagorda Bay region Author

N78-14571\*# Canada Centre for Remote Sensing Ottawa (Ontario)

#### A SOLUTION TO THE PROBLEM OF SAR RANGE CURVA-TURE

R K Raney In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1255-1257 ref

Avail NTIS HC A99/MF A01 CSCL 171

When synthetic aperture radar systems are pushed to attain finer resolution at larger ranges than was previously the case for remote sensing purposes, the geometric signal aberration known as range curvature arises. Known techniques for correcting range curvature are exact at only one selected range, thus forcing neighboring ranges to use the same correction as an approximation. A solution to the problem is proposed that is exact at all

ranges, thus simplifying and improving the image processing for such systems

Author

N78-14575\*# GeoSpectra Corp Ann Arbor, Mich REDUCING LANDSAT DATA TO PARAMETERS WITH

## REDUCING LANDSAT DATA TO PARAMETERS WITH PHYSICAL SIGNIFICANCE AND SIGNATURE EXTENSION A VIEW OF LANDSAT CAPABILITIES

Bette C Salmon-Drexler In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1289-1299 refs Sponsored in part by Bur of Land Management

(Contract AT(05-1)-1635)

Avail NTIS HC A99/MF A01 CSCL 05B

The premise is the LANDSAT is capable of sensing only a few physical parameters. Much of the contrast provided in LANDSAT data is provided by differences in vegetation cover Although dominant, vegetation is not the only physical parameter that can be detected with LANDSAT a ratio of MSS Channel 5 to MSS Channel 4 (R54) two visible channels separates materials by color hue. Additional information is attained by the addition of MSS channels 5 and 4 to approximate brightness, permitting separation of materials by color value. Other spectral combinations may provide correlations with these physical parameters or new ones. An iron absorption in the infrared can also be recognized in LANDSAT data when iron content is present in sufficient percentages. Although by color, limonite-rich soils are distinctive as bright yellow, they are not unique in the R5.4. A fairly strong iron absorption is present in the infrared band MSS Channel 7 for these soils, although the wideband configuration of LANDSAT is not optimal for its enhancement and the effects of vegetation often obscure it

Author

N78-14577\*# Environmental Research Inst. of Michigan, Ann Arbor Information Systems and Analysis Dept

### BLOB AN UNSUPERVISED CLUSTERING APPROACH TO SPATIAL PREPROCESSING OF MSS IMAGERY

R J Kauth, A P Pentland, and G S Thomas *In its* Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1309-1317 refs

(Contract NAS9-14988)

Avail NTIS HC A99/MF A01 CSCL 05B

A basic concept of Multispectral Scanner data processing was developed for use in agricultural inventories, namely, to introduce spatial coordinates of each pixel into the vector description of the pixel and to use this information along with the spectral channel values in a conventional unsupervised clustering of the scene. The result is to isolate spectrally homogeneous field-like patches (called blobs). The spectral mean vector of a blob can be regarded as a defined feature and used in a conventional pattern recognition procedure. The benefits of use are ease in locating training units in imagery, data compression of from 10 to 30 depending on the application, reduction of scanner noise and consequently potential improvements in classification/proportion estimation performances.

Author

N78-14578\*# Environmental Research Inst. of Michigan, Ann Arbor Information Systems and Analysis Dept

### MULTISPECTRAL SYSTEM ANALYSIS THROUGH MODELING AND SIMULATION

W A Malila J M Gleason and R C Cicone In its Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1319-1328 refs

(Contract NAS-14988)

Avail NTIS HC A99/MF A01 CSCL 05B

The design and development of multispectral remote sensor systems and associated information extraction techniques should be optimized under the physical and economic constraints encountered and yet be effective over a wide range of scene and environmental conditions. Direct measurement of the full range of conditions to be encountered can be difficult time consuming and costly. Simulation of multispectral data by modeling scene atmosphere sensor and data classifier character-

istics is set forth as a viable alternative particularly when coupled with limited sets of empirical measurements. A multispectral system modeling capability is described. Use of the model is illustrated for several applications - interpretation of remotely sensed data from agricultural and forest scenes evaluating atmospheric effects in LANDSAT data examining system design and operational configuration and development of information extraction techniques.

N78-14579\*# Environmental Research Inst of Michigan Ann Arbor

### A 'DIGITAL' TECHNIQUE FOR MANUAL EXTRACTION OF DATA FROM AERIAL PHOTOGRAPHY

Laurence B Istvan and Mark T Bondy In its Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1329-1336 refs

Avail NTIS HC A99/MF A01 CSCL 14E

The interpretation procedure described uses a grid cell approach. In addition, a random point is located in each cell. The procedure required that the cell/point grid be established on a base map and identical grids be made to precisely match the scale of the photographic frames. The grid is then positioned on the photography by visual alignment to obvious features. Several alignments on one frame are sometimes required to make a precise match of all points to be interpreted. This system inherently corrects for distortions in the photography. Interpretation is then done cell by cell. In order to meet the time constraints first order interpretation should be maintained. The data is put onto coding forms along with other appropriate data, if desired. This digital manual interpretation technique has proven to be efficient and time and cost effective, while meeting strict requirements for data format and accuracy.

N78-14580\*# Consiglio Nazionale delle Ricerche Milan (Italy) Istituto per la Geophysica della Litosfera

#### APPLICATION OF CONVENTIONAL AND ADVANCED TECHNIQUES FOR THE INTERPRETATION OF LANDSAT 2 IMAGES FOR THE STUDY OF LINEARS IN THE FRIULI EARTHQUAKE AREA

P Cardamone G M Lechi, A Cavallin (Univ Degli Studi Milan), C M Marino (Univ Degli Studi Milan) and A Zanferrari (Univ Degli Studi Padua) /n ERIM Proc of the 11th Intern Sympon Remote Sensing of Environment, Vol 2 1977 p 1227-1353

Avail NTIS HC A99/MF A01 CSCL 08K

The results obtained in the study of linears derived from the analysis of LANDSAT 2 images recorded over Friuli during 1975 are described Particular attention is devoted to the comparison of several passes in different bands scales and photographic supports. Moreover reference is made to aerial photographic interpretation in selected sites and to the information obtained by laser techniques.

N78-14586\*# National Weather Service, Camp Springs, Md Spaceflight Meteorology Group

### METEOROLOGICAL SUPPORT FOR REMOTE SENSING PROGRAMS

James L Cox In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1387-1396

#### Avail NTIS HC A99/MF A01 CSCL 04B

Many earth-oriented remote sensing spacecraft and aircraft programs are affected by the presence of clouds. Like aerial photography they require clear or mostly clear skies. To cope with the cloud problem, the National Weather Service through its Spaceflight Meteorology Group (SMG) of the Space Operations. Support Division makes cloud cover forecasts, as part of its specialized weather service for various NASA remote sensing and other programs. Forecasting requirements vary in time from a few hours out to several days and in aerial extent from a particular locality to nearly global in coverage. Depending on the stage of program development, some remote sensing programs may involve special climatological studies for planning purposes or need ground-truth data for comparison with remotely sensed information. The importance of computer and weather satellite products to the SMG meteorologist is discussed and the nature

of SMG's weather support of past present and future remote sensing programs is described Author

#### N78-14592\*# Geological Survey, Denver Colo DIGITAL COLOR ANALYSIS OF COLOR-RATIO COMPOSITE LANDSAT SCENES

Gary L. Raines In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1463-1472 refs

Avail NTIS HC A99/MF A01 CSCL 05B

A method is presented that can be used to calculate approximate Munsell coordinates of the colors produced by making a color composite from three registered images. Applied to the LANDSAT MSS data of the Goldfield Nevada area this method permits precise and quantitative definition of the limonitic areas originally observed in a LANDSAT color ratio composite. In addition, areas of transported limonite can be discriminated from the limonite in the hydrothermally altered areas of the Goldfield mining district. From the analysis, the numerical distinction between limonitic and nonlimonitic ground is generally less than 3% using the LANDSAT bands and as much as 8% in ratios of LANDSAT MSS bands.

N78-14598\* Lockheed Electronics Co Houston Tex Systems and Services Div

### PERFORMANCE TESTS OF SIGNATURE EXTENSION ALGORITHMS

R A Abotteen, S Levy M Mendlowitz T Moritz J Potter S Thadani and O A Wehmanen *In* ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1523-1532 refs

(Contract NAS9-15200)

Avail NTIS HC A99/MF A01 CSCL 12A

Comparative tests were performed on seven signature extension algorithms to evaluate their effectiveness in correcting for changes in atmospheric haze and sun angle in a LANDSAT scene Four of the algorithms were cluster matching and two were maximum likelihood algorithms. The seventh algorithm determined the haze level in both training and recognition segments and used a set of tables calculated from an atmospheric model to determine the affine transformation that corrects the training signatures for changes in sun angle and haze level. Three of the algorithms were tested on a simulated data set and all of the algorithms were tested on consecutive-day data.

Author

N78-14602\*# Purdue Univ Lafayette Ind Lab for Applications of Remote Sensing

### QUANTIFICATION OF SOIL MAPPING BY DIGITAL ANALYSIS OF LANDSAT DATA

F R Kirschner (Soil Conservation Service, Indianapolis Ind.), S A Kaminsky, E J Hinzel H R Sinclair (Soil Conservation Service, Indianapolis, Ind.) and R A Weismiller In ERIM Proc of the Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1567-1573 refs

(Grant NGL-15-005-186)

(Rept-6690) Avail NTIS HC A99/MF A01 CSCL 08B

Soil survey mapping units are designed such that the dominant soil represents the major proportion of the unit. At times soil mapping delineations do not adequately represent conditions as stated in the mapping unit descriptions. Digital analysis of LANDSAT multispectral scanner (MSS) data provides a means of accurately describing and quantifying soil mapping unit composition. Digital analysis of LANDSAT MSS data collected on 9 June 1973 was used to prepare a spectral soil map for a 430-hectare area in Clinton County Indiana. Fifteen spectral classes were defined representing 12 soil and 3 vegetation classes. The 12 soil classes were grouped into 4 moisture regimes based upon their spectral responses the 3 vegetation classes were grouped into one all-inclusive class.

N78-14604\*# National Environmental Satellite Service, Suitland, Md

THE OPERATIONAL PROCESSING OF WIND ESTIMATES FROM CLOUD MOTIONS PAST, PRESENT AND FUTURE

C Novak and M Young In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1589-1598 refs

Avail NTIS HC A99/MF A01 CSCL 04B

Current NESS winds operations provide approximately 1800 high quality wind estimates per day to about twenty domestic and foreign users. This marked improvement in NESS winds operations was the result of computer techniques development which began in 1969 to streamline and improve operational procedures In addition the launch of the SMS-1 satellite in 1974, the first in the second generation of geostationary spacecraft, provided an improved source of visible and infrared scanner data for the extraction of wind estimates Currently, operational winds processing at NESS is accomplished by the automated and manual analyses of infrared data from two geostationary spacecraft This system uses data from SMS-2 and GOES-1 to produce wind estimates valid for OOZ, 12Z and 18Z synoptic times

N78-14813# Air Force Systems Command, Wright-Patterson AFB Ohio Foreign Technology Div INCREASE IN THE FIDELITY OF IMAGE DURING THE PRODUCTION OF DIAPOSITIVES

O V Portnova 22 Apr 1977 19 p Transl into ENGLISH from Geod i Kartografiya (Moscow), no 5 May 1972

(AD-A046226, FTD-ID(RS)T-0325-77, FTD-77-C-000430) Avail NTIS HC A02/MF A01 CSCL 14/5

The task of improving the quality of materials of aerial photography and their treatment was considered in regard to large scale stereotopographic photography. Distortions of images on aerial photographs were examined as they appear in the process of photographing the locality and in the process of producing diapositives in a contact manner Author (GRA)

N78-14817# Centre National d'Etudes Spatiales Toulouse (France)

TEST SYSTEM FOR EARTH OBSERVATION - SPOT VOLUME 1 SYSTEMS ANALYSIS AND DEVELOPMENT PLAN [SYSTEME PROBATOIRE D'OBSERVATION DE LA TERRE SPOT VOLUME 1 ANALYSE SYSTEME ET PLAN DE DEVELOPPEMENT)

Mar 1977 400 p in FRENCH 5 Vol

Avail NTIS HC A17/MF A01

A study is presented of an earth observation satellite program, SPOT The spacecraft consists of a multimission platform and a payload, which for the first mission will be for land use observation A launch using Ariane is foreseen for 1983. Mission profile and constraints are discussed and a systems analysis for the first mission is described. General principles of project management are dealt with They cover the roles of CNES and ESA in the project A development and test plan is proposed and a cost analysis presented

N78-14618# Centre National d'Etudes Spatiales, Toulouse (France)

TEST SYSTEM FOR EARTH OBSERVATION - SPOT VOLUME 3 MULTIMISSION PLATFORM - SUBSYSTEMS (Systeme probatoire d'observation de la terre SPOT VOLUME 3 PLATEFORME MULTIMISSIONS SOUSSYSTEMES

Mar 1977 535 p refs in FRENCH 5 Vol Avail NTIS HC A23/MF A01

The design of the subsystems for the platform is discussed A semimodular version of the structural subsystem was gauged and a dynamic analysis carried out in view of decoupling from launcher and other subsystems. A modular version was also gauged and although no dynamic analysis was performed, it was estimated that decoupling performance is as good. In examining the thermal control subsystem it was found that the new problems created by this satellite are due to the high power dissipation. The solar generator drive and the power supply subsystem were investigated Problems posed by electrical distribution EMC, TTC, onboard processing and attitude/orbit control are dealt with

N78-14819# Centre National d'Etudes Spatiales, Toulouse (France)

TEST SYSTEM FOR EARTH OBSERVATION - SPOT VOLUME 4 FIRST MISSION PAYLOAD [SYSTEME PROBATOIRE D'OBSERVATION DE LA TERRE SPOT VOLUME 4 CHARGE UTILE PREMIERE MISSION

Mar 1977 572 p In FRENCH Original contains color illustrations

Avail NTIS HC A24/MF A01

The first mission payload is comprised of two instruments allowing earth observation along the satellite's vertical. The first instrument, MRVIR supplies images in the visible and infrared range, and its resolution is average (80 m in the visible range), the field is 140 km. The second instrument, HRV, supplies images in the visible range with a resolution of 20 m and a field of 60 km Some technical and technological problems of the instruments are identified scanning and associated electronics, detector strips and their positioning and the low noise preamplifier FSA

원78-14620# Centre National d Etudes Spatiales, Toulouse (France)

TEST SYSTEM FOR EARTH OBSERVATION - SPOT FIRST MISSION PAYLOAD AND MI-VOLUME 4818 CROWAVE PAYLOAD, COMPATIBILITY STUDY [SYSTEME PROBATOIRE D'OBSERVATION DE LA TERRE SPOT VOLUME 4BIS CHARGE UTILE PREMIERE MISSION) Mar 1977 138 p refs in FRENCH 5 Vol Avail NTIS HC A07/MF A01

The first payload telemetry and possible microwave payloads were studied for the SPOT system. The feasibility of an 8 GHz telemetry was investigated for ground and space segment. An analysis is presented of passive and active microwave equipment which may be used as payload during later missions

R78-14821# Centre National d'Etudes Spatiales Toulouse

TEST SYSTEM FOR EARTH OBSERVATION - SPOT. VOLUME 5 MULTIPURPOSE GROUND FACILITIES AND DEDICATED IMAGE STATIONS (SYSTEME PROBATOIRE D'OBSERVATION DE LA TERRE SPOT VOLUME 5 MOYENS SOL DE SERVITUDE ET D'ACQUISITION D'IMAGE] Mar 1977 100 p in FRENCH 5 Vol

Avail NTIS HC A05/MF A01

Ground facilities and image acquisition stations for the SPOT system are analyzed. The layout of ground facilities is based on the concept of an interface between the spaceborne platform and the users of imagery produced. The role of the command and control center is outlined together with that of a dedicated ımage system FSA

N78-14894# Instituto de Pesquisas Espaciais Sao Jose dos Campos (Brazil)

BOUNDARY DETECTION IN IMAGES OPTICAL FORMULA-TION IN TERMS OF SIGNAL DETECTION THEORY M S. Thosis [DETECCAO DE BORDAS EM IMAGENS FORMULAÇÃO EM TERMOS DE TESTES DE MIPOTESES] Lucila Olivia DaCostaPrado Sep 1977 147 p refs In PORTUGUESE, ENGLISH summary

(INPE-1118-TPT-067) Avail NTIS HC A07/MF A01

Statistical techniques for the boundary detection problem are developed for application to pictures taken by land resources satellites. The image is modeled by signal and noise which are independent additive Gaussian and autoregressive in two dimensions. The parameters of the model are determined by correlation measurements. The optimal formulation in terms of signal detection theory leads to the construction of a test which involves seven overlapping hypothesis. A computationally attractive suboptimal test involving non-overlapping hypothesis is developed. Simulation results of the algorithm, when applied to groups of four pixels of the image are included Author

N78-15327°# Systematics General Corp McLean, Va FREQUENCY BAND JUSTIFICATIONS FOR PASSIVE SENSORS, 1 TO 10 GMz

Dec 1976 218 p refs (Contract NAS5-23434)

(NASA-CR-155531) Avail NTIS HC A10/MF A01 CSCL

Remote sensor systems operating in the microwave region of the frequency spectrum provide information unobtainable with basic imaging techniques such as photography, television or multispectral imaging. The frequency allocation requirements for passive microwave sensors used in the earth exploration satellite and space research services are presented for (1) agriculture forestry, and range resources (2) land use survey and mapping, (3) water resources, (4) weather and climate (5) environmental quality and (6) marine resources, estuarine and oceans. Because measurements are required simultaneously in multiple frequency bands to adequately determine values of some phenomena, the relationships between frequency bands are discussed. The various measurement accuracies, dynamic range resolutions and frequency needs are examined A band-by-band summary of requirements, unique aspects, and sharing analyses of the required frequency bands is included Author

N78-15328\*# Systematics General Corp McLean Va FREQUENCY BAND JUSTIFICATIONS FOR PASSIVE SENSORS 10.0 TO 385 GHz, CHAPTER 1 Dec 1976 255 p refs

(Contract NAS5-23434)

(NASA-CR-155530) Avail NTIS HC A12/MF A01 CSCL 17B

For abstract see N78-15327

N78-15329\*# Systematics General Corp McLean, Va FREQUENCY BAND JUSTIFICATIONS FOR PASSIVE SENSORS 10 0 TO 385 GHz, CHAPTER 2 Dec 1976 301 p refs

(Contract NAS5-23434)

(NASA-CR-155532) Avail NTIS HC A14/MF A01 CSCL

17B

Sensitivity requirements of the various measurements obtained by microwave sensors, and radiometry techniques are described Analytical techniques applied to detailed sharing analyses are discussed. A bibliography of publications pertinent to the scientific justification of frequency requirements for passive microwave remote sensing is included

N78-15340# Post Office Research Dept Ipswich (England) THE 20 AND 30 GHz ATTENUATION MEASUREMENTS USING THE ATS-6 SATELLITE

R G Howell J Thirlwell, R R Bell N G Golfin J W Ballance and R H Macmillan In ESA ATS-6 Propagation Expts in Europe Oct 1977 p 55-68 refs

Avail NTIS HC A09/MF A01

Simultaneous 20 and 30 GHz attenuation measurements were made by the British Post Office Martlesham Heath using transmissions from the ATS-6 satellite. The ratio of 30 GHz to 20 GHz attenuation during rain events was investigated along the 23 deg elevated path while the satellite was at 35 deg E and found to be 2 20 plus or minus 0 13 Amplitude scintillation of the received signals was little affected by rain in the slant-path and was highly correlated at the two frequencies, but of greater amplitude at 30 GHz by a factor of about 16 At 30 GHz the scintillation was typically 0.7 db p-p but bursts of up to 6.0 db p-p were observed associated with clouds 30 GHz attenuation measurements made as the satellite drifted westward to 130 deg W revealed increasing scintillation and also multipath effects as the slant-path elevation angle decreased to zero. Effects of snow are reported and attenuation and rainfall rate cumulative distributions are presented Author (ESA)

N78-15535\* + National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt Md

LANDSAT 1 CUMULATIVE US STANDARD CATALOG. 1976/1977

31 Jul 1977 261 p

(NASA-TM-74993 GSFC/LN-77/013, NTISUB/C/138-013A) Avail NTIS HC A12 CSCL 05B

The LANDSAT 1 U S Cumulative Catalog lists U S imagery acquired by LANDSAT 1 which has been processed and input to the data files during the referenced year. Data, such as data acquired, cloud cover and image quality are given for each scene The microfilm roll and frame on which the scene may be found are also given

N78-15544\* # National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville, Ala

VECTOR STATISTICS OF LANDSAT IMAGERY

Robert R Jayroe Jr and Debrah Underwood Dec 1977 19 p

(NASA-TM-78149) Avail NTIS HC A02/MF A01 CSCL 14E A digitized multispectral image, such as LANDSAT data, is composed of numerous four dimensional vectors, which quantitatively describe the ground scene from which the data are acquired The statistics of unique vectors that occur in LANDSAT imagery are studied to determine if that information can provide some guidance on reducing image processing costs. A second purpose of this report is to investigate how the vector statistics are changed by various types of image processing techniques and determine if that information can be useful in choosing one processing approach over another Author

N78-15545\*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md LANDSAT US STANDARD CATALOG, 1 OCTOBER -

31 OCTOBER 1977

31 Oct 1977 100 p (NASA-TM-74992 GSFC/LU-C/010, NTISUB/C/138-010) Avail NTIS HC A05/MF A01 CSCL 05B

The U S Standard Catalog lists U S imagery acquired by LANDSAT 1 and 2 which has been processed and input to the data files during the referenced month. Data, such as date acquired, cloud cover and image quality are given for each scene. The microfilm roll and frame on which the scene may be found is also given

N78-15546\*# National Aeronautics and Space Administration Goddard Space Flight Center Greenbelt, Md LANDSAT NON-US STANDARD CATALOG, 1 - 31 OCTOBER

1977

31 Oct 1977 81 p

(NASA-TM-74990, GSFC/LN-C/010, NTISUB/C/139-010) Avail NTIS HC A05/MF A01 CSCL 05B

The Non-U S Standard Catalog lists non-U S imagery acquired by LANDSAT 1 and 2 which has been processed and input to the data files during the referenced month. Data, such as date acquired cloud cover and image quality are given for each scene The microfilm roll and frame on which the scene may be found is also given Author

N78-15547\*# National Aeronautics and Space Administration Goddard Space Flight Center Greenbelt, Md

LANDSAT 1 NON US CUMULATIVE CATALOG, 1976/ 1977

31 Jul 1977 68 p

(NASA-TM-74991, GSFC/LN-77/013, NTISUB/C/139-013A)

Avail NTIS HC A04/MF A01 CSCL 05B
The LANDSAT 1 Non-U S Cumulative Catalog lists non-U S imagery acquired by LANDSAT 1 which has been processed and input to the data files during the referenced year Data, such as date acquired, cloud cover and image quality are given for each scene The microfilm roll and frame on which the scene may be found is also given Author

N78-15548\*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md

LANDSAT NON-US STANDARD CATALOG Monthly Report, 1 - 31 Aug 1977

31 Aug 1977 140 p

#### 07 DATA PROCESSING AND DISTRIBUTION SYSTEMS

(NASA-TM-74988, GSFC/LN-C/008, NTISUB/C/139-008) Avail NTIS HC A07/MF A01 CSCL 05B For abstract, see N78-15546

N78-15551\*# Mitte Corp., McLean Va METREK DIV DETERMINATION OF SCATTERING FUNCTIONS AND THEIR EFFECTS ON REMOTE SENSING OF TURBIDITY IN NATURAL WATERS

Ali H Ghovanlou, Jai N Gupta, and Robert G Henderson Jul 1977 148 p refs Sponsored by NASA (Contract F19628-77-C-0001) (NASA-CR-145239) Avail NTIS HC A07/MF A01 CSCL 08H

The development of quantitative analytical procedures for relating scattered signals measured by a remote sensor, was considered. The applications of a Monte Carlo simulation model for radiative transfer in turbid water are discussed. The model is designed to calculate the characteristics of the backscattered signal from an illuminated body of water as a function of the turbidity level, and the spectral properties of the suspended particulates. The optical properties of the environmental waters, necessary for model applications were derived from available experimental data and/or calculated from Mie formalism. Results of applications of the model are presented.

N78-15554\*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md LANDSAT US STANDARD CATALOG, 1 - 31 AUGUST 1977
31 Aug 1977 123 p
(GSFC/LU-C/008, NTISUB/C/138-008) Avail NTIS HC A06/MF A01 CSCL 05B

For abstract, see N78-15545

N78-15555\*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md LANDSAT NON-US STANDARD CATALOG, 1-30 SEPTEM-BER 1977 30 Sep 1977 96 p (NASA-TM-74956, GSFC/LN-C/009 NTISUB/C/139-009) Avail NTIS HC A05/MF A01 CSCL 05B For abstract, see N78-15546

N78-15556\*# National Aeronautics and Space Administration Goddard Space Flight Center Greenbelt, Md LANDSAT US STANDARD CATALOG, 1-30 SEPTEMBER 1977 30 Sep 1977 119 p (NASA-TM-74957 BSFC/LU-C/009, NTISUB/C/138-009) Avail NTIS HC A06/MF A01 CSCL 05B For abstract, see N78-15545

#### 08

#### INSTRUMENTATION AND SENSORS

A78-12830 Design of the Seasat-A radar altimeter J L MacArthur (Johns Hopkins University, Laurel, Md ) In Oceans '76, Proceedings of the Second Annual Combined Conference, Washington, D C, September 13-15, 1976 New York, Institute of Electrical and Electronics Engineers, Inc., Washington, D C. Marine Technology Society, 1976, p. 108-1 to 108-8 8 refs

A third generation satellite radar altimeter to be flown on the Seasat-A mission in 1978 is described. Building on Skylab and Geos-C experience, a design has evolved that will allow a long-term goal of 10-cm altimetry to be realized. While dependent on recent developments in surface acoustic-wave device technology, the design in all other respects presents no major difficulty. A linear FM/full-deramp waveform and processing technique allows fine range tracking to be done in the frequency domain A digital filter bank will provide 60 contiguous samples of the ocean return waveform with 3 125-ns resolution. An adaptive tracker built around a microprocessor will operate on the waveform samples to implement the basic height tracking function, adjusting its parameters in response to sensed waveheight.

A78-12831 \* The Seasat-A Scanning Multichannel Microwave Radiometer P Gloersen (NASA, Goddard Space Flight Center, Greenbelt, Md ) and F T Barath (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif ) In Oceans '76, Proceedings of the Second Annual Combined Conference, Washington, D C , September 13-15, 1976 New York, Institute of Electrical and Electronics Engineers, Inc., Washington, D C , Marine Technology Society, 1976, p 10C-1 to 10C-8 26 refs

A Scanning Multichannel Microwave Radiometer has been designed for the Nimbus-G Spacecraft and incorporated also into the Seasat-A payload for the primary purpose of determining sea surface temperatures and wind stress on a nearly all-weather basis Observations of microwave polarization components will be made at wavelengths of 08, 14, 17, 28, and 46 cm over a swath 577 km wide below the Seasat-A spacecraft. The smallest spatial resolution cell is 15 x 23 km at a wavelength of 0.8 cm, and proportionately larger at the other wavelengths. Using experimentally determined algorithms for converting the observed brightness temperatures, the indicated accuracies of the results (excluding conditions of significant rainfall) are within 1 K for sea surface temperature and 2 m/sec for surface wind speeds, over a range from 0-50 m/sec. (Author)

A78-12832 \* The Seasat-A satellite scatterometer W L Grantham, E M Bracalente, and W L Jones (NASA, Langley Research Center, Hampton, Va) In Oceans '76, Proceedings of the Second Annual Combined Conference, Washington, D C, September 13-15, 1976

New York, Institute of Electrical and Electronics Engineers, Inc., Washington, D C, Marine Technology Society, 1976, p 10D-1 to 10D-9

This report describes the methods used to develop performance requirements and design characteristics of a microwave scatterometer wind sensor planned for Seasat-A. User requirements such as wind speed accuracy, resolution cell size, grid spacing, and swath width of the measurements formed the basis for defining instrument characteristics. Results are presented that show scatterometer accuracy as a function of orbit position satisfies. User requirements for nominal orbit conditions.

(Author)

A78-12833 \* Seasat-A Synthetic Aperture Radar - Radar system implementation. T W Thompson and A Laderman (California Institute of Technology, Jet Propulsion Laboratory, Space Sciences Div , Pasadena, Calif ) In Oceans '76, Proceedings of the

Second Annual Combined Conference, Washington, D.C., September 13-15, 1976

New York, Institute of Electrical and Electronics Engineers, Inc., Washington, D.C., Marine Technology Society, 1976, p. 10E-1 to 10E-5 Contract No. NAS7-100.

The Synthetic Aperture Radar (SAR) onboard the Seasat-A satellite will conduct a number of experiments involving deep ocean waves, coastal wave patterns, polar ice and land forms. The SAR will have a 25 m by 25 m resolution over a swath of 100 km width centered about 300 km to the right of the spacecraft track. The SAR's high data rate limits operations to times when Seasat-A is in view of a few ground stations with special SAR receiving equipment. However, the SAR will collect much useful data about deep ocean and coastal waves in the Atlantic and Pacific Oceans, about ice in the Northwest Atlantic, in the Great Lakes and off the coast of Alaska, and about land over much of the United States and Canada (Author).

A78-12836 Measurement of sea surface by means of microwave altimeters - A computer simulation for system evaluation. D W H Hampshire and J M Reeves (Portsmouth Polytechnic, Portsmouth, England) In Oceans '76, Proceedings of the Second Annual Combined Conference, Washington, D C, September 13-15, 1976 New York, Institute of Electrical and Electronics Engineers, Inc., Washington, D C, Marine Technology Society, 1976, p 15C-1 to 15C-6 Research sponsored by the Aeronautical Research Council

The paper describes a simulation being applied to a range of sea states and radar altimeter characteristics as part of a program of assessing the performance of an airborne radar altimeter for sea surface height measurements. The basic programming technique is to first simulate the impulse response of the radar above a specified sea. The transient response for any transmitted pulse shape is then found using the convolution integral. This transient response can then be applied to a simulated receiver characteristic in order to predict the performance of the instrument.

B.J.

A78-13083 Characteristics of polar cap sun-aligned arcs S Ismail, D D Wallis, and L L Cogger (Calgary, University, Calgary, Alberta, Canada) *Journal of Geophysical Research*, vol 82, Oct 1, 1977, p 4741-4749 24 refs National Research Council of Canada Grants No A-7, No A-6762

Observations of polar cap sun-aligned arcs obtained with the auroral scanning photometer on Isis 2 for the period 1971 to 1975 are examined A 2 1 asymmetry was found in the occurrence frequency between the morning and evening sectors of the polar cap Sun-aligned arcs were observed on only 0 6% of polar cap passes and occurred most frequently during periods of low magnetic activity (Kp and AE) Moreover, for all cases observed during times for which interplanetary magnetic field data were available, the field was directed northward. Although the intensity along any single arc varied considerably, it was found that the 5577 A/3914 A intensity ratio remained constant. Examination of particle data and the observed intensity ratios indicate that the arcs are excited by low-energy (not greater than 1 keV) electron fluxes.

A78-13218 Comparison of various methods of determining solar-proton spectra E A Devicheva, lu A Samonenko, I N Senchuro, and P I Shavrin (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) (Geomagnetizm i Aeronomiia, vol 16, Nov-Dec 1976, p 976-979) Geomagnetism and Aeronomy, vol 16, June 1977, p 492, 493 15 refs Translation

Existing methods of solar cosmic ray spectra are compared by applying them to the proton event of January 24, 1971. It is shown that methods based on the geomagnetic (cutoff) effect yield largely exaggerated values of the characteristic rigidity of the exponential pulse spectrum as compared to other methods, particularly, if the vertical rigidity is taken as the cutoff rigidity.

A78-13239 A vector aeromagnetometer instrument system N V Alekseev, E A Bugrov, V I Pochtarev, A la Rotshtein, M A Sergeev, Iu G Turbin, S V Farmakovskii, A D

#### **08 INSTRUMENTATION AND SENSORS**

Cherednichek, and V I lushchenko (Akademiia Nauk SSSR, Institut Zemnogo Magnetizma, Ionosfery i Rasprostraneniia Radiovoln, Leningradskii Institut Tochnoi Mekhaniki i Optiki, Leningrad, USSR) (Geomagnetizm i Aeronomiia, vol 16, Nov-Dec 1976, p 1101-1105) Geomagnetism and Aeronomy, vol 16, June 1977, p 564-566 6 refs Translation.

The instrumentation developed for vector aeromagnetometers to study secular variations and the spatial structure of the geomagnetic field is discussed. The basic principles of designing circuits for high-frequency measurements of the geomagnetic field components are outlined.

A78-13435 How to minimize the baseline drift in a COSPEC remote sensor M M Millan and R M Hoff (Department of the Environment, Atmospheric Environment Service, Downsview, Ontario, Canada) Atmospheric Environment, vol 11, no 9, 1977, p 857-860 6 refs

A procedure is presented for the electronic set-up of a Correlation Spectrometer to minimize the baseline drift caused by daily changes in the sky spectral radiance in the case of SO2 passive detection, the drift can be kept within 100 ppm-m during the operational day, less, if over shorter periods Several days of experimental measurements are required under well ventilated conditions, with no physical changes to the commercial instrument

A78-13688 # Detection and measurement of interfaces in remotely acquired data using a digital computer K H Faller (Earth Resources Laboratory, Slidell, La) In Satellite applications to marine technology, Conference, New Orleans, La, November 15-17, 1977, Collection of Technical Papers Conference sponsored by AIAA, AMS, AGU, IEEE, MTS, and SEG New York, American Institute of Aeronautics and Astronautics, Inc., 1977 6 p (AIAA 77-1616)

A technique for the accurate detection and measurement of surface feature interfaces in remotely acquired data has been developed and evaluated. The technique has been implemented on a digital computer to automatically process categorized data derived from various sources such as the Landsat multispectral scanner and other scanner-type sensors Application of the technique to multiple Landsat data sets has established the precision of the technique as 3.5 percent, and comparison with measurements made using traditional methodology indicates that the Landsat-based measurement agrees with measurements made on 1 24,000-scale maps to better than 5 percent. The technique is currently being utilized in an investigation of the relationship between the shoreline complexity and the estuary and marsh productivity and in an effort with the National Oceanic and Atmospheric Administration and the coastal states to measure and map the shorelines within the states' coastal zone management areas (Author)

A78-13943 PROBE - A new technique for measuring the density profile of a specific constituent using counterpropagating laser pulses. R M Measures (Toronto, University, Downsview, Ontario, Canada) Applied Optics, vol 16, Nov 1977, p 3016-3026 forefs Research supported by the National Research Council of Canada and Environment Canada.

A new approach at attaining density measurements of a specific constituent with spatial resolution using two counterpropagating laser pulses is proposed. This PROBE (Profile Resolution Obtained by Excitation) concept involves exciting the species of interest with one pulse then probing the wake of excited atoms or molecules with a second laser pulse. The lifetime of the excited state, in terms of the time for the laser pulse to cross the region of interest, turns out to be an important parameter in specifying the form of the relation needed to ascertain the profile of the species under investigation. This new technique could find application in several areas, ranging from remote atmospheric pollution monitoring in the ir to trace species profile evaluation within plasma or chemical reactors.

A78-13971 \* A model for microwave intensity propagation in an inhomogeneous medium A D Fisher (MIT, Cambridge, Mass )

IEEE Transactions on Antennas and Propagation, vol AP-25, Nov
1977, p 876-882 20 refs Contract No NAS5-21980

A combined analytic and phenomenological approach, utilizing Maxwell's equations in the Born approximation with radiative transfer theory, is used to describe the propagation of microwave intensity in a scattering medium characterized by three-dimensional random fluctuations in refractive index, as well as nonrandom variations in permittivity, temperature, and loss. This approach yields microwave intensities as a function of polarization, direction, and position. Numerical techniques are presented to solve the transport equations, which include cases of spatially varying coefficients, and highly peaked phase functions. Some computed results illustrating the behavior of microwave intensity in various media are presented Included are the angular and frequency spectra of thermal emission from semi-infinite media, and the diffuse transmission and reflection response of a scattering layer. The effects of scatterer geometry and scale sizes, correlation function, and gradients in temperature, loss, and scattering parameters are also demonstrated. This model should be particularly useful in interpreting active and passive remote sensing data (Author)

A78-14826 \* # Investigation of thematic mapper spatial, radiometric, and spectral resolution J P Morgenstern, R F Nalepka (Michigan, Environmental Research Institute, Ann Arbor, Mich), and J D Erickson (NASA, Johnson Space Center, Houston, Tex) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1
Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 693-701 7 refs Contract No NAS9-14819

Low-altitude aircraft scanner data were employed in simulating the spatial resolution, radiometric sensitivity and spectral bandwidth parameters of the proposed Landsat Thematic Mapper (TM). The 30 to 40 m resolution of the TM was found to provide significant improvement over current Landsat resolution (50 to 60 m) in crop mensuration, especially for Western Europe and India where field sizes average from one to four hectares. In terms of radiometric sensitivity, a noise equivalent reflectance value of 0.5% was held to be necessary for discrimination of spectrally similar data, in addition, all of the six proposed TM spectral bands were shown to be necessary for monitoring at some point during the growing season.

A78-14873 # Capabilities of operational infrared sounding systems from satellite altitude L McMillin (NOAA, National Environmental Satellite Service, Washington, D.C.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 1207-1215 9 refs

Data processing techniques developed for the Vertical Temperature Profile Radiometers (VTPR) of the NOAA series satellites are considered, with attention given to the problems of retrieving temperature profiles from clear radiances and of deriving clear radiances from measurements contaminated by clouds. In addition, sounding capabilities of the stratospheric sounding unit and the infrared and microwave sounding units of the Tiros-N satellite are described. It is suggested that microwave measurements may provide meteorological information for cloudy areas.

A78-14892 # Use of an inertial navigation system for accurate track recovery and coastal oceanographic measurements B M Oliver and J F R Gower (Department of Fisheries and Environment, Institute of Ocean Sciences, Victoria, British Columbia, Canada) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 1399-1413 9 refs

A data acquisition system using a Litton LTN-51 inertial navigation unit (INU) has been tested and used for aircraft track recovery and for location and tracking from the air of targets at sea The characteristic position drift of the INU is compensated for by sighting landmarks of accurately known position at discrete time intervals using a visual sighting system in the transparent nose of the Beechcraft 18 aircraft used. The angular direction data from the sight in conjunction with the aircraft's attitude and barometric altitude, enables the aircraft's 'true' position to be determined. A modified cubic spline interpolation routine was then used to approximate the continuous drift of the INU with time. For an aircraft altitude of about 300 m, theoretical and experimental tests indicate that calculated aircraft and/or target positions obtained from the interpolated INU drift curve will be accurate to within 10 m for landmarks spaced approximately every 15 minutes in time. For applications in coastal oceanography, such as surface current mapping by tracking artificial targets, the system allows a broad area to be covered without use of high altitude photography and its attendant needs for large targets and clear weather. Data is collected in digital form enabling the data to be easily processed and the results plotted directly

A78-14971 # Estimating clear radiances - A report and a new decision rule D S Crosby (American University, NOAA, National Environmental Satellite Service, Washington, D C ) and D J DePriest (U S Navy, Office of Naval Research, Arlington, Va ) In Conference on Aerospace and Aeronautical Meteorology, 7th, and Symposium on Remote Sensing from Satellites, Melbourne, Fla , November 16-19, 1976, Preprints Boston, Mass , American Meteorological Society, 1977, p 101, 102

A previously developed technique for obtaining estimates of clear IR radiances when some fields of view are contaminated by clouds is noted. The technique is applied to data obtained in the 10.5-12.5 micron IR channel of the scanning radiometer on the NOAA satellites in order to estimate sea-surface temperature. A statistical procedure is discussed for separating those sets of data which are too contaminated by clouds from those that can be used in the analysis. The goodness-of-fit statistics tested were the chi-square, the Kolmogorov-Smirnov, the Cramer-Smirnov-Von Mise, and the Anderson-Darling. The last is found to yield the best results in most situations.

A78-14972 # Special Sensor H data processing at AFGWC - Preliminary results. W D Klein, T H Kyle, and W C Smith (USAF, Global Weather Central, Offutt AFB, Neb) In Conference on Aerospace and Aeronautical Meteorology, 7th, and Symposium on Remote Sensing from Satellites, Melbourne, Fla , November 16-19, 1976, Preprints Boston, Mass , American Meteorological Society, 1977, p 103-108 11 refs

The Special Sensor H (SSH) is a multichannel IR temperature-humidity-ozone sounder used as a step-scanning radiometer that makes measurements at 25 positions across an 1100 nautical mile scan line every 32 sec. The paper focuses on a review of the SSH hardware-software data processing system. The SSH instrument is described along with performance specifications, and the temperature profile retrieval capabilities of the operational SSH data processing software are discussed. Results are presented for a comparative study performed with two retrieval algorithms, viz., the minimum information technique and a statistical eigenvector scheme. An SSH water vapor retrieval algorithm is described along with initial results of SSH dewpoint temperature profile and total precipitable water retrievals. A method is outlined for computing total ozone from the single SSH ozone channel measurement.

A78-14973 # Cloud properties from satellite infrared and visible measurements J T Bunting (USAF, Geophysics Laboratory, Bedford, Mass) In Conference on Aerospace and Aeronautical Meteorology, 7th, and Symposium on Remote Sensing from Satellites, Melbourne, Fla, November 16-19, 1976, Preprints

Boston, Mass , American Meteorological Society, 1977, p 109-114 16 cefs.

Satellite data on the radiative properties of clouds are compared with simultaneous cloud measurements by aircraft underflights. A variety of cloud conditions are sampled over midlatitudes of the U.S.A. during winter and spring months and analyzed with the IR and visible measurements from NOAA satellites. Radiances at 12-15 microns determined by vertical temperature profile radiometer instruments are combined with known temperature profiles to estimate cloud altitude and IR transmissivity. Broadband visible and IR window measurements taken by the scanning radiometers aboard the same satellites are empirically related to total cloud thickness and mass. The data obtained corroborate the hypothesis that clouds which appear coldest in the IR and brightest in the visible have the greatest total mass and vertical thickness.

A78-15013 # Measurement of atmospheric ozone by satellite. J E Lovill, T J Sullivan, and J A Korver (California, University, Livermore, Calif) In Conference on Aerospace and Aeronautical Meteorology, 7th, and Symposium on Remote Sensing from Satellites, Melbourne, Fla, November 16-19, 1976, Preprints.

Boston, Mass., American Meteorological Society, 1977, p 325-327 5 refs FAA-supported research, Contract No W-07405-eng-48

A cross-track scanning, multifilter radiometer, returning 16 spectral radiance values, will be orbited aboard the DMSP Block 5D-1 system for the purpose of monitoring global atmospheric ozone trends. The ozone data will be processed by the Satellite Ozone Analysis Center which will be dedicated to the following areas (1) the collection of data for use in initializing numerical models, (2) the analysis of ozone variability at the mesoscale with the higher resolution sensor, (3) the analysis of the diurnal variability of total ozone with a two satellite sensor system, and (4) cooperation with the World Meteorological Organization's Global Monitoring and Research Project.

A78-15662 An advanced computer calculation of ground clutter in an airborne pulse Doppler radar M B Ringel (Westinghouse Electric Corp., Baltimore, Md.) In NAECON '77, Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, May 17-19, 1977 New York, Institute of Electrical and Electronics Engineers, Inc., 1977, p. 921-928 USAF-supported research

This paper presents the unique features of a computer program that calculates the clutter level in an arbitrary range-Doppler cell of a range-gated pulse Doppler radar. The program is capable of accurately computing the details of the so-called altitude line, sidelobe, and mainbeam clutter associated with arbitrary measured antenna/ radome data or an analytical representation of them. It can handle arbitrary mission geometry with respect to both platform and antenna orientations relative to a round earth. In addition, it handles all range and/or Doppler ambiguities associated with the radar pulse repetition frequency. (Author)

A78-15664 Characteristics of sea clutter measured from E-3A high radar platform P-W Chen, T F Havig, and W C Morchin (Boeing Aerospace Co , Seattle, Wash ) In NAECON '77, Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, May 17-19, 1977 New York, Institute of Electrical and Electronics Engineers, Inc , 1977, p 934-937

Backscatter data was taken using a developmental Airborne Warning and Control System radar, now known as the AN/APY-1 Clutter statistics for its operating frequency, clutter patch size, and grazing angle were not found in the available literature. Therefore this experiment was done to determine the clutter statistics for use in the design of a production system. Data acquisition used a digital recording system and processing was done automatically using a ground based computer.

(Author)

A78-16699 \* # An entree for large space antennas R V Powell and A R Hibbs (California Institute of Technology, Jet

Propulsion Laboratory, Pasadena, Calif) Astronautics and Aeronautics, vol. 15, Dec. 1977, p. 58-64. 5 refs

Some of the possible areas of application for large antennas placed in space are discussed, and some initial design concepts for various antenna proposals are described. Applications include rural mobile communications, an orbiting deep space relay station, submillimeter radio astronomy, and multispectral radiometry of earth surface features. As a first step in developing the needed technology, a deployable 30-m antenna with 1-mm surface accuracy is proposed. Flight experience with such an antenna system would enable validation of performance prediction models. The 30-m-diam mesh deployable-defurlable antenna experiment would be carried out with the shuttle.

A78-17101 Some characteristics of the equatorial electrojet in Ethiopia /East Africa/ R P Kane and R G Rastogi (Physical Research Laboratory, Ahmedabad, India) Indian Journal of Radio and Space Physics, vol 6, June 1977, p 85-101 27 refs Research supported by the Department of Space of India

A78-17113 Ion temperature estimation with ion trap data from rockets and satellites A Z Bochev and B C N Rao (National Physical Laboratory of India, New Delhi, India) Indian Journal of Radio and Space Physics. vol. 6, June 1977, p. 151-154

Ion trap measurements of collector current and the retarding grid voltage are used in the estimation of ion temperature and space vehicle potential. The relationship between collector current and retarding grid potential is a nonlinear equation of the unknown parameters of space vehicle potential and of ion temperature. An appropriate theoretical curve, which fits the observed data points, is determined via minimizing the coefficient of variation. The method, which is found to be convergent, is illustrated by an example. S.C.S.

A78-17377 \* Remote sensing of earth resources using a spaceborne microwave radiometer. A Leber and T Flattau (Cutler Hammer, Inc., AIL Div., Melville, N.Y.) In International Instrumentation Symposium, 23rd, Las Vegas, Nev., May 1.5, 1977, Proceed pittsburgh, Pa., Instrument Society of America, 1977, p. 317-320. 10 refs. Contract No. NAS9-11275

A microwave radiometer was one of five experiments installed onboard the NASA Skylab spacecraft in order to remotely monitor selective earth resources information. The essential features of the radiometer are described, and typical data required in space is also presented in order to illustrate the instrument's utility. (Author)

A78-18245

Analysis of 1.4 GHz radiometric measurements from Skylab R M Lerner and J P Hollinger (U.S. Navy, Naval Research Laboratory, Washington, D.C.) Remote Sensing of Environment, vol. 6, no. 4, 1977, p. 251-269. 16 refs

Data collected from the 1 4 GHz S-194 microwave radiometer aboard Skylab are analyzed in order to determine the extent to which quantitative measurements of sea surface conditions and related wind fields can be made using the S-194 radiometer. The discussion covers a demonstration of the reliable operation of the radiometer and the feasibility of satellite-based observations under ideal ocean and atmospheric conditions, an examination of the effects of marine wind speed, sea surface roughness, and foam coverage on radiometer antenna temperature in order to evaluate the potential for passive microwave determination of ocean surface-wind fields from a satellite, an evaluation of the effects of changes in sea salinity of selected target areas, and an estimation of the radiometer's ability to measure sea surface temperature over the widest available variety of environmental conditions. Analysis results demonstrate the possibility of making accurate measurements of the earth's ocean areas from a satellite with a passive microwave radiometer

A78-20164 On the role of magnetic mirroring in the auroral phenomena. W Lennartsson (Kungl Tekniska Hogskolan, Stockholm, Sweden) Astrophysics and Space Science, vol. 51, no. 2, Oct. 1977, p. 461-495. 84 refs

On the basis of field and particle observations, it is suggested that a bright auroral display is a part of a magnetosphere-ionosphere current system which is fed by a charge-separation process in the outer magnetosphere (or the solar wind) The upward magnetic-fieldalianed current is flowing out of the display, carried mainly by downflowing electrons from the hot-particle populations in the outer magnetosphere (the ambient cold electrons being depleted at high altitudes) As a result of the magnetic mirroring of these downflowing current carriers, a large potential drop is set up along the magnetic field, increasing both the number flux and the kinetic energy of precipitating electrons. It is found that this simple basic model, when combined with wave-particle interactions, may be able to explain a highly diversified selection of auroral particle observations It may thus be possible to explain both 'inverted-V' events and auroral rays in terms of a static parallel electric field, and the electric field may be compatible with a strongly variable pitch-angle distribution of the precipitating electrons, including distributions peaked at 90 deg as well as zero deg. This model may also provide a simple explanation of the simultaneous precipitation of electrons and collimated positive ions (Author)

N78-10174\*# National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio

DEVELOPMENT OF ENVIRONMENTAL CHARGING EFFECT MONITORS FOR OPERATIONAL SATELLITES

N John Stevens, John C Sturman, and Frank D Berkopec In ts Proc of the Spacecraft Charging Technol Conf 24 Feb 1977 p 745-751 refs

Avail NTIS HC A99/MF A01 CSCL 22B

Design details and design goals are given of an instrumentation package to monitor the effects of the environmental charging of spacecraft surfaces on the systems of operational spacecraft Author

N78-10436\*# General Dynamics Corp., Chicago III
REAL TIME DUST FALL MONITOR (RTDFM) Final Report,
1 Dec 1975 - 1 Oct. 1978

C R Claysmith Oct 1976 47 p (Contract NAS8-31682)

(NASA-CR-150446) Avail NTIS HC A03/MF A01 CSCI

A prototype ultraviolet optical instrument designed and developed to monitor 300 level surface cleanliness is described Size, weight, sensitivity, and simplicity design parameters were satisfied. Tests were conducted with various configurations of the detector array and sample surfaces. Circuit schematics are included. It is shown that output drift is due to effective lamp intensity variations. The instrument is intended to be a part of the integrated environmental contamination monitor of the space shurtle.

Author

N78-10539\*# Old Dominion Univ , Norfolk, Va School of Engineering

LABORATORY REQUIREMENTS FOR IN-SITU AND REMOTE SENSING OF SUSPENDED MATERIAL Final Report

Chin Y Kuo and Robert Y K Cheng Mar 1976 90 p refs (Contract NAS1-11707)

(NASA-CR-145263, TR-76-C2) Avail NTIS HC A05/MF A01 CSCL 08H

Recommendations for laboratory and in-situ measurements required for remote sensing of suspended material are presented. This study investigates the properties of the suspended materials, factors influencing the upwelling radiance, and the various types of remote sensing techniques. Calibration and correlation procedures are given to obtain the accuracy necessary to quantify the suspended materials by remote sensing. In addition, the report presents a survey of the national need for sediment data, the agencies that deal with and require the data of suspended sediment, and a summary of some recent findings of sediment measurements.

Author

N78-10549# Radiometric Technology Inc., Wakefield Mass MICROWAVE RADIOMETRIC SENSING OF SURFACE TEMPERATURE AND WIND SPEED FROM SEASAT Final Report

Ronald A Porter and Ping-Tong Ho 22 Feb 1977 167 p

(Grant NOAA-6-35-217)

(PB-270323/9, NOAA-77062710) Avail NTIS

HC A08/MF A01 CSCL 08J

An evaluation was performed on the effects of scattered solar radiation on sea surface brightness temperatures to be measured with a 6.6 GHz radiometer. An algorithm for deriving sea surface temperatures and wind speeds from brightness temperatures has been developed for use on SEASAT. A set of conclusions and recommendations for further studies are presented.

N78-11446 Drexel Univ Philadelphia, Pa

TECHNIQUES FOR OPENING REGIONAL RADIATION BUDGETS FROM SATELLITE RADIOMETER OBSERVATIONS Ph D Thesis

Jose Fermin Pina 1977 216 p

Avail Univ Microfilms Order No 77-17221

Methods developed for obtaining regional radiation budgets from wide field of view satellite radiometer measurements were discussed. The instantaneous technique yields values of the radiant emittance (We) and the radiant reflectance (Wr) which regions have during the time interval of a single satellite pass. The number of observations matches the number of regions under study and a unique solution is obtained using matrix inversion. Another method, termed the best fit technique yields time averages of We and Wr for large time intervals. The number of observations in this technique is much greater than the number of regions considered, and an approximate solution is obtained by the method of least squares.

N78-11449\*# Cornell Univ Ithaca, N Y Center for Radiophysics and Space Research

FAR-INFRARED PHOTOMETRY WITH AN 04-METER LIQUID HELIUM COOLED BALLOON-BORNE TELESCOPE Ph D Thesis

Michael Ray Jacobson Aug 1977 282 p refs

(Grant NGR-33-010-172)

(NASA-CR-155234 CRSR-673)

HC A13/MF A01 CSCL 14E

A 0.4-meter aperture, liquid helium cooled multichannel far-infrared balloon-borne telescope was constructed to survey the galactic plane. Nine new sources above a 3-sigma confidence level of 1300 Jy, were identified. Although two-thirds of the scanned area was more than 10 degrees from the galactic plane, no sources were detected in that region, all nine fell within 10 degrees and eight of those within 4 degrees of the galactic equator. Correlations with visible, compact. H. lines associated with radio continuum and with sources displaying spectra steeply rising between 11 and 20 microns were noted while stellar objects were not detected.

# N78-11453\*# Honeywell Radiation Center Lexington Mass MULTILAYERED (Hg,Cd)Te INFRARED DETECTOR Final Technical Report

W G Rae 16 May 1977 63 p

(Contract NAS9-14180)

(NASA-CR-151548) Avail NTIS HC A04/MF A01 CSCL 20F

Multilayered mercury-cadmium telluride photoconductive detectors were developed which are capable of providing individual coverage of three separate spectral wavelength bands without the use of beam splitters. The multilayered three-color detector on a single dewar takes the place of three separate detector/filter/dewar units and enables simpler and more reliable mechanical and optical designs for multispectral scanners and radiometers. Wavelength channel design goals (in micrometers) were 10.1 to 11.0 to 12.0 and 13.0 Detectivity for all channels was 1 x 10 to the 10th power cm-Hz 1/2/Watt A problem occurred in finding an epoxy layer which had good infrared transmission properties and which also was chemically and mechanically compatible with HgCdTe processing techniques. Data on 6 candidate bonding materials are surveyed and discussed

Author

NTIS

Avail

N78-11496# Netherlands Interdepartmental Working Group on the Application of Remote Sensing, Delft EVALUATION OF AN INFRARED LINE SCANNER FOR THE

EVALUATION OF AN INFRARED LINE SCANNER FOR THE STUDY OF COASTAL WATER CIRCULATION [EVALUATIE INFRARED LINE SCANNER VOOR ONDERZOEK KUSTWATER-CIRCULATIE]

H W BrunsveldvanHulten (Rijkswaterstaat) and C Kraan (Roy Neth Meteorol Inst.) Jan 1977 88 p refs In DUTCH ENGLISH summary

(NIWARS-Publ-41) Avail NTIS HC A05/MF A01

Research on the application of infrared techniques in studies on coastal water circulation is reported. Results with an airborne infrared line scanner (IRLS) and infrared thermometer (IRT) are presented. In addition to some instrumentational characteristics, interpretation of measurements and data processing techniques are mentioned. It is shown that such techniques may contribute substantially to the knowledge on water circulation processes. Detailed information especially from IRLS is obtained. The usefulness of such techniques for different studies is mentioned. It is shown that temperature measurements in general are realistic but studies on the radiation temperature and phenomena in the air-sea boundary layer e.g., emissivity coefficient are necessary in order to make this technique reliable.

N78-11813\*# Washington Univ, St. Louis Mo. Dept. of Earth and Planetary Sciences

IMAGING NATÚRAL MATERIALS WITH A QUASI-MICROSCOPE Final Report, 1 Jul 1974 - 31 Aug 1977 Susan Bragg and Raymond Arvidson 31 Aug 1977 47 p refe

(Contract NsG-1084)

(NASA-CR-155250) Avail NTIS HC A03/MF A01 CSCL 20F

A Viking lander camera with auxilliary optics mounted inside the dust post was evaluated to determine its capability for imaging the inorganic properties of granular materials. During mission operations prepared samples would be delivered to a plate positioned within the camera's field of view and depth of focus. The auxiliary optics would then allow soil samples to be imaged with an 11 pm pixel size in the broad band (high resolution, black and white) mode, and a 33 pm pixel size in the multispectral mode. The equipment will be used to characterize (1) the size distribution of grains produced by igneous (intrusive and extrusive) processes or by shock metamorphism (2) the size distribution resulting from crushing chemical alteration, or by hydraulic or aerodynamic sorting (3) the shape and degree of grain roundess and surface texture induced by mechanical and chemical alteration and (4) the mineralogy and chemistry of grains.

N78-12113\*# National Aeronautics and Space Administration Langley Research Center Langley Station, Va

# AN INTRODUCTION TO ORBIT DYNAMICS AND ITS APPLICATION TO SATELLITE-BASED EARTH MONITORING SYSTEMS

David R Brooks Nov 1977 85 p refs (NASA-RP-1009 L-11710) Avail NTIS HC A05/MF A01 CSCI 224

The long term behavior of satellites is studied at a level of complexity suitable for the initial planning phases of earth monitoring missions. First-order perturbation theory is used to describe in detail the basic orbit dynamics of satellite motion around the earth and relative to the sun. Surface coverage capabilities of satellite orbits are examined. Several examples of simulated observation and monitoring missions are given to illustrate representative applications of the theory. The examples stress the need for devising ways of maximizing total mission output in order to make the best possible use of the resultant data base as input to those large-scale, long-term earth monitoring activities which can best justify the use of satellite systems.

Autho

N78-12268# Naval Research Lab , Washington, D C HIGH-RESOLUTION RADAR SCATTERING CHARACTERISTICS OF A DISTURBED SEA SURFACE AND FLOATING DEBRIS Interim Report

Bernard L Lewis James P Hansen, Irwin D Olin, and Vincent Cavaleri 29 Jul 1977 47 p refs

(SF1214141B)

(AD-A044216, NRL-8131) Avail NTIS HC A03/MF A01 CSCL 17/4

A study was made of high-resolution radar returns from a disturbed sea surface and from ngid debris floating on such a surface. The goal was to determine if there are differences between the scatter from the sea and that from debris that would permit sea return to be suppressed and debris return to be detected. The study involved both theoretical and experimental efforts. Measurement revealed that sea return was relatively improbable in any given resolution cell and that when it did occur it lasted only a second or two Also, such return was always heavily amplitude modulated with modulation frequencies much higher than those on debris echoes. These findings were explained theoretically and used in developing a debris-avoidance radar concept for high-speed ships.

Author (GRA)

N78-12513# Image Graphics, Inc., Fairfield, Conn Cartographic Electron Beam Recorder (EBR) System Final Controct Roport, 16 Jun. 1975 - 18 Jul 1977

Patrick F Grosso and Andrew A Tamowski 1 Aug 1977 85 p refs

(Contract DAAG53-75-C-0221)

(AD-A044401, ETL-0111) Avail NTIS HC A05/MF A01 CSCL 08/2

This report describes the development of an advanced model of a Cartographic EBR for use in plotting and recording a variety of map and image data on electron sensitive film. Performance levels achieved with the minicomputer controlled EBR are satisfactory for the automated production of a number of cartographic products. Recording spot sizes of 3 and 6 microns diameter, beam addressability of 32,000 x 32,000, image repeatability of 1/30,000, and geometric fidelity of 0.03% have been demonstrated. Image format sizes were 5 inch x 8 inch, 4 inch x 6 inch, 70 mm and 35 mm. 32 line widths can be varied automatically from 6 to 250 micrometer. Graphic arts quality characters can be recorded from 4 pts to 36 pts (at full scale).

pprox pprox pprox pprox Army Cold Regions Research and Engineering Lab , Hanover, N H

Airborne Spectroradiometer data compared with ground water-turbidity measurements at lake powell utam. Correlation and quantification of data

Carolyn J Merry Sep 1977 44 p refs Prepared in cooperation with Dartmouth Coll , Hanover, N H

(Grant NsG-5014)

(NASA-CR-155290, AD-A044793, CRREL-SR-77-28) Avail NTIS HC A03/MF A01 CSCL 13/2

During the past three years there has been a renewed interest in the methodology and procedures used to monitor water quality in fresh and salt water regimes. However, there still exists a need to calculate quantitatively the amount of surface turbidity by remote sensing methods to provide rapid and synoptic water quality surveys. Recently a 500-channel airborne spectroradiometer, which may provide a quantitative means of comparing high resolution multispectral data to water quality parameters has been designed at the the NASA Goddard Institute for Space Studies (GISS) The objective of this study is to correlate and quantify the airborne spectroradiometer multispectral data to ground truth water quality measurements obtained in Lake Powell, Utah, during June 1975 A ground truth water sampling program was accomplished during 9-16 June 1975 for correlation to an aircraft spectroradiometer flight. Field measurements were taken of percentage of transmittance, surface temperature, pH and secchi disk depth Also, percentage of transmittance was measured in the laboratory for the water samples. In addition, electron micrographs and suspended sediment concentration data were obtained of selected water samples located at Hite Bridge (Mile 171), Mile 168, Mile 150 and Bullfrog Bay (Mile 122) Airborne spectroradiometer spectra were selected which correlated to the Hite Bridge (Mile 171), Mile 168, Mile 150 and Bullfrog Bay (Mile 122) test sites GRA

N78-12618# Physical Dynamics, Inc. La Jolla, Calif
MEASUREMENT OF AMBIENT MAGNETIC FIELD GRADIENTS USING A SUPER CONDUCTING MAGNETIC
GRADIOMETER Final Tochnical Roport, Jan - Doc 1976
Walter N Podney and George H Gillespie Mar 1977 152 p
refs

(Contract F30602-72-C-0494, ARPA Order 1649) (AD-A044997, PD-76-107, RADC-TR-77-100)

(AD-A044997, PD-76-107, RADC-TR-77-100) Avail NTIS HC A08/MF A01 CSCL 20/3

This report presents the results of investigations involving the relationship of the motion of ocean waves to measurement of fluctuating magnetic fields that result from a wave progressing horizontally in a stratified ocean. This report (1) describes design features of a superconducting magnetic gradiometer that will be employed to measure gradients of magnetic fields generated at a fixed point above the ocean surface due to waves passing the oceanographic tower operated by the U.S. Naval Undersea Center near San Diego, CA In addition, the report gives a formulation describing instrument response to ambient magnetic gradients that are sensibly constant over the distance separating centers of the pickup loops in the gradiometer. This report also presents the first measurements of spectra that characterize noise in the frequency range 5 x 10 (-4) to 20 Hz of a superconducting magnetic gradiometer operating in a magnetically quiet environment. Two techniques that provide means of suppressing noise from nearby magnetic objects are examined A procedure for operating at the Oceanographic tower that both uses the techniques to suppress noise from magnetization currents in the tower's steel structure, and gives a maximum response to gradients from internal waves is presented

Author (GRA)

R78-13518# Officine Galileo SpA, Florence (Italy) Div Sistemi

IRFES - INFRA-RED FAN BEAM EARTH SENSOR. PRO-TOTYPE MODEL Final Report

Paris ESA Nov 1976 384 p refs (Contract ESTEC-1799/72-AA)

(ESA-CR(P)-974) Avail NTIS HC A17/MF A01

The design is described of the fan beam IR horizon sensor A description is given of sensor optical head, the design and optimization of the sensor electronics, the sensor housing and tests performed A mathematical model is used for the analysis of sensor errors. An evaluation is included of sun and moon interference on sensor operation. An error and reliability analysis is detailed.

NTG-13684/ Air Force Geophysics Lab., Hanscom AFB, Mass LWIR (7-24-MICROMETER) MEASUREMENTS FROM THE LAUNCH OF A ROCKET GORNE SPECTROMETER INTO A QUIET ATMOSPMERE (1974)

James W Rogers 24 May 1977 117 p refs (AD-A045466, AFGL-TR-77-0113, AFGL-ERP-597,

DNA-HAES-64) Avail NTIS HC A06/MF A01 CSCL 17/5

A liquid-helium-cooled, long-wavelength infrared (LWIR) spectrometer was successfully launched on 14 Feb 1974 from the University of Poker Flat Research Range at Chatanika, Alaska, part of the DNA ICECAP 74 Program The Spectrometer, which employs a circular-variable filter was almost identical to one flown on 22 Mar 1973 that provided the first measurements of the altitude profile of the infrared spectrum of the upperatmospheric emissions between 7 and 24 micrometers. The 1973 measurements were from an energetically pumped atmosphere during the occurrence of an IBC II aurora. The objective of the 1974 flight was to obtain emission data from an aurorally quiet atmosphere to determine the contribution of the auroral energy input to the data obtained in 1973. The payload was successfully launched during nonauroral conditions, and data were obtained on the 15 micrometer carbon dioxide (nu 2) emission from 74 to 160 km and on the 96 micrometer ozone (nu 3) emission between 74 and 110 km. Above 110 km, significant unidentified emission was again observed at 9.3 micrometers

N79-13716°# Wentz (Frank J) and Associates Cambridge,

# COMPUTATION OF THEORETICAL BRIGHTNESS TEMPER-ATURES CORRESPONDING TO THE CAPE COD CANAL RADIOMETER MEASUREMENTS Final Report

Frank J Wentz Nov 1977 14 p refs (NASA Order L-24420-A)

(NASA-CR-145277) Avail NTIS HC A02/MF A01 CSCL **08J** 

Theoretical brightness temperatures are computed from the ground-truth data that was collected during the radiometer measurements of the Cape Cod Canal An approximate correction for antenna pattern effects is made and the results are compared with the radiometer measurements Author

N78-14495\*# Kansas Univ Center for Research, Inc., Lawrence Remote Sensing Lab

#### SPACE RADAR SYSTEM SPECIFICATIONS

F T Ulaby T F Bush and W H Stiles In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 407-425 refs

Avail NTIS HC A99/MF A01 CSCL 171

System specifications are proposed for an imaging radar whose primary objective is to provide useful information for land applications including hydrology, agriculture and geology. Author

N78-14532\* # National Oceanic and Atmospheric Administration Washington D C

#### POTENTIAL APPLICATIONS OF DIGITAL VISIBLE, AND INFRARED DATA FROM GEOSTATIONARY ENVIRONMEN-TAL SATELLITES

D B Miller, M P Waters III, J D Tarpley, R N Green and D C Dismachek In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 849-858 refs

Avail NTIS HC A99/MF A01 CSCL 05B

An hourly digital data base from the Visible/Infrared Spin-Scan Radiometer (VISSR) instrument on the GOES-1 and SMS-2 geostationary satellites is described. Several examples of developmental applications of these quantitative digital data are presented. These include a review of recent attempts to develop products that are of use to meteorologists who provide services to aviation, agriculture, forestry, hydrology, oceanography, and climatology The sample products include high resolution thermal gradients of land and ocean surfaces thermal change analyses, fruit frost/freeze application cloud-top altitude analysis analysis of hurricane characteristics and analyses of solar insolation

N78-14567\* # National Environmental Satellite Service Washington D C

#### CAPABILITIES OF OPERATIONAL INFRARED SUUNDING SYSTEMS FROM SATELLITE ALTITUDE

Larry McMillin In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1207-1215 refs

Avail NTIS HC A99/MF A01 CSCL 04A

Initial attempts at using satellite radiances resulted in the production of temperature profiles similar to those produced by radiosondes. While increases in accuracy were made and additional increases are expected to result from increased instrument capabilities it was recognized that the production of level temperatures is not consistent with the average temperature that is represented by the radiances Author

#### N78-14568\* # Aerojet Electrosystems Co , Azusa Calif A MULTICHANNEL PASSIVE MICROWAVE ATMOSPHERIC TEMPERATURE SOUNDING SYSTEM

M E Louappe and K A Paradis In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1217-1225 refs

(Contract F04701-75-C-0090)

Avail NTIS HC A99/MF A01 CSCL 04A

The development of a small lightweight low-power seven channel passive microwave radiometer system for use on the Defense Meteorological Satellite Program (DMSP) was described The 50-60 GHz sensor system operates in the region of an intense atmospheric oxygen absorption band to provide atmospheric temperature profiles to 30 kilometer altitudes on a global Author

N78-14599\*# Atomic Energy Establishment Cairo (Egypt) Remote Sensing Center

INTERPRETATION OF MULTISPECTRAL AND INFRARED THERMAL SURVEYS OF THE SUEZ CANAL ZONE, EGYPT E M ElShaziv M A Abdel Hady Hady M A Abdel Hafez A B Salman M A Morsy M M elRakarby I E E alAassy, and A F Kamel In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1533-1542

Avail NTIS HC A99/MF A01 CSCL 17E

Remote sensing airborne surveys were conducted as part of the plan of rehabilitation of the Suez Canal Zone using I2S multispectral camera and Bendix LN-3 infrared passive scanner The multispectral camera gives four separate photographs for the same scene in the blue green red, and near infrared bands The scanner was operated in the microwave bands of 8 to 14 microns and the thermal surveying was carried out both at night and in the day time. The surveys, coupled with intensive ground investigations were utilized in the construction of new geological structural lineation and drainage maps for the Suez Canal Zone on a scale of approximately 1 20 000 which are superior to the maps made by normal aerial photography. A considerable number of anomalies belonging to various types were revealed through the interpretation of the executed multispectral and infrared thermal surveys

N78-14601\*# Kansas Univ Lawrence Remote Sensing

#### ESTIMATION OF SOIL MOISTURE WITH RADAR REMOTE SENSING

Percy P Bativala and Fawwaz T Ulaby In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1557-1566 refs

Avail NTIS HC A99/MF A01 CSCL 08M

The radar response to soil moisture content was investigated using a truck-mounted 1-18 GHz (30-167 cm wavelength respectively) active microwave spectrometer (MAS) system. The sensitivity to soil moisture content and the accuracy with which it could be estimated were evaluated for both bare and vegetation-covered fields. Bare field experiments were conducted to determine the optimum radar parameters (frequency, angle of incidence range, and polarization configuration) for minimizing the response to surface roughness while retaining strong sensitivity to moisture content. In the vegetation-covered case, the effects of crop type crop height and row direction relative to the radar look direct were evaluated Author

#### N78-14605\* # Aerojet Electrosystems Co Azusa Calif DATA PROCESSING FOR THE DMSP MICROWAVE RADIOMETER SYSTEM

J L Rigone and A P Stogryn In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 2 1977 p 1599-1608

Avail NTIS HC A99/MF A01 CSCL 05B

A software program was developed and tested to process microwave radiometry data to be acquired by the microwave sensor (SSM/T) on the Defense Meteorological Satellite Program spacecraft The SSM/T 7-channel microwave radiometer and systems data will be data-linked to Air Force Global Weather Central (AFGWC) where they will be merged with ephemeris data prior to product processing for use in the AFGWC upper air data base (UADB). The overall system utilizes an integrated design to provide atmospheric temperature soundings for global applications. The fully automated processing at AFGWC was accomplished by four related computer processor programs to produce compatible UADB soundings, evaluate system performance and update the a priori developed inversion matrices. Tests with simulated data produced results significantly better than climatology Author

N78-14699# Chalmers Univ of Technology, Goteborg (Sweden) Research Lab of Electro-Optics and Lasers

#### A PASE DIODE LASER SPECTROMETER TO BE USED IN AIR POLLUTION MONITORING AND MINERAL PROSPECT-ING

E Max and S T Eng [1977] 21 p refs Sponsored by Swed Board for Tech Develop

(CTH-IEM-TR-7636) Avail NTIS HC A02/MF A01

The high resolution infrared PbSe diode laser spectrometer developed possesses three cells for measurement and calibration A correlation technique was applied to increase sensitivity. Silicon dioxide concentrations of around 5 ppm were monitored at 7.5 microns with the diode operating at 77 K

N78-14747 British Library Lending Div Boston Spa (England) THE DIGITAL PROCESSING OF SCANNING RADIOMETER (SR) DATA FROM NOAA WEATHER SATELLITES AS CARRIED OUT IN THE METEOROLOGICAL INSTITUTE OF THE FREE UNIVERSITY OF BERLIN PART 2 NOTES ON THE DIGITAL FILTERING OF SATELLITE PICTURES Egon Hilt [1977] 8 p refs Transl into ENGLISH from Meteorol Abh, Inst Meteorol Geophys Freie Univ Berlin (West Germany) ser B6H1 1976 p 1-8

(BLLD-M-24895-(5828 4F)) Avail British Library Lending Div. Boston Spa Engl

Detailed descriptions of digital filtering and recursive filtering specifically are presented along with each method's use in on-line processing of satellite data Author

N78-14750 British Library Lending Div Boston Spa (England) THE DIGITAL PROCESSING OF SCANNING RADIOMETER (SR) DATA FROM NOAA WEATHER SATELLITES AS CARRIED OUT IN THE METEOROLOGICAL INSTITUTE OF THE FREE UNIVERSITY OF BERLIN PART 1 LINEARISING THE SR DATA

Heiner Billing and Dirk Koslowsky [1977] 5 p refs Transl into ENGLISH from Freie Univ Inst, Met u Inst Geophys Wissensch, Met Abt, Neue Folge Ser b, 1, H G, 1975 Beil 74 (Berlin) 5 p

(BLL-M-24896-(5828 4F)) Avail British Library Lending Div. Boston Spa Engl

A digital picture processing procedure developed to correct the distorted scanning radiometer pictures from the NOAA satellites is decribed. The procedure is run on the PDP 11/40. in real time. Results show that even the boundary regions of the distortion-corrected picture are good enough for recognizing large-scale cloud structures

### N78-15028\*# Hacking Labs Santa Clara, Calif DESIGN AND FABRICATION OF NOSECONE FOR WB-57F AIRCRAFT FITTED WITH APQ-102A SIDE LOOKING RADAR Final Report

Dec 1977 104 p refs

(Contract NAS9-15189, HL Proj 22)

(NASA-CR-151592) Avail NTIS HC A06/MF A01 CSCL

The design, fabrication, and testing of a nose cone which included a radome for a NASA WB-57F high altitude natural resources mapping aircraft was reviewed. The plane was fitted with a APQ-102A side looking radar operating at 9 6 GHz. The radar is directed normally to the direction of the flight and downward by a changeable angle, and it is assumed that the axis of the plane will not deviate from this direction by more than + or - 6 deg The radome is required to subtend an angle of 160 deg centered 30 deg below the left horizon

## N78-15142\*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt Md

#### SIGNIFICANT INITIAL RESULTS FROM THE ENVIRONMEN-TAL MEASUREMENTS EXPERIMENT ON ATS-6

T A Fritz (NOAA Boulder, Colo.) C W Arthur (California Univ Los Angeles), J B Blake (Aerospace Corp., Los Angeles), P J Coleman, Jr (California Univ Los Angeles), J P Corrigan (NASA Goddard Space Flight Center) W D Cummings (Grambling State Univ La), S E DeForest (Alabama Univ, Huntsville), K N Erickson (Minnesota Univ., Minneapolis), A. Konradi (NASA Johnson Space Center) W Lennartsson (NASA Marshall Space Flight Center) et al Dec 1977 34 p refs

(NASA-TP-1101, G-7702F-15) Avail NTIS HC A03/MF A01 CSCL 22A

The Applications Technology Satellite (ATS-6), launched into synchronous orbit on 30 May 1974 carried a set of six particle detectors and a triaxial fluxgate magnetometer. The particle detectors were able to determine the ion and electron distribution functions from 1 to greater than 10 to the 8th power eV It was found that the magnetic field is weaker and more tilted than predicted by models which neglect internal plasma and that there is a seasonal dependence to the magnitude and tilt ATS-6 magnetic field measurements showed the effects of field-aligned currents associated with substorms and large fluxes of field-aligned particles were observed with the particle detectors Encounters with the plasmasphere revealed the existence of warm plasma with temperatures up to 30 eV A variety of correlated waves in both the particles and fields were observed pulsation continuous oscillations, seen predominantly in the plasmasphere bulge, ultralow frequency (ULF) standing waves ring current proton ULF waves and low frequency waves that modulate the energetic electrons. In addition large scale waves on the energetic-ion-trapping boundary were observed, and the intensity of energetic electrons was modulated in association with the passage of sector boundaries of the interplanetary magnetic field Author

N78-15626\*# Old Dominion Coll, Norfolk Va School of Engineering ESTIMATION OF GROUND TEMPERATURE FROM GFCR RADIOMETRIC SIGNAL Progress Report, Feb - May 1977 S K Gupia and S N Tiwari Jun 1977 80 p refs (Grant NsG-1282)

(NASA-CR-145291) Avail NTIS HC A05/MF A01 CSCL

A procedure was developed which demonstrates the feasibility of estimating actual surface temperature from the effective brightness temperature which can be conveniently measured by a radiometer from remote sensing platforms. Atmospheric corrections to the effective brightness temperature are computed corresponding to the base model' atmosphere and several modifications of this caused by deviations of the various atmospheric or surface parameters from their base model values Simple analytical relations were established between the deviations of these parameters and the additional temperature corrections required to compensate for them Effects of simultaneous variation of several parameters also were examined Use of these analytical relations instead of radiative transfer calculations results in tremendous savings in data reduction costs Author

# N78-15632# Air Force Geophysics Lab , Hanscom AFB, Mass ROCKETBORNE MEASUREMENT OF AN INFRARED ENHANCEMENT ASSOCIATED WITH A BRIGHT AURORAL BREAKUP Interim Report, Nov 1975 - Dec 1976

K D Baker, Doran J Baker, James C Ulwick, and A T Stair, Jr 5 Jul 1977 100 p refs

(A D-A046474, AFGL-TR-77-0157, DNA-HAES-50, ERP-605) Avail NTIS HC A05/MF A01 CSCL 18/3

A Paiute-Tomahawk sounding rocket containing a 15-53 micrometers cryogenically cooled spectrometer was flown into a very bright (IBC III-) auroral breakup from Poker Flat Alaska The main emission features at 28, 43, and 53 micrometers were all found to be enhanced due to the large energy input to the atmosphere associated with the aurora. The most prominent enhancement occurred in the 4.3 micrometers region

Author (GRA)

### N78-15643# Earth Satellite Corp , Washington, D C A PRELIMINARY STUDY OF THE APPLICABILITY OF NIMBUS 6 ESMR TO SURFACE WIND SPEED ESTIMATES Final Report, May 1975 - Sep 1976

Romeo R Sabatini Lawrence J Heitkemper, and Dennis L Hlavka Sep 1976 50 p refs

(Contract N00228-75-C-2269)

(AD-A046629, NEPRF-TR-6-76(ESC)) HC A03/MF A01 CSCL 04/2

NTIS Avail

## 08 INSTRUMENTATION AND SENSORS

The utility of the Nimbus 6 ESMR for sea-surface wind determination is explored in this study by (1) analysis of wind equations derived from theoretical calculations of brightness temperatures above model atmospheres and assumptions of linear increases in sea-surface emissivities with wind, and (2) actual analysis of Nimbus 6 ESMR brightness temperatures in areas of known wind. Unfortunately a calibration problem in the Nimbus 6 ESMR prevented quantitative comparisons of brightness temperatures and wind, and the derivation of a sound empirical relationship between wind and sea-surface emissivities needed to estimate winds from satellite-measured brightness temperatures. Notwithstanding the erroneous calibration analyses of ESMR brightness temperatures maps do show definite increases in horizontally and vertically polarized brightness temperatures with wind Such increases are dramatically brought out in a Mistral occurrence over the Mediterranean Sea An error analysis on derived wind equations establishes the accuracy of wind speed determination from Nimbus 6 ESMR under various conditions

GRA

# Page intentionally left blank

Page intentionally left blank

# 09 GENERAL

A78-10353 Pending issues before the Legal Sub-Committee of the United Nations Committee on the Peaceful Uses of Outer Space K Chen (United Nations, Office of Legal Affairs, New York, N Y ) Journal of Space Law, vol 5, Spring-Fall 1977, p 29-35 13 refs.

The present article consists mainly of a summary of views expressed at the sixteenth (1977) session of the Legal Sub-Committee of the Committee on the Peaceful Uses of Outer Space, held from March 14 to April 8 this year, concerning the unresolved issues of the following priority items on its agenda (1) draft treaty relating to the moon, (2) elaboration of principles governing the use by states of artificial earth satellites for direct television broadcasting, and (3) legal implications of remote sensing of the earth from space A brief description is also given to the fourth item, i.e., 'matters relating to the definition and/or delimitation of outer space and outer space activities,' which did not have priority and was not discussed in any detail in the Sub-Committee (Author)

A78-10358 The development of international law relating to remote sensing of the earth from outer space R F Stowe (U S Department of State, Washington, D C.) Journal of Space Law, vol. 5, Spring-Fall 1977, p. 101-109 16 refs

The Legal Sub-Committee of the United Nations Committee on the Peaceful Uses of Outer Space has surveyed the legal implications of remote sensing of the earth by satellite. Among the issues considered by the committee are the right to sense, and the procedures for the dissemination of available data to interested parties. Future areas for committee work have been identified, including the recommendation of guidelines for remote sensing programs. S.C.S.

A78-12214 Remote sensing - A burgeoning science. D G Goodenough (Department of Energy, Mines and Resources, Centre for Remote Sensing, Ottawa, Canada) Engineering Journal, vol 60, Sept -Oct 1977, p 23 26 22 refs.

Remote sensing objectives and techniques are described Topics considered include data processing, platforms and sensors, and processing and analysis devices. A nighttime thermogram of a shopping center is presented as an example, a light tone indicates heat loss areas, which correspond to areas where a waterproof enclosure membrane had broken, as verified by on-site inspection. Remote sensing can facilitate environmental monitoring, winter navigation in ice-infested waters, global crop information systems, and energy exploration.

A78-12925 International Electronics Congress, 24th, Rome, Italy, March 28-30, 1977, Proceedings (Congresso Internazionale per l'Elettronica, 24th, Rome, Italy, March 28-30, 1977, Atti) Congress sponsored by the Ministero delle Poste e Telecomunicazioni Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1977 392 p. In Italian and English

Remote sensing of earth resources, pollution monitoring systems, and the sensors and instrumentation applicable to monitoring and sensing are discussed. Topics of the papers include Landsat data employed in resource inventories, ground stations for receiving and interpreting Landsat imagery, aerological assessments with acoustic or optical radar systems, sulfur dioxide pollution monitoring, agricultural applications of satellite data, microprocessors employed by data acquisition systems, measurement of the low tropospheric temperature and the atmospheric transparency, detection of water pollution with ultrasonic impulses, and the automatization of a Doppler satellite tracking station.

A78-12926 # The use of the Landsat series satellites for the monitoring and management of territory (L'utilizzazione dei satelliti della serie Landsat per il controllo e la gestione del territorio) P Castruccio (Ecosystems International, Inc., Baltimore, Md.) In International Electronics Congress, 24th, Rome, Italy, March 28-30, 1977, Proceedings Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1977, p. 15-22. In Italian

Remote sensing of earth resources conducted by the Landsat satellites is discussed, and methods of interpreting remote sensing data are compared Characteristics of the multispectral scanners and return beam vidicon apparatus employed by Landsat A and B are reviewed Applications of remote sensing data, such as the inventory of agricultural production, the creation of land and water resource maps, weather forecasting, monitoring of water pollution, and the identification of mineral deposits, are considered Automated data interpretation and visual identification of significant features are described

A78-12932 # User experience with the applications of Landsat data G Thorley (U S Geological Survey, Reston, Va) and D Hood (U S Geological Survey, Sioux Falls, D Dak) In International Electronics Congress, 24th, Rome, Italy, March 28-30, 1977, Proceedings Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1977, p 63-71

The use of Landsat data in resource assessment and management is discussed, with attention given to cost analysis of the interpretive techniques, as well as to technical problems such as inadequate resolution of the imagery or infrequent coverage of an area Projects involving forest inventories, the inspection of water impounded by dams, the detection of geologic structures corresponding to mineral, petroleum or natural gas deposits, and crop monitoring are considered Limitations of Landsat data arising from the presence of cloud cover or the deficiencies of the multispectral scanning apparatus are also mentioned

A78-12943 # Remote sensing from space and models of the management of renewable resources (Telerilevamento spaziale e modelli di gestione delle risorse rinnovabili). F Capozza (Bari, Università, Bari, Italy) in International Electronics Congress, 24th, Rome, Italy, March 28-30, 1977, Proceedings Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1977, p 247-253 in Italian

This paper contains a short introduction to space remote sensing technology, Earth Resources Satellites programs and their potential uses in renewable earth resources inventory and management. A few notes about multispectral image preprocessing and pattern recognition techniques are given. Some possible models, relevant in earth

(Author)

resources management information system are indicated

A78-13495 The European Space Agency and remote sensing by satellite. R Gibson (ESA, Paris, France) *ITC Journal*, no 3, 1977, p 467-481

Satellite remote sensing programs under development by the ESA are reviewed, with attention given to the earth resources satellite data network (Earthnet), Spacelab projects, and automatic satellite projects. Earthnet, consisting of three stations providing coverage of the Western European region (including most of Greenland and the continental shelf), will receive Landsat and Seasat data Spacelab, capable of providing synoptic coverage at infrequent intervals, may be used to procure cartographic mapping or surveys of semistatic features. Automatic satellite programs employing multispectral scanners for land surface and coastal zone applications, or synthetic aperture radar for all-weather sensing, are also considered.

A78-13667 \* # Surveying the earth's environment from space - Spectral, areal, temporal coverage trends. R G Nagler (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif ) In Satellite applications to marine technology, Conference, New Orleans, La., November 15-17, 1977, Collection of Technical

Papers New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p 157-166 Contract No NAS7-100 (AIAA 77-1585)

Attention is given to various areas of satellite applications to monitoring the earth's environment. These trends primarily concern spectral, areal, and temporal coverage. Various environmental monitors are discussed in terms of derived economic benefits. Several types of remote sensors for earth applications are described, noting spectral channels, resolution cell size, swath width, and data rate. A sample environmental monitoring system is presented which includes five geostationary satellites, and three or four low earth orbit spacecraft.

A78-14776 \* International Symposium on Remote Sensing of Environment, 11th, University of Michigan, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volumes 1 & 2 Symposium sponsored by the Environmental Research Institute of Michigan, University of Michigan, NASA, et al. Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977 Vol 1, 867 p., vol 2, 867 p. Price of two volumes, \$60

Consideration is given to remote sensor development and sensor data analysis and interpretation, and to the following fields of application of remote sensors geology and mineral resources, meteorology, agriculture, forestry and rangeland, ocean and coastal regions, and environmental quality Attention is also given to economic and institutional issues and technology transfer in the field of remote sensing, to microwave remote sensing and to the current and future role of remote sensing in operational programs

A78-14777 # The problems and opportunities W A Nierenberg (California, University, La Jolla, Calif) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p  $\,3.25\,$ 

A review is presented of remote sensing of the ocean surface, with some emphasis on the use of microwave scatterometers, Doppler sensors and satellite-borne very high resolution radiometers. Attention is given (in the 16 figures) to the effects of ocean variability on remote sensing, radar measurement of surface winds, the Skylab S-193 Scatterometer response to wind at sea, and NOAA-3 imagery off the coast of California.

A78-14778 \* # Sensing the earth's environment from space - User needs and technology opportunities R G Nagler (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 35-50 9 refs Contract No NAS7-100

Results of a number of studies involving industry, universities and government agencies working in concert to identify specific measurement and data needs in the field of satellite remote sensing are discussed. Comparisons are made with existing sensor capabilities and with the trends in the supporting technology. A series of tables is presented describing, among other things, user subcommittees using remote sensing data, atmosphere, ocean, land and cryosphere measurement needs and funded capabilities, and the capability status of such sensors as passive and active microwave sensors, visible and IR radiometers and laser sensors.

A78-14785 \* # A survey of SAR image-formation processing for earth resources applications R W Bayma (Michigan, Environmental Research Institute, Ann Arbor, Mich.), R L Jordan (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.), and B N Manning (Goodyear Aerospace Corp., Litchfield Park, Ariz.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich.

Environmental Research Institute of Michigan, 1977, p 137-159 6

Currently there is considerable interest in active microwave sensors for earth resources applications. A particular example is the Seasat-A radar. However, to obtain spatial resolutions comparable to optical sensors at radar frequencies, sophisticated image formation processing techniques must be applied to the raw data. This paper briefly compares processing requirements for non-coherent optical and coherent radar imaging systems, and then discusses the image formation processing requirements for synthetic aperture radar (SAR) systems. Both optical and digital techniques are addressed, and examples of hardware and imagery for each processing technique are presented. (Author)

A78-14790 # Operational utilization of remotely sensed data J B Jones (NOAA, National Weather Service, Silver Spring, Md) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 221-228

Ways that data from environmental satellites and other remote sensing platforms are used in some of NOAA's operational service programs are described Attention is given to the application of remote sensing data to the monitoring of hurricanes, and severe local storms and tornados and to forecast guidance, public weather and hydrology Such specialized services as space programs (effects of weather on X-band communications), marine operations, search and rescue, and wildlife management, are also considered

B J

A78-14795 # An overview of remote sensing technology transfer in Canada and the United States W M Strome (Department of Energy, Mines and Resources, Canada Centre for Remote Sensing, Ottawa, Canada) and D T Lauer (US Geological Survey, EROS Data Center, Sioux Falls, S Dak.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p 325-331 10 refs

The paper is concerned with motivation and communication problems that hinder the greater use of remote sensing technology Motivation problems result because decision makers worry about the risk of adopting a new technology, or fear that their position will be undermined. Some communications problems are due to the different training backgrounds of the designers of the technology, the field managers who would apply the technology, and their superiors who would make the purchasing decision. Programs designed to alleviate motivation and communication problems are considered.

МL

A78-14796 # The transfer of remote sensing technology in the developing nations - An observation. A. A Abiodun (Ife, University, Ile-Ife, Nigeria) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich , April 25-29, 1977, Proceedings Volume 1 Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p. 339-351 24

The paper is concerned with the utilization of remote sensing technology by the developing nations. It is suggested that there should be a shift of emphasis from centralized training to regional training programs, which would result in larger local participation and on-the-spot application of the technology to solve local problems. It is hoped that developing countries will be encouraged to develop their own technological capability rather than rely on contracts with firms from industrialized countries. Some lack of coordination and communication gaps hinder, it is thought, UN and similar training programs on the use of remote sensing. The need to avoid overselling the benefits of remote sensing programs is noted.

ΜL

A78-14823 \* # An operational, multistate, earth observation data management system L F Eastwood, Jr, T R Hays, C T Hill,

R J Ballard, R P Morgan, G G Crnkovich, J K Gohagan, and M A Schaeffer (Washington University, St Louis, Mo.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 1

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p 659-670 5 refs Contract No NAS5-20680

The purpose of this paper is to investigate a group of potential users of satellite remotely sensed data - state, local, and regional agencies involved in natural resources management. We assess this group's needs in five states and outline alternative data management systems to serve some of those needs. We conclude that an operational Earth Observation Data Management System (EODMS) will be of most use to these user agencies if it provides a full range of information services - from raw data acquisition to interpretation and dissemination of final information products. (Author)

A78-14842 # Indicators of international remote sensing activities G W Spann (METRICS, Inc., Atlanta, Ga.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2.

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p. 885-891

A survey was conducted to determine the extent of worldwide remote sensing activities, including the use of satellite and high/medium altitude aircraft data. The specific objectives of the survey, which used nine indicators, were a country-by-country evaluation of remote sensing activities for all countries known to be involved in this area, classification of each country into one of three categories according to the nature and extent of remote sensing data use, and evaluation of remote sensing activities of international organizations.

A78-14858 # Remote sensing utilization of developing countries - An appropriate technology M W Conitz (Agency for International Development, Washington, D.C.) and D.S. Lowe (Michigan, Environmental Research Institute, Ann Arbor, Mich.) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich., Environmental Research Institute of Michigan, 1977, p. 1055-1064

Applications of remote sensing to the development programs of African, Asian and South American nations are discussed. The projects, based on the use of Landsat data and sponsored by the Agency for International Development, include detection of iron ore deposits in Bolivia, identification of an economically important palm tree in the eastern Peruvian jungle, investigation of drainage patterns in Lesotho, development of crop acreage statistics for Thailand, and demographic applications in Kenya.

A78-14859 \* # A survey of users of earth resources remote sensing data G E Wukelic, J G Stephan, H E Smail, and T F. Ebbert (Battelle Columbus Laboratories, Columbus, Ohio) In International Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich, April 25-29, 1977, Proceedings Volume 2 Ann Arbor, Mich, Environmental Research Institute of Michigan, 1977, p 1067-1076 NASA-supported research

The use of Landsat imagery and digital data, Skylab data and high-altitude aerial imagery by industry, government, academic and foreign analysts was surveyed. The study indicated that while most users are satisfied with current Landsat product quality and spectral coverage, there does exist a significant demand for extension of the spectral coverage to thermal and microwave regions, for resolutions in the 20 to 40 and 10 to 20 meter range, and for more rapid data delivery. Problems involving the acceptance of digital processing techniques by some users are also mentioned.

A78-14889 # Applications of Landsat data to the integrated economic development of Mindoro, Philippines T W Wagner (Michigan, Environmental Research Institute, Ann Arbor, Mich.) and J C Fernandez (Bureau of Mines, Manila, Philippines) In Interna-

tional Symposium on Remote Sensing of Environment, 11th, Ann Arbor, Mich., April 25-29, 1977, Proceedings Volume 2

Ann Arbor, Mich , Environmental Research Institute of Michigan, 1977, p. 1375-1380

Landsat data of Mindoro Island in the Philippines was processed to provide thematic maps showing patterns of agriculture, forest cover, terrain, wetlands and water turbidity. A hybrid approach using both supervised and unsupervised classification techniques resulted in 30 different scene classes which were subsequently color-coded and mapped at a scale of 1 250,000. The images, maps, and aerial statistics are being used to provide data to seven technical departments in planning the economic development of Mindoro Multispectral aircraft imagery has been collected to complement the application of Landsat data and validate the classification results. (Author)

A78-16544 # Earth Resources Technology Satellite /ERTS/
- An assessment G C Agarwal (Survey of India, Hyderabad, India)
International Society for Photogrammetry, International Congress
for Photogrammetry, 13th, Helsinki, Finland, July 11-23, 1976,
Paper 29 p 30 refs

In view of the existing controversy concerning the potential of remote sensing, an attempt is made to appraise realistically the potential of the multispectral imaging systems used on board the ERTS satellites. The salient features of the 3-camera television system and the multispectral scanner are discussed, and their spectral bands are tabulated. The possibilities and limitations of ERTS imagery are examined for such applications as geological studies (mineral resources), soil surveys, agricultural uses, water resources, land use, and cartography.

A78-17141 The versatile satellite R W Porter Oxford and New York, Oxford University Press, 1977 181 p \$11 00

The introductory book discusses several uses of satellites in the fields of communication, meteorology, navigation, surveying, field biology, and astronomy Satellite design, history, and orbiting physics are examined, and the development of man-satellite systems is considered. The presentation includes photographs and diagrams An account of the motion of a small point mass subject to an inverse square force of attraction is offered.

A78-18189 \* Uses of the Space Shuttle in the NASA Applications Program D G McConnell (NASA, Washington, D C ) In Space research XVII, Proceedings of the Open Meetings of Working Groups on Physical Sciences, June 8-19, 1976 and Symposium on Minor Constituents and Excited Species, Philadelphia, Pa, June 9, 10, 1976 Oxford and New York, Pergamon Press, 1977, p 839-845 11 refs

Examples are given of Shuttle and Spacelab payloads proposed in the NASA Applications Program. These range from processing of materials under near-zero gravity conditions to studies of microphysical processes occurring in clouds, and from high resolution Fourier interferometers for studying trace constituents in the atmosphere to complementary groups of sensors for viewing the earth. (Author)

A78-18522 # Results and prospects of the study of natural resources by aerospace methods (Rezul'taty i perspektivy izuchemila prirodnykh resursov aerokosmicheskimi metodami) S V Zoni (Akademila Nauk SSSR, Institut Geografii, Moscow, USSR) Akademila Nauk SSSR, Izvestina, Seriia Biologicheskaia, Sept Oct 1977, p. 673-682 16 refs In Russian

The deciphering of geographic features from small- and medium-scale televised photographs and aerospace spectrograms is discussed Agricultural landscapes are examined, and different plant and soil characteristics are distinguished Reliability of categorization is considered with respect to the altitude at which the photograph was obtained Future research goals and programs are described M.L.

A78 18721 # A study of the earth by aircraft - Results obtained by radio techniques (Issledovanie zemli s letatel'nykh

apparatov - Rezul'taty, poluchennye s pomoshch'iu radiofizicheskikh metodov) N A Armand and A E Basharinov Akademiia Nauk SSSR, Vestnik, no 8, 1977, p 28-38 In Russian

A broad description of utilizing radio techniques for remote sensing applications is presented. Primary advantages of using radio waves rather than other methods are identified, including that radio waves are neither absorbed nor dispersed by clouds, and that radio waves have great penetrating eapacity. Active and passive modes of radio methods are described. Several areas in which radio methods may be used are outlined, such as for meteorology, oceanography, agriculture, geology, hydrology, monitoring ice formations, and measuring water temperature as a function of wind and wave SCS velocity

Δ78-19595 \* Spacelab - A new tool for cooperative research E R Schmerling (NASA, Washington, D.C.) In Dynamical and chemical coupling between the neutral and ionized atmosphere, Proceedings of the Advanced Study Institute, Spatind, Norway, April 12-22, 1977 Dordrecht, D. Reidel Publishing Co, 1977, p 373-379

For work in earth orbit, the European Space Agency, ESA, in cooperation with NASA, has developed a flexible laboratory system called Spacelab, which will fit into the Space Shuttle Spacelab will offer new possibilities for conducting research related to the behavior and properties of the neutral and ionized atmosphere. Up to 400 km altitude, the total payload weight will be in excess of 25,000 kg. The main advantages of Spacelab consist of high payload weight, power, the return of the instrumentation, and the availability of man for real-time operation of the equipment. Limitations are related to the local contamination, the restriction of mission duration to periods from one to four weeks, and limited altitudes and inclinations (for early missions) Spacelab is, therefore, not suited for many types of in-situ sensing, or for long-term monitoring. Attention is given to the proposed science program, passive observations, and chemical releases and active experiments

N78-10968\*# General Accounting Office, Washington, D C Procurement and Systems Acquisition Div

LANDSATS ROLE IN AN EARTH RESOURCES INFORMA-TION SYSTEM: NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. OFFICE OF SCIENCE AND TECHNOL-OGY POLICY

10 Jun 1977 47 p Sponsored in part by NASA (NASA-CR-155217, PB-269456/0, PSAD-77-58) Avail NTIS HC A03/MF A01 CSCL 05B

The need for a clear statement of government policy regarding support of an operational LANDSAT system is discussed Conclusions and recommendations are given which will allow congress and the executive branch to have a better understanding to reach a decision

N78-11448\*# National Aeronautics and Space Administration Washington, D C

INVESTIGATION OF NATURAL ENVIRONMENT BY SPACE MEANS GEOBOTANY, GEOMORPHOLOGY, SOIL SCI-ENCES, AGRICULTURAL LANDS, LANDSCAPE STUDY

S V Zonn, ed, L A Vedeshin ed and L A Grinberg, ed Sep 1977 288 p Transl into ENGLISH from 'Issled Prirodnoy sredy Kosmicheskimi, Sredstuvami Geobotan Geomorfol. Pochvoyedeniye, Selskokhozyayst-Vennyye Ugodya, Landshaftov-Moscow Acad of Soc of USSR 1976 p 1-223 Presented at Conf of Socialist Country Specialists on Remote Sensing of the Earth with Aerospace Means Moscow 8-14 Oct 1975 Translation was announced as N76-11511 Transl by Sci Transl Serv Santa Babara Calif (Contract NASw-2791)

(NASA-TM-75041) Avail NTIS HC A13/MF A01 CSCL 08F Reports given by Soviet specialists at a meeting of Socialist countries on remote sensing of the earth using aerospace methods are presented Author

N78-11450# Committee on Science and Technology (U S House)

#### **EARTH RESOURCES INFORMATION SYSTEMS**

Washington GPO 1977 93 p refs Rept for Subcomm on Space Sci and Applications of the Comm on Sci and Technol, 95th Congr., 1st Sess., Nov. 1977

(GPO-95-881) Avail Subcomm on Space Sci and Applications

A series of hearings were held on the definition and scope of an earth resources information system and on the institutional arrangements required to transform LANDSAT from an experimental to an operational system Mr Charles W Mathews, formerly the NASA Associate Administrator for the Office of Applications submitted two reports which were used by the Subcommittee as a point of departure during the hearings. The subcommittee obtained views from several Federal agencies and departments including the Office of Science and Technology Policy, the Department of Agriculture, the Department of Interior, the Army Corps of Engineers, and the National Aeronautics and Space Administration Discussions were held with State agencies and organizations with experience using LANDSAT data and with representatives from Comsat General Electric Co Earth Satellite Corp and the Geosat Committee Author

N78-12506\* # Caspan Corp , Houston, Tex INDEXING, SCREENING, CODING AND CATALOGING OF EARTH RESOURCES AIRCRAFT MISSION DATA Final Report [1977] 21 p

(Contract NAS9-15145)

(NASA-CR-151549, SB-6238(A)77C-219) NTIS HC A02/MF A01 CSCL 05B

Tasks completed are as follows (1) preparation of large Area Crop Inventory experiment for data base entry,(2) preparation of Earth Observations Aircraft Flight summary reports for publication, (3) updating of the aircraft mission index coverage map and Ames aircraft flight map, (4) preparation of earth observation helicopter flight reports for publication, (5) indexing of LANDSAT imagery, (6) formulation of phase 3 biowindows 1, 2, 3, and 4 listings by country, footprint, and acquisition dates, (7) preparation of flight summary reports, and (8) preparation of an Alaska state index coverage map Author

N78-12509# Committee on Science and Technology (U S House)

#### **EARTH RESOURCES INFORMATION SYSTEM**

Washington GPO 1977 677 p refs Hearings before Subcomm on Space Sci and Applications of the Comm on Sci and Technol, 95th Congr., 1st Sess., No. 18, 21-23 Jun. 1977 (GPO-94-462) Avail Subcomm on Spa Subcomm on Space Sci

**Applications** The possibility for establishing an Earth Resources Information System is explored Federal stimulation and subsidy of early industry investment in an operational system is cited for promoting widespread acceptance of LANDSAT

N78-13510\*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md

A COST-BENEFIT EVALUATION OF THE LANDSAT FLOW-ON GPERATIONAL SYSTEM

Mar 1977 124 p refs (NASA-TM-78052,

X-903-77-49) NTIS Avail HC A05/MF A01 CSCL 05C

Disciplines to benefit from the LANDSAT Follow-on System include agriculture, petroleum and mineral exploration, hydrologic land use, water resources management, forestry, land use planning and monitoring and soil management. The annual quantified benefits are in the range of 420 to 970 million (FY 1976 dollars) The operational system sized to achieve the quantified benefits involves a single orbiting satellite with a backup satellite in launch readiness. The ground system includes a basic processing system which feeds information to three user systems - one for agriculture, one for hydrologic land use, and a third for all other users. The resulting present worth benefit cost ratio is at least equal to four with a reasonable likelihood of exceeding nine. This benefit cost ratio is evaluated for an infinite time horizon at the discount rate of 10 percent Author

N78-13511# Lockheed Missiles and Space Co , Palo Alto, Calif INVESTIGATION OF EARTH FROM SPACE. JOINT EXPERIMENT OF USSR AND GDR SCIENTISTS ON THE SOIUZ-22 SPACECRAFT

R Z Sagdeev 1977 20 p Transl into ENGLISH from Vestn Akad Nauk SSSR (USSR), no 3, 1977 p 6-20

Avail NTIS HC A02/MF A01 National Translation Center, John Crerar Library, Chicago, Illinois 60616

Methods of remote sensing used in studying the earth were reviewed Techniques mentioned included spectrum analysis and aerial photography, with emphasis on multizonal photography Experiments and investigations performed by Soyuz spacecraft using multizonal photography were discussed Specific photographic systems were explained including their orientations and operation in regard to the spacecraft, and their expected accuracies in resolution

#### N78-13519# Swedish Space Corp., Solna QUICK-LOOK CAPABILITY IN A EUROPEAN EARTH RESOURCES SATELLITE DATA NETWORK, VOLUME 1 **Final Report**

Paris ESA 15 Apr 1977 150 p refs Prepared jointly with Stansaab Elektronik AB 2 Vol

(Contract ESA-SC/128-HQ)

(FU15-4-Vol-1, ESA-CR(P)-977-Vol-1) NTIS

HC A07/MF A01

Plans of the European Space Agency for creation of an earth resources satellite ERS data network (Earthnet) comprising both national and European facilities are described. The network will receive, process, and distribute ERS data to a widespread group of earth scientists Initially, the network will accept data from the American satellites in the LANDSAT series, Nimbus-G. HCMM, and SEASAT User requirements for quick-look data in the area covered by the network were identified, and elements required for an optimum quick-look system to meet user requirements were assessed

#### N78-13978# Centre National d'Etudes Spatiales Paris (France) FRENCH SPACE PROGRAM

1977 138 p refs in FRENCH Presented at the 20th COSPAR Plenary Meeting and Assoc Activities, Tel Aviv, 7-18 Jun 1977

Avail NTIS HC A07/MF A01

The report to COSPAR on the French space programs is presented The organization and basic activities of CNES are mentioned Separate sections deal with astronomy outside the solar system solar physics and solar system, physics of the ionosphere and magnetosphere, aeronomy, meteorology, oceanology, remote sensing geodesy and aerodynamics space biology and medicine, and materials sciences

N78-14464\*# Environmental Research Inst. of Michigan, Ann Center for Remote Sensing Information and Analysis PROCEEDINGS OF THE ELEVENTH INTERNATIONAL SYMPOSIUM ON REMOTE SENSING OF ENVIRONMENT,

1977 832 p refs Proc held at Ann Arbor, Mich 25-29 Apr 1977, sponsored by FHA NOAA Geological Survey, Dept of Agriculture, Army Res Center, TVA, Coast Guard NASA, ERDA, and EPA Original contains color illustrations

(NASA-CR-155361) Avail NTIS HC A99/MF A01 CSCL 05B

The application of modern sensor technology and associated data processing capabilities to the assessment of earth resources and environmental monitoring is described Problems associated with meeting future needs are explored

### N78-14465\*# Jet Propulsion Lab , Calif Inst of Tech , Pasadena SENSING THE EARTH'S ENVIRONMENT FROM SPACE USER NEEDS AND TECHNOLOGY OPPORTUNITIES

Robert G Nagler In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 35-50 refs

(Contract NAS7-100) Avail NTIS HC A99/MF A01 CSCL 04B

The specific measurements and data needs of users of remotely sensed environmental data were identified in a number of studies supported by NASA in cooperation with industry, universities and the operational government agencies involved The present capabilities of space and aircraft sensors, data systems, and satellite support systems were assessed and compared with the trends in the supporting technology Areas of high benefit in which there is a large gap between the efforts underway and the need are identified. The problems in narrowing these gaps are briefly discussed Author

N78-14470\* # California Univ. Santa Barbara Dept of Geography

THE IMPACT OF REMOTE SENSING ON UNITED STATES' GEOGRAPHY THE PAST IN PERSPECTIVE, PRESENT REALITIES, FUTURE POTENTIALS

John E Estes John R Jensen, and David S Simonett In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 101-121 refs

Avail NTIS HC A99/MF A01 CSCL 08F

The use of remotely sensed data by cartographers and other physical geographers is reviewed. The current status of remote sensing in the academic, governmental and private sector is assessed, as well as its capability for providing information within the context of the explanatory forms used by geographers

#### N78-14477\* Mational Weather Service, Silver Spring, Md OPERATIONAL UTILIZATION OF REMOTELY SENSED DATA

James B Jones In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 221-228

#### Avail NTIS HC A99/MF A01 CSCL 05B

The use of data from environmental satellites and other remote sensing platforms in some of NOAA's operational services are described Topics discussed include hurricanes severe local storms and tornadoes forest guidance, weather forecasting, hydrology, space program support, oceanography search and rescue, and wildlife management Applications which have become routine, and those which are in advanced field test are included. Some applications yield a clear cut economic benefit In other cases, benefits -- if any -- are obscure in yet other cases, benefits in one sector may be offset by detriments in another Illustrative examples are given Author

# N78-14478\*# Interior Dept Washington, D C REBIRTH OF REMOTE SENSING DO WE KNOW ENOUGH FOR OUR OWN GOOD?

Robert L. Herbst In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 229-235

Avail NTIS HC A99/MF A01 CSCL 05B

Obstacles or deficiencies in on-going satellites that impede operational use of data are described. Because spectral and spatial characteristics of LANDSAT D sensors are different from earlier satellites, they deter operational planning and data use and an operational program operated in parallel with experimental technology development is needed. Particular attention is given to the satellite sensor readout system, its current applications, and needs for the future ARH

N78-14479\*# Environmental Research Inst of Michigan, Ann Arbor

# GATHERING AND USING INFORMATION ON A GLOBAL

Charles W Mathews In its Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 237-241

Avail NTIS HC A99/MF A01 CSCL 05B

The importance of information gathered, integrated and analyzed over broad regions of the world is discussed. Means of acquiring information on critical areas are outlined, and the particular role that remote sensing can play is described in each case The possible implementation of a global information system and some of the current difficulties in initiation of such a system on an operational basis are explored. In this way, issues will be surfaced for consideration Topics include the importance of innovative leadership, and some actions that the government might take both in Congress and in the Executive Branch, the relationship of U.S. government activities to international interests and to industry, and the need to stimulate more private sector initiative and to transfer responsibilities from government to commercial interests.

N78-14480\*# Agency for International Development, Washington D C

# US INITIATIVES FOR REMOTE SENSING APPLICATIONS IN THE DEVELOPING WORLD

John K Wilhelm In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 243-246

### Avail NTIS HC A99/MF A01 ESCL 05B

Efforts of the Agency for International Development to stimulate interest in remote sensing and the use of operational data are described

ARH

N78-14481\*# International Astronautical Federation, Paris (France)

# THE PRESENT STATUS OF REMOTE SENSING IN THE UNITED NATIONS, 8 APRIL 1977

Eilene Galloway In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 247-256

Avail NTIS HC A99/MF A01 CSCL 05B

Problems arising from remote sensing of the earth by satellites have been the subject of indepth research and analysis by the United Nations Every aspect of this multidisciplinary subject has been explored in more than 100 reports and papers published as UN documents dealing with all the implications of remote sensing scientific technological, institutional political economic, cultural, and legal National, regional and international situations have been analyzed, and the General Assembly has passed resolutions requesting that the Committee on the Peaceful Uses of Outer Space give a high priority to remote sensing. The identification and analysis of issues has been going on for several years, the objective being international agreement on general principles to guide nations in the conduct of their remote sensing activities.

## N78-14486\*# Geological Survey Sioux Falls, S Dak AN OVERVIEW OF REMOTE SENSING TECHNOLOGY TRANSFER IN CANADA AND THE UNITED STATES

W M Strome (Canada Centre for Remote Sensing) and D T Lauer In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 325-331 refs

### Avail NTIS HC A99/MF A01 CSCL 05B

To realize the maximum potential benefits of remote sensing, the technology must be applied by personnel responsible for the management of natural resources and the environment In Canada and the United States, these managers are often in local offices and are not those responsible for the development of systems to acquire, preprocess and disseminate remotely sensed data nor those leading the research and development of techniques for analysis of the data. However, the latter organizations have recognized that the technology they develop must be transferred to the management agencies if the technology is to be useful to society. Problems of motivation and communication associated with the technology transfer process and some of the methods employed by Federal, State Provincial, and local agencies, academic institutions, and private organizations to overcome these problems are explored.

# N78-14487\*# United Nations New York TECHNICAL ASSISTANCE AND THE TRANSFER OF REMOTE SENSING TECHNOLOGY

Ralph Chipman In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol 1 1977 p 333-338

refs

Avail NTIS HC A99/MF A01 CSCL 05B

The transfer of technology from industrialized countries to the third world is a very complicated process and one that requires a great deal of research and development. The political and social obstacles to this transfer are generally greater than the technical obstacles, but technical assistance programs have neither the competence nor the inclination to deal with these factors adequately. Funding for technical assistance in remote sensing is now expanding rapidly, and there is a growing need for institutions to study and promote the effective use of this technology for economic development. The United Nations, the Food and Agriculture Organization, the World Bank, the United States Agency for International Development and the Canadian technical assistance agencies take different approaches to the problem and deal with the political pressures in different ways.

Author

N78-14488\*# Ife Univ , Ile-Ife (Nigeria) Dept of Agriculture Engineering

# THE TRANSFER OF REMOTE SENSING TECHNOLOGY IN THE DEVELOPING NATIONS AN OBSERVATION

Adigun Ade Abiodun In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 339-351 refs\

Avail NTIS HC A99/MF A01 CSCL 05B

The cooperation and assistance of industrialized nations and the United Nations and its agencies in promoting the transfer of remote sensing technology in developing nations was discussed Training programs, workshops and seminars as well as on-going globally scattered demonstration projects were evaluated and it was suggested that emphasis should shift from centralized training to scheduled regional training programs, resulting in larger local participation and on-the-spot application of the technology to solve local problems

N78-14515\*# Washington Univ, St Louis, Mo Center for Development Technology

# AN OPERATIONAL MULTISTATE, EARTH OBSERVATION DATA MANAGEMENT SYSTEM

Lester F Eastwood, Jr Christopher T Hill Robert P Morgan, John Kenneth Gohagan Timothy R Hays, Richard J Ballard, Gregory G Crnkovich, and Mark A Schaeffer In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 1 1977 p 659-670 refs

#### Avail NTIS HC A99/MF A01 CSCL 05A

State, local and regional agencies involved in natural resources management were investigated as potential users of satellite remotely sensed data. This group's needs are assessed and alternative data management systems serving some of those needs are outlined. It is concluded that an operational earth observation data management system will be of most use to these user agencies if it provides a full range of information services -- from raw data acquisition to interpretation and dissemination of final information products.

N78-14529\*# Environmental Research Inst of Michigan Ann Arbor Center for Remote Sensing Information and Analysis PROCEEDINGS OF THE ELEVENTH INTERNATIONAL SYMPOSIUM ON REMOTE SENSING OF ENVIRONMENT, VOLUME 2

1977 826 p refs Symp held at Ann Arbor, Mich., 25-29 Apr 1977 Sponsored in part by NASA, FHA NOAA, Geolog Survey Dept of Agr., Army Res Center, TVA Coast Guard, ERDA and EPA Original contains color illustrations

(NASA-CR-155362) Avail NTIS HC A99/MF A01 CSCL 05B

Application and processing of remotely sensed data are discussed Areas of application include pollution monitoring water quality, land use, marine resources ocean surface properties, and agriculture Image processing and scene analysis are described along with automated photointerpretation and classification techniques Data from infrared and multispectral band scanners onboard LANDSAT satellites are emphasized

#### N78-14535\*# Metrics Inc. Atlanta Ga INDICATORS OF INTERNATIONAL REMOTE SENSING ACTIVITIES

G William Spann In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment, Vol. 2, 1977, p. 885-891

### Avail NTIS HC A99/MF A01 CSCL 05B

The extent of worldwide remote sensing activities including the use of satellite and high/medium altitude aircraft data was studied. Data were obtained from numerous individuals and organizations with international remote sensing responsibilities indicators were selected to evaluate the nature and scope of remote sensing activities in each country. These indicators ranged from attendance at remote sensing workshops and training courses to the establishment of earth resources satellite ground stations and plans for the launch of earth resources satellites. Results indicate that this technology constitutes a rapidly increasing component of environmental, land use and natural resources investigations in many countries and most of these countries rely on the LANDSAT satellites for a major portion of their data.

N78-14552\*# Agency for International Development, Washington, D C

# REMOTE SENSING UTILIZATION OF DEVELOPING COUNTRIES. AN APPROPRIATE TECHNOLOGY

Merrill W Conitz and Donald S Lowe In ERIM Proc of the 11th Intern Symp Remote Sensing of Environment, Vol 2 1977 p 1055-1064 refs

Avail NTIS HC A99/MF A01 CSCL 05B

The activities of the Agency for international development were discussed Regional and national training centers were established to create an understanding of the role and impact of remote sensing on the developing process. Workshops, training seminars, and demonstration projects were conducted. Research on application was carried out and financial and technical assistance to build or strengthen a country's capability were granted.

# N78-14553\*# Battelle Columbus Labs , Ohio A SURVEY OF USERS OF EARTH RESOURCES REMOTE SENSING DATA

G E Wukelic, J G Stephan H E Smail, and T F Ebbert In ERIM Proc of the 11th Intern Symp on Remote Sensing of Environment Vol 2 1977 p 1067-1076 refs Sponsored by NASA

Avail NTIS HC A99/MF A01 CSCL 05B

The results of a NASA supported Battelle survey to obtain user views on the nature and value of LANDSAT data use, on current LANDSAT capabilities and on ways to improve data use were summarized Questionnaire and interview responses from over 1000 private and public sector users were analyzed and discussed

Author

N78-14612# Environmental Research Inst of Michigan, Ann Arbor Infrared and Optics Div

REMOTE SENSING A PARTIAL TECHNOLOGY Final Report, 1 Jun. 1976 - 31 May 1977

George J Zissis May 1977 790 p

(Contract NSF ERS-76-14462)

(PB-271278/4, ERIM-123600-1-F NSF/RA-770167) Avail NTIS HC A99/MF A01 CSCL 08F

A partial assessment of remote sensing technology is provided, intended to (1) define and structure the technology assessment problem (2) compile the necessary data bases, (3) identify some possible impacts as they relate to remote sensing technology, with emphasis on the visible and infrared portions of the electromagnetic spectrum, especially in satellite systems like LANDSAT, (4) develop an assessment procedure, and (5) do a few pilot analyses to test the ments of this procedure.

N78-15557# Joint Publications Research Service, Arlington, Va

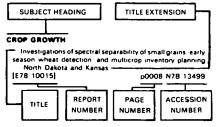
## TRANSLATIONS ON USSR RESOURCES, NO 768

23 Jan 1978 114 p refs Transl into ENGLISH from Russian journals

(JPRS-70524) Avail NTIS HC A06/MF A01

The report contains information on energy fuels, and related equipment, manpower, metallurgy and mineral fields, fishing industry and marine resources and water resources Author

## **Typical Subject Index Listing**



The subject heading is a key to the subject content of the document. The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of the document content the title extension is added separated from the title by three hyphens. The (NASA or AIAA) accession number and the page number are included in each entry to assist the user in locating the abstract in the abstract section (of this supplement) If applicable a report number is also included as an aid in identifying the document. Under any one subject heading, the accession numbers are arranged in sequence with the AIAA accession numbers appearing first

### **ABSORPTION SPECTRA**

The vertical distribution of HCI in the stratosphere p0019 A78-15890

Infrared absorption spectra attributed to ion-nucleated

water cluster p0064 N78-12518

[AD-A044661] ACCURACY

Increase in the fidelity of image during the production

of diapositives

[AD-A046226]

DO092 N78-14613

ACQUETIC SOUNDING

A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulse p0080 A78-18910

ACQUETICS

A numerical algorithm for remote sensing of ocean density

[AD-A042372]

profiles by acoustic pulses nOO50 N78-10674

ACTIVITY (BIOLOGY)

Design of a laser interferometer for measurement of extremely small biological motions. Application to crayfish p0051 N78-14381 giant axor

Data acquisition in the specification of behavior models for ecological environment and earth reso

p0072 A78-12942 ADSORBENTS

A study of gas solid reactions and air pollution detectors [AD-A046646] p0027 N78 15601

AERIAL PHOTOGRAPHY

A modern tool for land design --- serial photomapping p0071 A78 10075 Side-looking airborne radar p0071 A78-10325

Yield/reflectance relations in cabba - remote sensino p0001 A78-10521 of crops

Detection of oak wilt with color IR serial photography p0001 A78-10522

Measuring soil moisture with an airborne imaging passi p0001 A78 10523 microwave radiometer

Color serial photography in the plant sciences and related Proceedings of the Fifth Biennial Workshop Sioux Falls S Dak August 19-21 1975 p0001 A78 13060 high altitude color p0002 A78-13062 Quality control techniques for high

Tree stress detection through spectral rationing of color m records p0002 A78-13065

Spectral reflectance deduced from color-infrared photos r forest damage detection p0002 A78 13068 for forest damage detection Surface resource inver inventory rangelands utilizing high altitude color infrared serial p0002 A78-13067

Forest type mapping of the Atchafalaya River Basin from tellite and aircraft in n0002 A78-13068 Seasonal color-infrared photographs for mapping inland Geological wetlands on US 7 5-minute

p0035 A78-13069 quadrangles A perspective on the state of the art of photographic p0073 A78-14786

Remote sensing of environmental impact of land use p0018 A78-14798 Remote monitoring and Tenne ee Valley Authority p0018 A78-14800

andsat D thematic mapper simi ation using aircraft p0073 A78-14806 multispectral scanner data pe Requena Dam by p0073 A78-14807 A study of suspended solids remote sensing

On the photographic processing d digital texture for remote sensing of Kujukuri coast of Chiba

n0073 A78-14814 Estimation of old field ecosystem biomass using low p0003 A78-14828 altitude imagery
Application of aerial photography

y to water related p0056 A78-14835 Programs in Michigan
Remote sensing of aquatic plants
Po056 A78-14835
Phe application of IR- and MSS-data in the Ruhr district

Germany -- aerial photography of heat distribution p0074 A78-14838

Aerial albedos of natural vegetation in south-eastern p0075 A78-14882 A digital technique for manual extraction of data from serial photography --- for land use/land cover studies

p0075 A78-14885 Prototype active scanner for nighttime oil spill mapping nd classification p0019 A78-14898 Inventory of ricefields in France using Landsat and aircraft

p0005 A78-14900 Large scale 70mm photography for range resources analysis in the western United States p0005 A78-14902 Assessment of forest plantations from

m low altitude aerial p0005 A78-14903 photography The complex of optical-photographical transformation methods of aerial and space images used for study of natura resources p0077 A78-16501

Engineering geological interpretation of black and white flor and false color air photos p0036 A78-16503 color and false color air photos On the possibilities of using aerial photographs in the planning of the recreational use of waterways and

CONSERVATION n0058 A78-16505 A Finnish system for forest management planning using profile photographs p0006 A78-18508 aerial photographs roaches for solving forestry problems by utilizing ace methods p0006 A78-16515

space methods Mean annual volume growth from sequential volume determination on permanent aerial photographic plots --of conifer forest p0006 A78-16522

of conifer forest Optimum ratio of photo-field plots for aerial volume and aerial volume growth regression construction --- for spruce p0006 A78-16523 compensation procedure in a block of simply

overlapping photograms for the case of flat terrain p0077 A78-16526

Description of landform patterns on air photi p0020 A78-16529

Monitoring of polluted rivers by remote sensing p0020 A78-16530 Directional reflectances of terrain objects from p0078 A78-16531 B&W-senal photos Analytical aerial triangulation obtention through a p0078 A78-16533 simple algorithm

Recent crustal movements registe ered by the aid of p0030 A78-16534 airphoto interpretation Modulation transfer analysis of aerial imagery p0078 A78-16538

Digital preprocessing and classification of multispectral arth observation data p0078 A78-16542 earth observation data A system of remote sensing and m apping for developing p0030 A78-16546

A block adjustment for SLAR-image

p0079 A78 16548 A mathematical model for digital rectification of remote insing data p0079 A78 16549 sensing data

Application of aircraft multispectral scanners to quantitative analysis and mapping parameters in the James River Virginia water quality

n0080 A78 18104 A study of the earth by aircraft -Results obtained by p0107 A78 18721 radio techniques

Aerial photography and remote s nsing for soil survey p0080 A78-18749

Groundwater projects problems p0059 A78-18860 Saskatchewan and Alberta Canada hniques applied to p0060 A78-18865 Integration of remote sensing ter groundwater investigations

Models for the identification of topographic objects during p0031 A78-19243 the deciphering of aerial photographs Analysis of photogrammetric aerial camera calibrations p0082 N78-12487

Image modeling with application to measurem p0082 N78-12491

A perspective on the state of the art of photographic p0087 N78-14473 interpretation - - aerial photography Estimation of old field ecosystem p0088 N78-14520 altitude imagery Application of serial photograph

hy to water-related p0067 N78-14528 programs in Michigan Thermal imagery for census of ungulates

n0010 N78-14555

Aerial albedos of natural vegetation in South-eastern p0011 N78-14576 Australia A digital technique for manual ex

raction of data from p0091 N78-14579 aerial photography as in Egypt using p0068 N78-14582 Groundwater studies in arid ar

LANDSAT satellite images Applications of LANDSAT data to the integrated economic development of Mindoro Phillipines

p0011 N78-14583

Airborne monitoring of crop canopy temperatures for irrigation scheduling and yield prediction p0011 N78-14591

Large scale 20mm photography for range resources analysis in the Western United States -- Casa Grande Arizona Mercury Nevada and Mojave Desert

p0012 N78-14596

Assessment of forest plantations from low attitude aerial photography -- North Carolina coastal plair

p0012 N78-14597 Increase in the fidelity of image during the production

of diapositives [AD A046226] p0092 N78-14613

## AERIAL RECONNAISSANCE

Measurement of see surface by means of microwave altimeters - A computer simulation for system evaluation p0095 A78-12836

Remote sensing of chlorophyll co centration from high D0042 A78-12838

Hydrographic charting from Landsat satellite - A Aircraft versus spacecraft for remoti

monitoring of water p0021 A78-17576 quality in U.S. coastal zones Research and simulation in support of near real time/real time reconnaissance RPV systems [AD-A044598]

p0083 N78-12516 Remote infrared spectroscopy of the earth p0038 N78 14543

# AERONOMY

Spacelab - A new tool for cooperative research p0108 A78 19595

The growth of aerosol in an urban plum

p0016 A78 12971 Comment on Relative atmospheric aerosol content from ERTS observations by Yu Mekler Quenzel G Ohrana

p0017 A78 13837 and | Marcus Preliminary results from the Lidar system at the University of L Aquila --- stratospheric aerosols and nitrogen dioxide lucrescence observations p0022 A78 18476

fluorescence observations Determination of serosol content in the atmosphe ANDSAT data

[E78-10004] n0022 N78-10531

Formation of photochemical aero p0023 N78-10621

[P8-268895/0] Concept for an airborne in plinary lidar system p0023 N78-11634 aerosof measurements Inversion of solar aureole ents for determining p0085 N78-12596 aerosol characteristics

Inversion methods in temperature and aerosol remote Their commonality and differe ferences and some p0085 N78-12601 sounding Their communexplored approaches Application of modified Twomey techn iques to invert lidar angular scatter and solar extinction data for determining

p0085 N78-12602 osol size distributions inversion of solar extinction data from the Apollo-Soyuz Stratospheric (ASTP/SAM) experiment p0086 N78-12604 **AFRICA** SUBJECT INDEX

Effective aerosol optical parameters from polarimeter easurements p0086 N78-12605 Plants as indicators of photochemical oxidants in the SA p0017 A78-14199 Development of airborne electromagnetic survey instrumentation and application to the search for buried USA measurements Global sensing of gaseous and aerosol trace species using sand and gravel a summary report [P8-271331/1] influence of ground level SO2 on the diffuse to direct automated instrumentation on 747 airli p0039 N78 14622 irradiance ratio in the middle ultraviolet p0024 N78 13670 AIRBORNE SURVEILLANCE RADAR [NASA TM-73810] p0018 A78-14810 Radar detection of surface oil slicks Remote estimation of surface temperature in pollution easurement experiments p0019 A78-14992 p0021 A78-17197 The practical application of remote sensing for the measurement experiments nt and resource p0071 A78-12929 purposes of management resource assessment Airborne oceanographic lidar system Detection of a plume 400 km from the source p0053 N78-14572 p0019 A78-15370 Remote sensing utilization of developing countries - An AIRCRAFT PERFORMANCE appropriate technology p0107 A78-14858
Application of Landsat satellite imagery for iron ore The vertical distribution of HCl in the stratosphere Results obtained by p0107 A78 18721 A study of the earth by aircraft p0019 A78-15890 radio techniques ALABAMA prospecting in the western desert of Egypt Quantitative remote measurements of pollutants from stationary sources using Raman lidar p0020 A78-17000 DO035 A78-14887 Remote monitoring and Tennessee Valley Authority Groundwater studies in arid areas in Egypt using Landsat tellite images p0057 A78-14888 p0018 A78-14800 Design and operation of an airborne air quality easurement system p0021 A78-17575 Tennessee-Tombigbee industrial siting project. A study measurement system Localization of an experimental ecological unit in the of physical and environmental factors of potential industrial Remote sensing of pollutant plumes from Landsat Maradi region of Nigeria [NASA-TM-75085] - Mississippi Columbus Air Force Base and Lowndes p0021 A78-18240 nOO32 N78 12553 Clay Monroe Itawamba and Tishomingo Counties Measurement of atmospheric composition at the AGRICULTURE [E78-10035] p0024 N78-13507 oring station p0021 A78-18270 Australian baseline atmospheric mo Progress and needs in agricultural research, development Remote monitoring and Tennessee Valley Authority and applications programs - - of remote sensing p0002 A78 14791 n0066 N78 14492 The fate of nitrogen oxides in the atm [P8-267784/7] tmosphere p0023 N78-10619 Computer processing of SAR L-band imagery -- Synthetic Aperture Radar for ice mapping Evaluation of spectral channels and wavelength regions A quality assurance program for monitoring ozone and for separability of agricultural cover type p0004 A78 14860 carbon monoxide p0055 A78-10524 [PB-271204/0] p0024 N78-13636 Reindeer range inventory in western Alaska from computer aided digital classification of Landsat data Computer aided classification for remote sensing in p0024 N78-14489 agriculture and forestry in Northern Italy Remote sensing of air pollutants p0004 A78-14879 A PbSe diode laser spectrometer to be used in air pollution p0003 A78-14824 ERTS B imagery to monitor large scale clearing and monitoring and mineral prospecting [CTH-IEM-TR-7636] Use of Landsat imagery in studies of spring icings and p0101 N78 14699 development programmes in the Daly Basin northern seasonally flooded karst in permafrost area p0061 A78-18872 Air pollutant monitor network design using mathematical [E78-10002] p0081 N78-10530 p0027 N78-15593 Indexing screening coding and cataloging of earth mming Investigations using data from LANDSAT 2
[E78-10026] p0083 resources aircraft mission data A study of gas solid reactions and air pollution p0083 N78-12502 [NASA-CR-151549] p0108 N78-12508 detectors [AD-A046646] Microwave remote sensing of hydrologic parameters p0065 N78-14468 n0027 N78 15601 AIR QUALITY Reindeer range inventory in western Alaska from ing of air pollutants p0017 A78 14797 Remote sens Procedure B A multisegment training selection and proportion estimation procedure for processing LANDSAT computer-aided digital classification of LANDSAT data Design and operation of an airborne air quality measurement system p0021 A78-17575 p0009 N78-14516 Recent vertical crustal movements from geodetic measurements. Alaska and the eastern United States pricultural data Monitoring air quality from satellites 78-10039] p0008 N78-14456 Signature extension preprocessing for LANDSAT MSS [E78-10039] p0021 A78-18300 p0033 N78-15622 Measurement and the law Monitoring for compliance ALBEDO with the Clean Air Amendments of 1970 [E78-10040] DO087 N78 14457 p0022 A78 18456 Monitoring surface albedo change with Landsat Agricultural scene understanding [E78-10043] p0029 A78-13766 Energy resource development The monitoring p0008 N78-14459 Aerial albedos of natural vegetation in south-eastern components

A quality assurance program for monitoring ozone and Progress and needs in agricultural research, development Australia p0075 A78-14882 p0009 N78-14482 nd applications programs p0009 N78-14482
Classification of LANDSAT agricultural data based upon Aerial albedos of natural vegetation on in South-eastern p0011 N78-14576 carbon monoxide [PB-271204/0] p0024 N78-13636 Australia p0010 N78-14539 color trends ALGAE AIR SAMPLING Evaluation of spectral channels and wavelength regions A multispectral analysis of algal bloom in the Gulf of Atmospheric particulate properties inferred from lidar and for separability of agricultural cover types Mexico solar radiometer observations compared with simultaneous AIAA 77-1565] p0010 N78-14554 Computer-aided classification for remote sensing in p0044 A78-13657 in situ aircraft measurements - A case study p0016 A78-13616 **ALGORITHMS** Evaluation of algorithms for geological thermal-inertia apping p0029 A78-14868 agriculture and forestry in Northern Italy Evaluation of a hydrogen p0011 N78-14573 p0017 A78 13843 mapping
Blob - An unsupervised clustering approach to spatial p0075 A78 14883 LANDSAT data from agricultural sites Crop signature Design and operation p0021 A70---measurement system p0021 A70---Use of radio-controlled miniature aircraft for manne p0049 A78 20485 Design and operation of an p0021 A78-17575 p0012 N78-14593 analysis - - Kansas preprocessing of MSS imagery Analytical aerial triangulation - its obtention through a Pilot study of the potential contributions of LANDSAT ata in the construction of area sampling frames mple algorithm p0078 A78-16533 Experience with the per-point classification algorithms p0012 N78-15536 [E78-10037] WATER INTERACTIONS for the mapping of estuarine areas from Landsat Application of remote sensing technology in South Dakota Satellite observations of mesoscale eddy dynamics in the eastern tropical Pacific Ocean p0041 A78-10027 An overview of oceanic features and air-sea interaction p0058 A78 18243 to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulse cell selection criteria for spatial data processes as viewed from the NOAA operational p0080 A78-18910 p0013 N78-15542 [AIAA 77-1569] A numerical algorithm for remote sensing of ocean density DO044 A78-13660 AGROMETE OROLOGY On the hysteresis of the sea surface and its applicability to wave height predictions
[AIAA 77-1588] p0045 A78-13669 profiles by acoustic pulses [AD-A042372] Results of a remote sensing study of the effects of ha p0050 N78 10674 p0001 A78-12878 on vegetation Resampling study [E78-10014] Remote sensing for the medium-scale assessment of p0082 N78-12495 ground-level thermal and hydrologic variations - An application to the local prediction of storms by use of the Project Tellus system p0055 A78-12930 Atmospheric transformation of solar radiation reflected om the ocean p0047 A78 13803 Evaluation of signature extension algorithms - Kansas from the ocean ind North Dakota Spectral structure of the solar radiation field reflects DO083 N78-12498 [E78 10021] p0049 A78-20055 Wheat productivity estimates using LANDSAT data [E78-10009] p0007 N78-10534 by the ocean-atmosphere system The vector classifier p0033 N78-14503 AIRBORNE EQUIPMENT Evaluation of algorithms for geological thermal-inertia Atmospheric particulate properties inferred from lidar and AIR POLLUTION n0039 N78-14562 solar radiometer observations compared with simultaneous Performance tests of signature extension algorithms p0091 N78-14598 The determination of volatile organic compounds in city in situ aircraft measurements - A case study air by gas chromatography combined with standard addition selective subtraction infrared spectrometry and mass spectrometry p0015 A78-10041 n0016 A78-13616 Atmospheric transformation of solar radiation reflected om the ocean p0047 A78-13803 ALL SKY PHOTOGRAPHY Pulsating aurora - Local and global morphology p0035 A78-13082 Instrumental sensing of stationary source emissions --Airborne Oceanographic Lidar System sulphur dioxide remote sensing for coal-burning power p0048 A78-14878 p0015 A78-10056 Use of an inertial navigation system for accurate track Investigations using data from LANDSAT-2 Tropospheric photochemical and photophysical processes recovery and coastal oceanographic measu [E78-10026] p0083 N78 12502 -- timable laser application to air pollution monitoring p0096 A78 14892 ALPS MOUNTAINS (EUROPE)
Computer-aided classification for remote sensing in n0015 A78-11809 Prototype active scanner for nighttime oil spill mapping id classification p0019 A78-14896 and classification A mask correlation remote sensor for measurements of agriculture and forestry in Northern Italy SO2 optical depths on long light source Airborne monitoring of crop canopy temperatures for p0004 A78 14879 irrigation scheduling and yield prediction p0016 A78-12938 distances Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of p0004 A78 14897 The growth of aerosol in an urban plume An advanced computer calculation of ground clutter in aurborne pulse Doppler radar p0097 A78-15662 p0016 A78-12971 linears in the Friuli earthquake area p0075 A78-14886 an airborne pulse Doppler radar The arrangement of atmospheric pollution detectors by ALTIMETERS Characteristics of sea clutter measured from E-3A high means of a minicomputer and a multicomponent chemical Space instrume [AIAA 77-1612] ents for oceanography p0097 A78-15664 p0016 A78-12975 , p0046 A78 13679 A block adjustment for SLAR-image Remote optical sensing of the concentration and mass Improved ground truth geoid for the GEOS-3 calibration p0079 A78-16548

Design and operation of an airborne air quality easurement system p0021 A78-17575

Spectral structure of the solar radiation field reflected the ocean-atmosphere system p0049 A78-20055

techniques p0061 N78-10630

plinary lidar system p0023 N78-11634

measurement system

by the ocean-atmosphere system Thermal remote sensing calibration [PB 269471/9]

Concept for an airborne multidis-aerosol measurements

[NASA-CR-141431]

[NASA-CR-141432]

and Coral seas [NASA-TM-78032]

p0032 N78 12510

o0083 N78 12511

p0053 N78-15550

SEAHT A computer program for the use of intersecting res of altimeter data for sea surface height refinement

The analysis of GEOS-3 altimeter data in the Tasman

**A-2** 

flow of particulate and gaseous pollutants in smoke plumes

The remote sensing of atmospheric pollutants by a CO2

Atmospheric particulate properties inferred from lidar and

solar radiometer observations compared with simultaneous

in situ aircraft measurements - A case study

discharged through chimneys

laser apparatus

p0016 A78-12981

p0016 A78-13616

Asteroid surface materials Mineralogical characterizations from reflectance spectra [NASA-CR-154510] p0036 N78-10992

ATCHAFALAYA RIVER BASIN (LA)
Forest type mapping of the Atchafalaya River Basin from satellite and aircraft imagery p0002 A78 13068

ANALOG DATA

ATMOSPHERIC PHYSICS

Use of thermal-infrared imagery in ground-water	On the hysteresis of the sea surface and its applicability	Atmospheric physics as a means of environmental
investigations in Montana p0067 N78-14563	to wave height predictions	research
ANALOG TO DIGITAL CONVERTERS  Use of thermal-infrared imagery in ground-water	[AIAA 77-1588] p0045 A78 13669 Atmospheric transformation of solar radiation reflected	[DLR-IB-553-75/7] p0027 N78-14732 ATMOSPHERIC RADIATION
investigations in Montana p0067 N78-14563	from the ocean p0047 A78-13803	Estimating clear radiances - A report and a new decision
ANISOTROPIC MEDIA	Study of the Brazil and Falkland currents using THIR	rule IR measurement in lower atmosphere
A model for microwave intensity propagation in an	images of Nimbus V and oceanographic data in 1972 to 1973 p0047 A78-14840	p0097 A78-14971
inhomogeneous medium p0096 A78-13971	Remote sensing of ocean color and detection of	ATMOSPHERIC SCATTERING
ANISOTROPY Anisotropic reflection properties of vegetated surfaces	chlorophyll content p0048 A78-14855	Remote sensing using tunable lasers p0015 A78-11811
p0001 A78-12904	Multispectral analysis of ocean dumped materials p0019 A78-14913	Hybrid methods are helpful p0084 N78-12587
Radar backscattering from a sea having an anisotropic	A multispectral analysis of the interface between the	Review of radiative transfer methods in scattering
large-scale surface part 2	Brazil and Falkland currents from Skylab	atmospheres p0084 N78 12588
[NASA-CR 145278] p0054 N78-15663 ANNUAL VARIATIONS	p0049 A78-18246	Some aspects of the inversion problem in remote sensing p0084 N78-12589
Stationary waves in the Southern Hemisphere	Multispectral analysis of ocean dumped materials p0028 N78-14607	inverse solution of the pseudoscalar transfer equation
mid-latitude zone revealed from average brightness charts	NASA/Cousteau ocean bathymetry experiment. Remote	through nonlinear matrix inversion p0084 N78 12592
p0071 A78-10543	bathymetry using high gain LANDSAT data	Inversion of solar aureole measurements for determining
Some aspects of the mixed layer of the upper ocean [AIAA 77-1590] p0045 A78-13670	[NASA-CR 156658] p0054 N78-15662 ATMOSPHERIC ATTENUATION	aerosol characteristics p0085 N78-12596
Multi-seasonal data analysis and some extensions for	Use of clear lakes as standard reflectors for atmospheric	Application of modified Twomey techniques to invertildar angular scatter and solar extinction data for determining
environmental monitoring p0003 A78-14812	measurements p0074 A78-14830	aerosol size distributions p0085 N78-12602
Multi-seasonal data analysis and some extensions for	A modular radiative transfer program for gas filter correlation radiometry	Experience with the inversion of Nimbus 4 BUV
environmental monitoring p0025 N78-14504	[NASA-CR 2895] p0022 N78 10528	measurements to retrieve the ozone profile
ANDMALIES  A method of inversion of satellite magnetic anomaly	Use of clear lake as standard reflectors for atmospheric	p0086 N78-12606
data	measurement p0088 N78 14522	ATMOSPHERIC STRATIFICATION Hybrid methods are helpful p0084 N78 12587
[NASA-TM-78039] p0032 N78-11452	ATMOSPHERIC BOUNDARY LAYER  Observation of the development of individual clear air	ATMOSPHERIC TEMPERATURE
ANTARCTIC REGIONS	convective cells p0020 A78-17061	Atmospheric sounding with passive microwaves Review
Soviet studies of the Arctic and Southern Oceans in the current stage p0049 A78-19850	ATMOSPHERIC CHEMISTRY	and prognosis p0018 A78-14802
current stage p0049 A78-19850 Glaciological and marine biological studies at perimeter	Photochemical reactions among formaldehyde chlorine	Capabilities of operational infrared sounding systems from satellite altitude p0096 A78-14873
of Dronning Maud Land Antarctica	and nitrogen dioxide in air p0017 A78-14174  Ozone sounding correction procedures and their	satellite altitude p0096 A78-14873 Application of statistical inversion to ground-based
[E78-10006] p0049 N78-10532	implications p0017 A78-14448	microwave remote sensing of temperature and water vapor
ANTENNA DESIGN	Measurement of atmospheric composition at the	profiles p0085 N78-12600
An entree for large space antennas p0097 A78 18699	Australian baseline atmospheric monitoring station p0021 A78-18270	inversion methods in temperature and aerosol remote
Four metre antenna system for Landsat and NOAA reception p0081 A78 20168	ATMOSPHERIC CIRCULATION	sounding Their commonality and differences and some
ANTICYCLONES	The summertime stratus over the offshore waters of	unexplored approaches p0085 N78-12601
Satellite observations of mesoscale eddy dynamics in	California p0043 A78-13108	Temperature sensing The direct road to information p0086 N78-12607
the eastern tropical Pacific Ocean p0041 A78 10027	The operational processing of wind estimates from cloud motions Past present and future p0091 N78-14804	A multichannel passive microwave atmospheric
APPLICATIONS OF MATHEMATICS Inversion Methods in Atmospheric Remote Sounding	ATMOSPHERIC COMPOSITION	temperature sounding system p0101 N78-14568
[NASA-CP 004] p0084 N78 12588	Photochemistry in the stratosphere p0015 A78-11810	Data processing for the DMSP microwave radiometer
AQUIFERS	Comparability of CO2 measurements of atmosphere	system p0101 N78-14605
Relationship of tectonic structure to aquifer mechanics	between standards and sample p0015 A78-12405 Comment on Relative atmospheric aerosol content from	ATMOSPHERIC TURBULENCE Waves and turbulence in the vicinity of a chinook arch
in the western Grand Canyon District Arizona [PB-272308/8] p0068 N78-14624	ERTS observations by Yu Mekler H Quenzel G Ohring	cloud p0076 A78-15455
ARCTIC OCEAN	and I Marcus p0017 A78 13837	ATS 6
Soviet studies of the Arctic and Southern Oceans in the	Tunable dual-line CO2 laser for atmospheric spectroscopy	Significant initial results from the environmental
current stage p0049 A78-19850	and pollution monitoring p0017 A78 14082 Measurement of atmospheric ozone by satellite	measurements experiment on ATS-6 [NASA-TP-1101] p0102 N78-15142
ARCTIC REGIONS OCS environmental research technology in ice-covered	p0097 A78-15013	The 20 and 30 GHz attenuation measurements using
water p0043 A78-12845	Benefit assessment of ozone monitoring satellites	the ATS-6 satellite p0093 N78-15340
Real time satellite imagery for sea ice forecasting	p0021 A78-17574  Measurement of atmospheric composition at the	AURORAL ARCS
[AIAA 77-1601] p0046 A78-13675 Analysis of Landsat-1 data for mapping of surficial	Australian baseline atmospheric monitoring station	Pulsating aurora - Local and global morphology
deposits - Test area in Alta commune Finnmark county	p0021 A78 18270	p0035 A78-13082
Norway p0036 A78-16553	Determination of aerosol content in the atmosphere from	Characteristics of polar cap sun-aligned arcs p0095 A78 13083
Hydrometry under Arctic conditions	LANDSAT data [E78-10004] p0022 N78-10531	AURORAL SPECTROSCOPY
p0062 N78-11475 Microwave remote sensing of hydrologic parameters	Inversion Methods in Atmospheric Remote Sounding	Rocketborne measurement of an infrared enhancement
p0065 N78-14468	[NASA CP-004] p0084 N78-12586	associated with a bright auroral breakup
ARGENTINA	Statistical principles of inversion theory p0084 N78-12591	[AD-A046474] p0102 N78-15632 AURORAL ZONES
A multispectral analysis of the interface between the	Comparison of linear inversion methods by examination	Dependence of substorm occurrence probability on the
Brazil and Falkland currents from Skylab	of the duality between iterative and inverse matrix	interplanetary magnetic field and on the size of the auroral
ARID LANDS	methods p0085 N78-12598	oval p0080 A78-18730
Groundwater studies in arid areas in Egypt using Landsat	The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements	AURORAS
satellite images p0057 A78-14888 Groundwater studies in and areas in Egypt using	p0086 N78-12603	Pulsating aurora - Local and global morphology p0035 A78-13082
LANDSAT satellite images p0088 N78 14582	Effective aerosol optical parameters from polarimeter	On the role of magnetic mirroring in the auroral
ARIZONA	measurements p0086 N78-12605 ATMOSPHERIC EFFECTS	phenomena p0098 A78-20164
A comparative study of the amount and types of geologic information received from visually interpreted U-2 and	Directional reflectances of terrain objects from	lonospheric irregularities Optical support of HAES
Landsat imagery p0035 A78-13492	B&W-aerial photos p0078 A78 16531	scintillation experiments [AD-A043666] p0082 N78-11561
Large scale 20mm photography for range resources	Atmospheric physics as a means of environmental	AUSTRALIA
analysis in the Western United States - Casa Grande	research [DLR-IB-553-75/7] p0027 N78-14732	Aerial albedos of natural vegetation in south-eastern
Arizona Mercury Nevada and Mojave Desert p0012 N78-14596	ATMOSPHERIC IONIZATION	Australia p0075 A78-14882 The use of Landsat imagery for terrain analysis
Relationship of tectonic structure to aquifer mechanics	Vertical lifting of ionization during geomagnetic storms	p0080 A78-18244
in the western Grand Canyon District Arizona	from satellite measurements of ion composition	Measurement of atmospheric composition at the
[PB-272308/8] p0068 N78-14624	p0079 A78 16730	Australian baseline atmospheric monitoring station
ARKANSAS  Trichlorofluoromethane a new hydrologic tool for tracing	ATMOSPHERIC MODELS  Analysis of some models of atmospheric optical properties	p0021 A78-18270 ERTS 8 imagery to monitor large scale clearing and
and dating ground water p0069 N78-15531	according to space photo surveys p0020 A78 16539	development programmes in the Daly Basin northern
ARTIFICIAL SATELLITES	On the role of magnetic mirroring in the auroral	terntory
The versatile satellite Book p0107 A78-17141	phenomena p0098 A78-20164	[E78 10002] p0081 N78 10530
NOAA satellite monitoring of snow cover in the northern	Review of radiative transfer methods in scattering	Water utilization evapotranspiration and soil moisture monitoring in the south east region of south Australia
hemisphere during the winter of 1977	atmospheres p0084 N78-12588 ATMOSPHERIC MOISTURE	[E78-10001] p0062 N78-11447
[IAF PAPER 77 121] p0057 A78-15935	Analysis of the marine environment in DMSP imagery	Aerial albedos of natural vegetation in South-eastern
ASSEMBLY LANGUAGE CAM-Cartographic Automatic Mapping program	focusing on island barrier effects	Australia p0011 N78-14576 The analysis of GEOS 3 altimeter data in the Tasman
CAM-Cartographic Automatic Mapping program documentation 5th edition	[AIAA 77-1596] p0045 A78-13671	and Coral seas
[PB-270304/9] p0032 N78 11498	Application of statistical inversion to ground-based	[NASA-TM-78032] p0053 N78 15550
ASTEROIDS	microwave remote sensing of temperature and water vapor profiles p0085 N78-12600	AUTOMATIC PICTURE TRANSMISSION
Asteroid surface materials Mineralogical characterizations from reflectance spectra	ATMOSPHERIC OPTICS	HRPT ground station High Resolution Picture Transmission from NOAA satellites p0081 A78-20171
[NASA-CR-154510] p0036 N78-10992	One parameter characterization of the ocean's inherent	AXONS pool Non NOAA Satellites pool A76-20171

One parameter characterization of the ocean's inherent optical properties for remote sensing p0041 A78-10161

Analysis of some models of atmospheric optical properties according to space photo surveys p0020 A78-16539

ATLANTIC OCEAN

Design of a laser interferometer for measurement of extremely small biological motions Application to crayfish giant axon p0051 N78-14381

R

**BACKSCATTERING** 

Experiments on the radar backscatter of snow

p0055 A78-10386 Remote sensing using tunable lasers

n0015 A78-11811

p0031 A78 18183

A model for sea backscatter intermittency at extreme azing angles p0043 A78 13312 grazing angles Determination of scattering functions and their effects

on remote sensing of turbidity in natural waters [NASA-CR-145239] p0094 N p0094 N78 15551 Radar backscattering from a sea having an anisotropic

large-scale surface part 2 [NASA-CR-145278] p0054 N78-15663

BALLOON-BORNE INSTRUMENTS

Comparison of various methods is of determining p0095 A78-13218 solar-proton spectra Far-infrared photometry with an 0 4-meter liquid helium cooled balloon-borne telescope [NASA-CR-155234] o0099 N78-11449

The use of balloons for geodetic research

BALTIC SEA

Mass appearance of marine blue algae in the Baltic Sea p0022 A78-18508 detected in satellite images **BANGLADESH** 

utilization and ecological Sylhet-Mymensingh Haor region of Bangladesh - An analysis of Landest data Landsat date p0019 A78-14871 Investigations using data from LANDSAT 2

[E78-10026] p0083 N78-12502 Land utilization and ecological aspects in the Sylhet-Mymensingh Haor Region of Bangladesh An nalysis of LANDSAT data p0028 N78-14565

Investigations of spectral separability of small grains early season wheat detection and multicrop inventory planning --- North Dakota and Kansas

[F78-10015] ' p0008 N78-13499

BARRIERS (LANDFORMS) Analysis of the marine environment in DMSP imagery focusing on island barrier effects
[AIAA 77-1596] p0045 A78-13671

BÁSALT

Rare earth and trace element geochemistry of al ophiolite California metabasalts from the Point Sal ophiolite

**BATHYMETERS** 

p0036 A78-20097 Airborne Oceanographic Lidar System

p0048 A78-14878 NASA/Cousteau ocean bathymetry experiment Remote

bathymetry using high gain LANDSAT data [NASA-CR-156658] nOOS p0054 N78-15662

BAYS (TOPOGRAPHIC FEATURES)

Computer-aided analysis of LANDSAT data for surveying Texas coastal zone environments --- Pass Cavallo and Port

[E78-10018] p0082 N78-12497 BEACHES

Basic remote sensing investigation for beach

[AD-A044836] p0083 N78-12515 BEAUFORT SEA (NORTH AMERICA)

Computer processing of SAR L-band imagery --Synthetic Aperture Radar for ice mapping DO055 A78-10524

BEDROCK

Investigation of LANDSAT imagery on correlations between ore deposits and major shield structures in Finland [E78-10012] p0036 N78-10537

BERING SEA

Monitoring open water and sea ice in the Bering Strait p0041 A78-10388 by radar

BLACK AND WHITE PHOTOGRAPHY

Engineering geological interpretation of black and white color and false color air photos p0036 A78-16503 p0036 A78-16503 Directional reflectances of rain objects from p0078 A78-16531 **B&W-aerial photos** Photo interpretative procedures in assessing river n0080 A78-18271 recreation potential

BLACK HILLS (SD-WY)

Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes mprove agricultural censusing map Aspen and quantify ction criteria for spatial data

p0013 N78-15542 [E78-10053]

BLUE GREEN ALGAE

Mass appearance of marine blue algae in the Baltic Sea detected in satellite images p0022 A78-18508

Study of the Brazil and Falkland currents using THIR of Nimbus V and oceanographic data in 1972 to p0047 A78-14840

Telemetering river level from a large remote p0063 N78-11476 area Study of the Brazil and Falkland currents using their

mages of Nimbus 5 and oceanographic data in 1972 p0052 N78-14533 Application of remote sensing to geothermal anomaly mapping in the Caldas Novas County Goias

p0039 N78-14610 [INPE-1129-TPT/070]

Boundary detection in images Optical formulation in terms of signal detection theory --- photointerpretation of allite imagery

[INPE-1118-TPT-067] p0092 N78-14894

BRIGHTNESS

the Southern Hemisphere ın mid-latitude zone revealed from average brightness charts p0071 A78-10543

**BRIGHTNESS TEMPERATURE** 

Remote estimation of surface temperature p0019 A78-14992 measurement experiments Microwave emission from sea ice

[REPT-S-90] p0050 N78-11292 Computation of theoretical brightness temperatures corresponding to the Cape Cod Canal radiometer

measurements p0100 N78-13716 [NASA-CR-145277]

BUOYS

Satellite application to data buoy requirements
[AIAA 77-1580] p0044 A7 p0044 A78-13664

C

CALCULATORS

Updated system for calculations of coordinates for locating points on computer GEO 2 DO033 N78-13514 [AD A045434]

CAUBRATING

How to minimize the baseline drift in a COSPEC remote sensor - - correlation spectrometer for pollution detection p0096 A78-13435

Analysis of photogrammetric aerial camera calibrations p0082 N78-12487 Improved ground truth geoid for the GEOS-3 calibration

[NASA CR-141431] p0032 N78-12510

CALIFORNIA he summertime stratus over the offshore water

California DO043 A78 13108 The microstructure of California coastal fog and stratus p0072 A78-14314

remote sensing of p0106 A78-14777 The problems and opportunities ocean surface Remote sensing-aided systems for snow quantification vapotranspiration estimation and their application p0056 A78-14834 hydrologic models

Radar detection of surface oil slicks Satellite observations of snowcover in the Sierra Nevadas during the great California drought p0059 A78-18250

Rare earth and trace element geochemis metabasalts from the Point Sal ophiolite California geochemistry of p0036 A78-20097 Determination of serosol content in the atmosphere from

ANDSAT LANDSAT data [E78-10004] p0022 N78-10531

Field infrared method to discriminate natural seeps from non-seeps. Santa Barbara. California area. p0023 N78-10608 [AD-A042861]

ampling study [E78-10014] DO082 N78-12495

The magnetic field and magnetic field gradients of the NUC oceanographic research tower [AD-A045161] o0051 N78-13289

D-A045101]
Utilization of remote sensing observations in hydrologic pools N78-14469 models ulation using aircraft p0088 N78-14498 LANDSAT-D thematic mapper sim

multispectral scanner data Automated image processing of LANDSAT 2 digital data for watershed runoff prediction p0068 N78-14508 p0066 N78-14508 Large scale 20mm photography for range resources analysis in the Western United States --- Casa Grande Anzona Mercury Nevada and Mojave Desert

p0012 N78-14596

CAMERAS

Analysis of photogrammetric aerial camera calibrations p0082 N78-12487

CANADA

ow mapping from Landsat digital data

p0055 A78-12933 An overview of remote sensing chnology transfer in p0106 A78-14795 Canada and the United States Remote sensing in operational range management programs in Western Canada p0019 A78-14862 An application of Landsat digital technology to forest pull type mapping p0004 A78-14863 fire fuel type mapping Convective cloud plumes mark Can dian fire sites p0005 A78-15308

Aerial triangulation with Skylab photograph p0078 A78-16541

The use of satellite photography in the National Topographic Mapping Program of Canada

p0030 A78 16552 Monitoring air quality from satellites

p0021 A78-18300 Groundwater projects problems Saskatchewan and Alberta Canada and parameters in p0059 A78-18860 Four metre antenna system for Landsat and NOAA popular pools 1 A78-20168

Systems approach to ice reconnaissance - A stud p0049 A78-20169 Resolution Picture

HRPT ground station --- High Transmission from NOAA satellites p0081 A78-20171

Application of electronic distance measuring devices to measurement of discharge and sediment depo p0062 N78-11467

Data retransmission by satellite for operational purposes
Canadian water management p0063 N78-11490 An overview of remote sensing technology transfer p0110 N78-14486 Canada and the United States inada and the United States
Thermal imagery for census of ungulates
p0010 N78-14555

Remote sensing in operational range management p0026 N78 14556 programs in Western Canada

Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt

CANALS

n0101 N78 14599 CANONICAL FORMS

The use of canonical correlation analysis for measuring urban environmental health quality p0027 N78 15592

CARBON DIOXIDE CONCENTRATION
Comparability of CO2 measurements
between standards and sample pC -- of atmosphere p0015 A78-12405 CARBON DIOXIDE LASERS

The remote sensing of atmospheric nollutants by a CO2 p0016 A78-12982 laser apparatus Tunable dual-line CO2 laser for atmopheric spectrosco p0017 A78-14082

and pollution monitoring CARBON MONOXIDE Unique ambient carbon monoxide monitor based on gas filter correlation Performance and application

n0020 A78-16771 A quality assurance program for monitoring ozone and

carbon monoxide [PB-271204/0] CATASTROPHE THEORY p0024 N78-13636

Oceanic morphogenesis --- catastrophe theory approach for current patterns using Landsat data

p0042 A78-12837

CENTIMETER WAVES Simulation of attenuation by rainfall at a wavelength of 5 cm p0058 A78-17019

CEYLON

Digital processing system for developing countries --- for Landsat computer compatible tape data p0075 A78-14865

CHANNELS (DATA TRANSMISSION)

Evaluation of spectral channels and wavelength regions for separability of agricultural cover types

DO010 N78-14554

CHEMICALS

Detection identification and quantification p0026 N78-14608 for spills of hazardous chemicals CHESAPEAKE BAY (US)

Resampling study [E78-10014] p0082 N78-12495

Photochemical reactions among formaldehyde chlorine

and nitrogen dioxide in air CHLORINE COMPOUNDS D0017 A78-14174 Trichlorofluoromethane a new hydrologic tool for traci

d dating ground water p0069 N78 15531 CHLOROPHYLLS

Remote sensing of chlorophyll concentration from hig altitude p0042 A78-12838 Remote sensing of ocean color and detection of p0048 A78-14855 chlorophyll content Remote sensing of ocean color and detection p0052 N78-14549 chlorophyll content

CITIES Determination of aerosol content in the atmosphere from LANDSAT date

[E78-10004] p0022 N78-10531

CLASSIFICATIONS

Necessity to adapt land use and land cover classification systems to readily accept radar data p0018 A78-14852 Objective analysis and classification of oceanographic p0048 A78-17982

Test of spectral/spatial classifier [E78-10044] DO087 N78-14460 Classification of LANDSAT agricultural data be DO010 N78-14539 color trends

Necessity to adapt land use and land cover classification systems to readily accept radar data p0025 N78-14546 The influence of multispectral scanner spatial resolution p0011 N78-14574 on forest feature classification

Prototype active scanner for nighttime oil spill mapping p0026 N78-14590 and classification Interim hierarchical regional classification scheme for coastal ecosystems of the United States and its territories [PB-272691/7] p0027 N78-15553 [PB-272691/7]

CLASSIFIERS p0033 N78-14503 The vector classifier CLAYS

Investigations using data from LANDSAT-2

p0083 N78-12502 [E78-10026]

CLEAR AIR TURBULENCE

Observation of the development of individual clear a o0020 A78-17061 convective cells CLIMATOLOGY

Cold climate mapping using satellite high resolution ermal imagery -- weather forecasting improvement p0076 A78-14978 thermal imagery -

CLOUD COVER Cloud properties from satellite infrared and visible measurements p0097 A78-14973 SUBJECT INDEX CONFERENCES

COMPOSITION (PROPERTY)

LANDSAT/coastal processes

Monitoring air quality from satellites

p0021 A78-18300 [E78-10011] p0061 N78 10536 Asteroid Mineralogical surface materials Evaluation of an infrared line aracterizations from reflectance spectra Application of HCMM satellite data to mineral exploration ner for the study of p0036 N78-10992 oastal water circi Yannoton Nevada lation [NASA-CR-154510] [E78-10036] p0037 N78-13508 INIWARS-PUBL 411 p0099 N78 11496 COMPRESSION LOADS Surface temperatures and tempera of the US Gulf Coast waters wave studies in Solenhofen limestor The operational processing of wind estimates from clo ure gradient features p0053 N78 14806 p0091 N78-14604 [SAND-76-0279] p0037 N78-13688 Past present and future CLOUD PHOTOGRAPHS COMPUTER GRAPHICS The microstructure of California coastal fog and stratus p0072 A78-14314
On the photographic processing and digital texture for Role of cumulanimbus in the evolution of cyclonic The use of Landsat imagery for terrain analysis disturbances in Mediterranean regions p0080 A78-18244 On the photographic processing and digital text remote sensing of Kujukuri coast of Chibe in Japan p0077 A78-16364 COMPUTER PROGRAMMING CLOUD PHOTOGRAPHY Updated system for cak ons of coordinates for OUD PHOTUGEACT TO Stationary waves in the Southern Hemisphere mid-latitude zone revealed from average brightness charts p0071 A78-10543 p0073 A78-14814 locating points on computer GEO 2 Change detection in coastal zone [AD-A045434] p0033 N78-13514 Landsat MSS data analysis p0048 A78-17198
Water utilization evapotranspiration and soil moisture COMPUTER PROGRAMS monitoring in the south east region of south Australia
[E78-10001] p0062 N78-11447 high altitude color p0002 A78-13062 Waves and turbulence in the vicinity of a cl Quality control techniques for DO076 A78-15455 photography Digital processing system for developing countries ---for Landsat computer compatible tape data Analysis of GATE radar data for a tropical cloud cluster Skylab/EREP application to ecological geological and p0079 A78-17068 oceanographic investigations of Delaware Bay [E78-10003] p0050 in an easterly wave p0050 N78-12492 p0075 A78-14865 CLOUDS (METEOROLOGY) LANDSAT menhaden and thread of ground clutter in p0097 A78-15862 Capabilities of operational infrared soul An advanced computer calc -- Gulf of Mexico satellite altitude nO101 N78-14587 an airborne pulse Doppler radar [E78-10024] n0050 N78-12500 CLUMPS A block adjustment for SLAR-image Geological and hydrogeological investigations in west BLOB An unsupervised clustering DO079 A78-16548 Malaysia preprocessing of MSS imagery p0090 N78-14577 Aircraft sensor analysis package system description [E78-10027] p0032 N78-12503 [NASA-TM-78038] p0081 N78-11451 CLUTTER Forest land management by satellite LANDSAT-derived An advanced computer calculation of ground clutter in CAM-Cartographic Automatic Mapping program information as input to a forest inventory system - - North documentation 5th edition [PB-270304/9] p0097 A78-15662 an airborne pulse Doppler radar p0032 N78 11498 Characteristics of sea clutter measured from E 3A high [E78-10038] p0008 N78-14455 p0097 A78 15664 radar platform SEAHT A computer program for the use of intersecting c processing and digital texture for arcs of altimeter data for sea surface height refine remote sensing of Kujukuri Coast of Chiba ın Japan [NASA CR-141432] p0083 N78-12511 p0052 N78-14506 Proposal for an extension of the CAMAC standard suitable Comprehensive Information Retrieval and Model Input equence (CIRMIS) --- processing ground water data BNWL-2235] p0087 N78-13951 to low power data acquisition systems for oceanographic stations on marine platforms and buoys The use of LANDSAT imagery to locate uncharted coastal features on the Labrador coast nOO89 N78-14524 [BNWL-2235] DO043 A78 12941 Development and application of operational techniques COAL for the inventory and monitoring of resources and uses Use of multispectral data in design of forest sample with Nucleonic coal detector independent for the Texas coastal zone. Volume 1 p0009 N78-14500 [E78 10042] p0053 N78-15537 ension COMPUTER SYSTEMS DESIGN [NASA-CR-150465] p0036 N78 11454 Development and application of operational techniques Remote sensing and geographically based information for the inventory and monitoring of resources and uses The application of LANDSAT 1 imagery for monitoring D0075 A78-14868 strip mines in the new river watershed in northeast for the Texas coastal zone Volume 2 Appendices Comprehensive Information Retrieval and Model Input [E78 10048] DO053 N78-15538 lennessee part 2 Sequence (CIRMIS) --- processing ground water data [BNWL-2235] p0087 N78-13951 COHERENT RADAR [E78-10032] o0037 N78 12506 Pulsed coherent lidar systems for airborne Onsite control of sedimentation utilizing the modified COMPUTER TECHNIQUES based wind field measurement p0076 A78-15012 block-cut method of surface mining [PB-272244/5] The arrangement of atmospheric pollution detectors by means of a minicomputer and a multicomponent chemical processing for earth p0087 N78-14472 A survey of SAR image-formation p p0040 N78 15552 COASTAL CURRENTS p0016 A78-12975 unit COLOR Ocean surface currents mapped by rada ent projects p0072 A78-13113 LANDSAT/coastal processes Landsat computers and develop p0041 A78 10344 [E78 10011] p0061 N78-10536 Accuracy of moored current Remote sensing of ocean color Reindeer range inventory in western Alaska from p0042 A78-12840 p0052 N78-14549 computer-aided digital classification of Landsat data COASTAL ECOLOGY p0003 A78-14824 COLOR PHOTOGRAPHY Coastal wetlands The present and future role of rem Color aerial photography in the plant sciences and relds. Proceedings of the Fifth Biennial Workshop Production of a water quality map of Saginaw Bay by p0055 A78-14794 computer processing of Landsat-2 data Evaluation of change detection tech Falls S Dak August 19 21 1975 Quality control techniques for o0001 A78-13060 nO057 A78-14857 DO048 A78-14875 coastal zone environments high altitude color p0002 A78-13062 Interim hierarchical regional classification scheme for pastal acosystems of the United States and its territories Analytical sensi triangulation - Its obtention through a p0078 A78-16533 simple algorithm tral ratioing of color p0002 A78-13065 Tree stress detection through spectra Computer elaboration and visualization of remote sens [PB-272691/7] COASTAL PLAINS p0027 N78-15553 data -- from Landsat for cartography p0080 A78-18241 film records Spectral reflectance deduced from color-infrared oh Textural analysis by statistical parameters and its Floodplain delineation using multispectral scanner data for forest damage detection p0002 A78-13066 application to the mapping of flow structures in wetlands /Mudflat area at the German coast of the North Sea/ Surface resource inventory eastern Montana Computer-aided classification for remote sensing in p0056 A78-14856 rangelands utilizing high altitude color infrared agriculture and forestry in Northern Italy photography p0002 A78-13067 DO011 N78-14573 Coastal wetlands The present and future role of remote Forest type mapping of the Atchafalaya River Basin fro satellite and aircraft imagery p0002 A78-130 sensing
Evaluation of change detection techniques for monitoring
p0090 N78-14569 COMPUTERIZED SIMULATION p0002 A78-13068 Measurement of sea surface by means of microwave Seasonal color infrared photographs for mapping inland altimeters - A computer simulation for system evalua on US Geological Use of an inertial navigation system for accurate track surve p0095 A78-12836 p0035 A78-13069 quadrangles recovery and coastal oceanographic measurements Landsat D thematic mapper simulation using aircraft Primer for the production of Landsat of p0073 A78-14806 pO053 N78-14586 p0072 A78-13496 Multispectral system analysis through modeling and p0075 A78-14884 Assessment of forest plantations from low altitude aerial Classification of Landsat agricultural data based photography --- North Carolina coastal plains p0003 A78-14845 p0012 N78-14597 Utilization of remote sensing observations in hyd Digital color analysis of color-ratio composite Landsat **COASTAL WATER** p0065 N78-14469 p0075 A78-14898 emote sensing of chlorophyll con COMPUTERS Large scale 70mm photography for range resources alysis in the western United States p0005 A78 14902 p0042 A78-12838 A case study using ECHO(Extraction and Classification altrtude Hydrographic charting from Landsat satellite comparison with aircraft imagery p0042 A78of Homogeneous Objects) for analysis of multispectral Three approaches to the classification and mapping of land wetlands p0057 A78 14906 pO042 A78-12839 scanner data [E78-10030] inland wetlands The application of remote sensing to the monitoring o p0083 N78-12504 Engineering geological interpretation of black and nOQ16 A78-12955 CENTRATION (COMPOSITION) color and false color air photos p0036 A78 16503 The summertime stratus over the offshore waters of p0043 A78-13108 and detection Remote sensing of ocean color Classification of LANDSAT agricultural data based up California p0052 N78-14549 The use of Landsat for monitoring water parameters in p0010 N78 14539 CONFERENCES the coastal zone Digital color analysis of color-ratio composite LANDSAT Oceans 76 Proceedings of the Second Annual Combined Conference Washington D.C. September 13-15 1976 p0041 A78-12827 [AIAA 77-1597] p0091 N78 14592 p0045 A78-13672 The use of Landsat imagery to locate uncharted coastal atures on the Labrador Coast p0074 A78-14832 COLORADO International Electronics Congress 24th Rome Italy March 28-30 1977 Proceedings - for exploration features on the Labrador Coast Integration of remote sensing and surface geophysics the detection of faults p0035 A78 14867 Surface temperatures and temperature gradient features the U.S. Gulf coast waters p0048 A78-14912 in the detection of faults of the U.S. Gulf coast waters utilization and conservation of earth resources Integration of remote sensing and surface geophysics p0105 A78-12925 Multispectral analysis of ocean dumpe p0038 N78 14561 in the detection of faults DO019 A78-14913 Color serial photography in the plant sciences and related COLORIMETRY monitoring of water p0021 A78-17576 Aircraft versus spacecraft for remote fields Proceedings of the Fifth Biennial Workshop Remote sensing of ocean color and detection of Falls S Dak August 19-21 1975 p0001 A78-13060 quality in US coastal zones chlorophyll content n0048 A78 14855 Preliminary differences in mean water level between tide Satellite applications to marine technology Conference New Orleans La November 15-17 1977 Collection of COMMITTEE ON SPACE RESEARCH gauges along the South American Paci p0109 N78 13978 Technical Papers p0043 A78-13651
International Symposium on Remote Sensing of Environment 11th University of Michigan Ann Arbor nOO48 A78-17650 Environmental mapping of the French COMMUNICATION SATELLITES remote sensing p0031 A70-70-0Experience with the per-point classification algorithms Satellite application to data buoy requ [AIAA 77-1580] pr p0044 A78 13664 Mich April 25-29 1977 Proceedings Volum COMPENSATION p0106 A78-14776 Remote sensing of soil moisture and groundwater
Proceedings of the Workshop Toronto Canada November
8-10 1976 p0059 A78-18859 DO058 A78-18243 A compensation procedure in a block of simply Remote sensing and laboratory techniques for monitoring p0022 A78-18795 overlapping photograms for the case of flat terrail ocean dumpino p0077 A78 16526

Investigation of natural environment by space means Evaluation of spectral channels and wavelength regions Development of an integrated data base for land use nd water quality planning p0026 N78-14584 Geobotany Geomorphology soil sciences agricultural and water quality planning
DATA COLLECTION PLATFORMS for separability of agricultural cover type DOOO4 A78-14860 lands landscape study [NASA TM-75041] nO108 N78 11448 Landsat data from agricultural sites es - Crop signature p0005 A78-14899 Use of earth satellite technology for telemetering hydrometeorological station data
DATA COMPRESSION p0063 N78 11489 Modern developments in hydrometry volume 2 --analysis conference proceedings Investigations of spectral separability of small grains early p0062 N78 11455 [WMO-427] An application of numerical filtering and data compression season wheat detection and multicrop inventory planning -- North Dakota and Kanses An application of numerical missing to the elaboration of earth resources imagery p0071 A78-12935 Inversion Methods in Atmospheric Remote Sounding p0084 N78 12586 [NASA-CP-004] [E78-10015] p0008 N78-13499 Geophysics Applied to Detection and Delineation of Some aspects of adaptive transform coding of ultispectral data p0079 A78 18071 On multidisciplinary research on the application of remote Non-energy Non-renewable Resources Workshop on multispectral data nsing to water resources problems -Mining Geophys [PB-271952/4] compressed data p0086 N78-13497 eophysics A remote display system utilizing [E78-10028] p0064 N78 13504 p0037 N78 13622 transmission Procedure B A multisegment training selection and Proceedings of the Eleventh Internation DATA CONVERSION ROUTINES nal Symposium on proportion estimation procedure for processing LANDSAT Remote Sensing of Environment volume 1 [NASA CR-155361] p01 Resampling study [E78-10014] p0109 N78 14464 ultural data p0082 N78-12495 [E78-10039] Proceedings of the Eleventh International Symposium on Remote Sensing of Environment volume 2 - application and processing of remotely sensed data [NASA-CR-155362] p0110 N78-14529 DOOOS N78-14456 DATA CORRELATION Reducing LANDSAT data to parameters with physical significance and signature extension. A view of LANDSAT Further tests of the suits reflectance mode p0010 N78-14519 A view of LANDSAT p0090 N78 14575 LANDSAT data from agricultural sites ites Crop signature p0012 N78-14593 apabilities CONGRESSIONAL REPORTS DATA MANAGEMENT using LANDSAT and p0012 N78-14594 An operational multistate earth observation data Earth resources information system Inventory of ricefields in France p0106 A78-14823 [GPO-94-462] p0108 N78 12509 nent system aircraft Data handling for the geometric correction of large The auxiliary use of LANDSAT data in estimating crop n0080 A78-18649 The effect of soil water deficit on the reflectance of conife acreages Results of the 1975 Illinois crop-acreage AOIPS water resources data management system
ASA-TM X-71396l p0061 N78 10542 p0003 A78-14829 Pre-visual detection of stress in nine forests [E78-10049] (NASA-TM X-71396) p0012 N78-15539 p0004 A78 14847 Applications of remote sensing to IASA-CR-150467 vater resources p0064 N78 13509 CROP INVENTORIES Mean annual volume growth from sequential volume Two phase sampling for wheat acreage estimation determination on permanent aerial photographic plots --of conifer forest p0008 A78-16522 DATA PROCESSING p0003 A78 14844 Remote sensing - A burgeoning science --- Canadian p0105 A78-12214 Wheat yield forecasts using Landsat data Optimum ratio of photo-field plots for serial volume and programs p0004 A78-14876 The Italian ground receiving and processing facility for rth resources survey data p0071 A78-12927 aerial volume growth regression construction p0006 A78-16523 Inventory of ricefields in France using Landsat and aircraft earth resources survey data p0071 A7.

A low cost system for reception process distribution of line-scan data from environmental forest cover The effect of soil water deficit on the reflectance of conp0005 A78-14900 data processing and p0010 N78-14521 seedling canopies Differentiation of selected annual field crops throughout [AIAA 77-1598] Assessment of forest plantations from low altitude aerial growing season by their spectral reflectance p0045 A78-13673 photography - - North Carolina coastal p p0007 A78-20172 p0009 N78-14496 Application of satellite-borne synthetic aperture radar to DO012 N78 14597 LACIE A look to the future marine operations [AIAA 77 1610] CONTAMINANTS Further tests of the suits reflectant n0046 A78-13687 p0024 N78-14489 p0010 N78-14519 Remote sensing of air pollutants Operational data processing - The first ten years are the acreages Results of the 1975 Illinois crop-acreage experiment Air pollutant monitor network design hardest -- in meteorological satellite remote sensing no mathematica p0027 N78-15593 p0073 A78-14789 at the National p0074 A78-14854 Processing of satellite imagery at the Nation Environmental Satellite Service p0074 A78-1485 Digital processing system for developing countries CONTINENTAL SHELVES OCS environmental research technological [E78-10049] DO012 N78-15539 ology in ice-covered p0043 A78-12845 CROP VIGOR water Yield/reflectance relations in cabbage --- remote sensing forops p0001 A78-10521 Norwegian marine geodetic projects for Landsat computer compatible tape data p0075 A78-14865 p0048 A78-17648 of crops Quantification of soil mapping by digital analysis of andsat data p0078 A78-14908
Special Sensor H data processing at AFGWC - Preliminary CONVECTION CLOUDS The use of remote sensing in the detection of cro p0006 A78-16513 Convective cloud plumes mark Canadian fire sit-Landsat data CRUDE OIL p0005 A78-15308 Field infrared method to discriminate natural seeps from **CONVECTION CURRENTS** results -- 1R temperature-humidity-ozone sounder individual clear ai non-seeps Santa Barbara California area p0097 A78-14972 Observation of the development of p0020 A78-17061 n0023 N78-10608 vective cells Measurement of atmospheric ozone by satellite p0097 A78-15013 COORDINATE TRANSFORMATIONS CUMULONIMBUS CLOUDS Test on the mapping application of Landsat imagery Role of cumulonimbus in the evolution of cyclonic Change detection in coastal zone environments --- by p0048 A78-17198 p0077 A78-16527 disturbances in Mediterranean regions Landsat MSS data analysis p0077 A78-16364 Geometric processing for digital mapping with multiseries CORN The auxiliary use of LANDSAT data in estimating crop acreages Results of the 1975 Illinois crop-acreage CURVES (GEOMETRY) nOOR2 N78-12489 ote sensing data A solution to the problem of SAR range curvature p0090 N78-14571 Indexing screening coding and cataloging of earth experiment irces aircraft mission data [F78-10049] p0012 N78 15539 CYCLONES [NASA CR 151549] p0108 N78-12508 CORRELATION On the hysteresis of the sea surface and its applicability Inversion Methods in Atmospheric Remote Sounding IASA-CP-004] p0084 N78-12586 The use of canonical correlation analysis for measuring ban environmental health quality p0027 N78 15592 to wave height predictions [AIAA 77 1588] [NASA-CP-004] p0045 A78-13869 inversion of scattered radiance horizon profiles for Role of cumulonimbus in the evolution of cyclonic COST ANALYSIS gaseous concentrations and aerosol parameters User experience with the applications disturbances in Mediterranean regions p0085 N78-12595 ns of Landsat data p0105 A78-12932 p0077 A78-16364 Inversion of solar aureole measurements for determining p0085 N78-12596 A cost-benefit evaluation of the LANDSAT flow-or aerosol characteristics Comparison of linear inversion methods by examination operational system [NASA-TM-78052] Đ p0108 N78-13510 duality between iterative and inverse matrix p0085 N78 12598 COST REDUCTION methods Vector statistics of LANDSAT imagery Inversion of passive microwave remote sensing data from DAME p0085 N78 12599 [NASA-TM-78149] p0093 N78-15544 A study of suspended solids in the Req CROP GROWTH Inversion methods in temperature and aerosol remote p0073 A78-14807 Agricultural applications of satellite remote sensing. The sounding Their communexplored approaches Their commonality and differences and some A study of suspended solids in the Requena Dam by p0085 N78 12601 measurement and prediction of principal harvests remote sensing DATA ACQUISITION Application of modified Twomey techniques to invert lidar p0001 A78-12931 angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12602 Estimation of old field ecosystem p0003 A78-14828 Data acquisition in the specification of behavior models --- for ecological environment and earth resources studies altitude imagery Airborne monitoring of crop canopy irrigation scheduling and yield prediction temperatures fo The inversion of stratospheric aeroso and ozone vertical DO072 A78-12942 Determination of design and operational criteria for profiles from spacecraft solar extinction measurements n0086 N78-12803 DOOG 478-14897 offshore facilities Pattern recognition of Landsat data bas Inversion of solar extinction data from the Apollo-Soyuz est Project Stratospheric Aerosol Measurement ed upon tempora [AIAA 77-1577] p0044 A78-13663 trend analysis p0007 A78-18248 Stratospheric Aerosol A low-cost system for reception processing and distribution of line scan data from environmental satellites p0086 N78-12604 Evaluating soil moisture and yield of winter wheat in (ASTP/SAM) experiment the Great Plains using Landsat data p0007 A78-18249 [AIAA 77-1598] p0045 A78-13673 Comprehensive Information Retrieval and Model Input Remote sensing of water quality in 7 lakes in north (CIRMIS) --- processing ground water data 235] p0087 N78 13951 Investigations of spectral separability of small grains early p0058 A78-16528 [BNWL-2235] wheat detection and multicrop inventory planning Gathering and using information on a global scale - North Dakota and Kansas Processing techniques development [E78 10045] p0008 N78-13499 [E78-10015] p0109 N78-14479 p0087 N78-14461 Progress and needs in agricultural research, development Two phase sampling for wheat acreage estimation Operational data processing. The first ten years are the large area crop inventory experiment p0010 N78-14538 and applications programs p0009 N78-14482
A digital technique for manual extraction of data from hardest -- National Environmental Satellite Service p0088 N78-14476 Wheat yelld forecasts using LANDSAT data n0091 N78-14579 aerial photography p0011 N78-14570 Proceedings of the Eleventh International Symposium on Airborne monitoring of crop canopy temperatures for Remote Sensing of Environment volume 2 -- application and processing of remotely sensed data [NASA-CR-155362] p0110 N78-14529 Potential applications of digital visible and infrared data irrigation scheduling and yield prediction from geostationary environmental satellites p0011 N78-14591 p0074 A78-14839 Production of a water quality map of Saginaw Bay by computer processing of LANDSAT 2 data CROP IDENTIFICATION Remote sensing and geographically based information stems p0075 A78 14866

Development of an integrated data base for land use

Potential applications of digital visible and infrared data

water quality planning

from geostationary environmental satellit

p0057 A78-14890

ellites p0101 N78-14532

p0067 N78-14551

p0089 N78-14559

p0101 N78-14605

Digital processing system for developing countries

Data processing for the DMSP m

environmental monitoring

remote sensing

color trends

Multi-seasonal data analysis and some extensions for

Further tests of the Suits reflectance model --- for crop

Classification of Landsat agricultural data based upon

p0003 A78-14812

p0003 A78-14827

p0003 A78-14845

model

ESA-CR(P)-974]

DEVELOPING NATIONS

developing nations - An observation Remote sensing utilization of developpropriate technology p0075 A78-14885

p0076 A78-15330

p0078 A78-16547

p0083 N78-12499

ent deposition p0062 N78-11467

p0063 N78-11480

mages p0071 A78-10519

p0030 A78-15589

p0097 A78-15013

p0036 N78-10545

p0064 N78-13504

p0064 N78-13505

p0065 N78-13522

p0065 N78-14458

p0101 N78-14599

p0065 N78-14467

p0096 A78-13435

The analysis of GEOS-3 altimeter data in the Tasman A system of remote sensing and mapping for developing purities p0030 A78-16546 A digital technique for manual extraction of data from and Coral seas aerial photography -- for land use/land cover studies The transfer of remote sensing technology in the veloping nations. An observation p0110 N78-14488 (NASA-TM 78032) pO053 N78-15550 Digital color analysis of color ratio composite Landsat enes p0075 A78-14898 DATA REDUCTION developing nations. An observation Remote sensing utilization of develor appropriate technology oping countries An p0111 N78-14552 Multi-seasonal data analysis and some extensions for environmental monitoring p0003 A78-14812 Quantification of soil mapping by digital analysis of p0078 A78-14908 Digital processing system for developing countri Reducing Landsat data to parameters with physical Landsat data p0089 N78-14559 significance and signature extension Digital image processing DIFFUSE RADIATION capabilities DO075 A78-14881 Analysis of MSS digital imagery with the aid of principal Objective analysis and classification of oceanographic p0048 A78-17982 Influence of ground level SO2 on the diffuse to direct component transform --- Landsat multispectral scannin irradiance ratio in the middle ultraviolet p0025 N78-14502 Analysis of synthetic aperture radar ocean wave data Data handling for the geometric correction of large poos poos A78-18649 DIGITAL COMPUTERS collected at Marineland and Georges Bank Detection and measurement of interfaces in remotely ımages [PB-268675/6] DO050 N78-10678 Digital image correlation techniques applied to LANDSAT ared data using a digital computer multispectral imagery Remote sensing data processing. Two years ago today [AIAA 77-1616] n0096 A78 13688 and two years from today DO087 N78-14471 Digital processing system for developing countries [E78-10022] Operational utilization of remotely sensed data --- NOAA A digital technique for manual extraction of data from aerial photography p0091 N78-14579 for Landsat computer compatible tape data p0109 N78-14477 p0075 A78-14865 Geometric processing for digital mapping with multiseries pools N78 12489 Rebirth of remote sensing Do we know enough for Geometric processing data p0082 N78 14559

Digital processing system for developing countries p0089 N78 14559 DISCHARGE our own good? -- LANDSAT system readouts Application of electronic distance measuring devices to pO109 N78-14478 measurement of discharge and sediment DATA SAMPLING DIGITAL DATA Composite sampling for digital terrain models Some specific problems in the operation of a gauging ation p0062 N78-11468 p0072 A78-13493 Snow mapping from Landsat digital data p0055 A78 12933 station Use of multispectral data in design of forest sample Aerial methods of measuring water discharges Automated image processing of Landsat II digital data for watershed runoff prediction p0056 A78 14816 Potential applications of digital visible and infrared data p0002 A78-14808 Two phase sampling for wheat acreage estimation DISPLAY DEVICES p0003 A78-14844 Aircraft sensor analysis package system description [NASA-TM 78038] p0081 N78-11451 from geostationary environmental satellites Optimal spatial sampling techniques for ground truth data p0074 A78 14839 in microwave remote sensing of soil moistu Landsat digital data for water pollution and water quality studies in southern Scandinavia p0018 A78 14841
The use of Landsat digital data to detect and monitor vagatation water deficiencies p0004 A78 14846 A remote display system utilizing compressed data ansmission p0086 N78-13497 p0058 A78-18247 transmission Resampling study DISTANCE MEASURING EQUIPMENT [E78-10014] pOO82 N78-12495 DATA SYSTEMS Height measurements from satellite im Land classification of south-central lowe from computer The Italian ground receiving and processing facility for earth resources survey data p0071 A78-12927 enhanced images GDM/GPS receiver hardware implementation enhanced minestral
[E78-10005] DUB2 TVO
Automated image processing of LANDSAT 2 digital data
Automated minest profit prediction p0066 N78 14508 Data acquisition in the specification of behavior models - for ecological environment and earth resources studies **DIURNAL VARIATIONS** Estimation of the daytime and nighttime distribution of atmospheric ozone from ground-based millimeter wavelength measurements p0016 A78-13617 oOO72 A78-12942 LANDSAT digital data for water pollution and water DATA TRANSMISSION quality studies in Southern Scandinavia Use of earth satellite technology for telemetering p0025 N78-14534 hydrometeorological station data p0063 N78-11489 Measurement of atmospheric ozone by satellite The use of LANDSAT digital data to detect and monitor A remote display system utilizing compressed data vegetation water deficiencies - - South Dakota DOORB N78-13497 transmission p0010 N78 14540 DOMES (GEOLOGY) Preliminary study of the present and possible future oil An application of LANDSAT digital technology to forest e fuel type mapping p0011 N78 14557 High-resolution radar scattering characteristics of a and gas development of areas immediately surrounding the interior Salt Domes Upper Gulf Coast Salt Dome basins of east Texas north Louisiana and Mississippi fire fuel type mapping disturbed sea surface and floating debris p0099 N78-12268 Remote sensing and geographically p0090 N78-14560 DECIDUOUS TREES systems Detection of oak wift with color IR aerial photography p0001 A78-10522 [ORNL/SUB-75/87988] Satellite land use acquisition and applications to drologic planning models p0068 N78 14564 DRAINAGE hydrologic planning models On multidisciplinary research on the application of remote The dry deciduous forests of Bastar Digital color analysis of color-ratio composite LANDSAT sensing to water resources problems -DOOG A78-16551 scenes -- Nevada p0091 N78 14592 [E78-10028] DELAWARE Quantification of soil mapping by digital analysis of ANDSAT data --- Clinton County Indiana p0091 N78 14602 Application of LANDSAT imagery for snow mapping in Application of remotely sensed land-use information to Norway [E78-10029] improve estimates of streamflow characteristics volume [REPT-6690] Maryland Virginia and Delaware The digital processing of Scanning Radiometer (SR) data [E78-10052] DO069 N78-15541 Effect of antecedent on frozen ground floods from NOAA weather satellites as carried out in the Meteorolog cell listrate of the Free University of Berlin Part 1 Linearsing the SR data [BLL-M-24896-(5828 4F)] p0102 N78 14750 DELAWARE RIVER BASIN (US) [PB-270632/3] Skylab/EREP application to ecological geological and Application of LANDSAT imagery for snow mapping in oceanographic investigations of Delaware Bay [E78-10003] p0050 p0050 N78-12492 [E78-10041] DIGITAL FILTERS DENMARK Utilization of remote sensing observations in hydrologic odels p0065 N78-14469 An application of numerical filtering and data compression Landsat digital data for water pollution and water quality udies in southern Scandinavia p0018 A78-14841 models to the elaboration of earth resources imagery p0071 A78-12935 studies in southern Scandinavia Interpretation of multispectral and infrared thermal LANDSAT digital data for water pollution and water surveys of the Suez Canal Zone Egypt Application of digital filtering to satellite geodesy quality studies in Southern Scandinavia p0082 N78-12486 p0025 N78-14534 Application of remotely sensed land-use information to DENSITY (MASS/VOLUME) The digital processing of Scanning Radiometer (SR) data Improve estimates of streamflow characteristics volume 8 -- Maryland Virginia and Delaware [E78-10052] p0069 N78-15541 A numerical algorithm for remote sensing of ocean density profiles by acoustic pulses [AD-A042372] p0050 N78-10674 from NOAA weather satellites as carried out in the Meteorological Institute of the Free University of Barlin Part 2 Notes on the digital filtering of satellite pictures [BLLD-M-24895 (5828 4F)] p0102 N78 14747 DRAINAGE PATTERNS p0102 N78 14747 DEMSITY DISTRIBUTION The utility of short wavelength (1mm) remote sensing A numerical algorithm for remote sensing of density DIGITAL SIMULATION techniques for the monitoring and assessment of hydrologic profiles of a simple ocean model by acoustic p i at a wavelength of p0058 A78 17019 Simulation of attenuation by rainfall at p0080 A78-18910 5 cm DRIFT (INSTRUMENTATION) DENSITY MEASUREMENT DIGITAL SYSTEMS w to minimize the baseline drift in a COSPEC remote PROBE - A new technique for measuring the density profile of a specific constituent using counterpropagating The Gestalt Photomapping System p0030 A78 15730 sensor --- correlation spectrometer for pollution determined A multiseries digital mapping system for positioning MSS and photographic remotely sensed data p0096 A78-13943 DROP SIZE Advances in surface geophysical al techniques for p0059 A78-18862 p0077 A78-16509 The microstructure of California coastal fog and stratus p0072 A78-14314 groundwater and soil moisture Digital rectification of multispectral imagery -- Landsat processing p0078 A78-16532 data processing DROUGHT Application of electronic distance measuring devices to The use of Landsat digital data to detect and monitor agetatron water deficiencies p0004 A78-14846 Digital preprocessing and classification of multispectral measurement of discharge and sedip0078 A78-16542 observation data vegetation water deficiencies p0062 N78-11467 Satellite observations of snowcover DEPTH MEASUREMENT A mathematical model for digital rectification of remote during the great California drought dsat satellite A p0042 A78-12839 p0079 A78-16549 Hydrographic charting from Landsat sensing data comparison with aircraft imagery Digital exploitation of synthetic aperture radar p0088 N78-14505 to space shuttle [NASA-CR-150446] Localization of an experimental ecological unit in the DIGITAL TECHNIQUES Maradi region of Nigeria [NASA-TM 75085] Composite sampling for digital terrain models n0032 N78-12553 p0072 A78-13493 Application of LANDSAT satellite imagery for iron ore prospecting in the Western Desert of Egypt Remote sensing of ocean temperature [AIAA 77-1599] E p0045 A78 13674 DO039 N78-14581 Sea surface temperature gradient analysis from digital E REGION DESIGN ANALYSIS IRFES - Infra-Red Fan beam Earth Sensor Prototype meteorological satellite data

IAIAA 77-16041

fire fuel type mapping

p0100 N78-13518

oping countries - An p0107 A78-14858

The transfer of remote sensing technology in the veloping nations - An observation p0106 A78-14796

p0046 A78 13676

p0056 A78-14856

Textural analysis by statistical parameters and its

An application of Landsat digital technology to forest full type mapping p0004 A78-14863

application to the mapping of flow structures in wetlands /Mudflat area at the German coast of the North Sea/

in the Sierra Nevada p0059 A78-18250 Real Time Dust Fall Monitor (RTDFM) --- for application p0098 N78-10436 Some characteristics of the equatorial electrojet p0098 A78-17101 Ethiopia /East Africa/ 3A AIRCRAFT Characteristics of sea clutter measured from E 3A high radar platform
EARLY WARNING SYSTEMS DO097 A78-15664 Pre-visual detection of stress in pine forests p0010 N78-14541 EARTH (PLANET)

Investigation of earth from space. Joint experiment of USSR and GDR scientists on the Soiuz-22 spacecraft p0109 N78-13511

EARTH ALBEDO

Method of obtaining and analyzing the spectral characteristics of natural formations --- spectral reflectance p0031 A78-18992 sensing of earth surface EARTH ATMOSPHERE

Atmospheric sounding with passive microwaves Review d prognosis p0088 N78 14494 and prognosis

Recent crustal movements registered by the aid of rephoto interpretation p0030 A78-16534 Recent vertical crustal movements from geodetic airphoto interpretation

measurements. Alaska and the eastern United States p0033 N78 15622

EARTH ENVIRONMENT

ensing the earth's environment from space - User r p0106 A78-14778 and technology opportunities A study of the earth by aircraft - Results obtained by p0107 A78-18721 adio techniques

EARTH LIMB

Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78-12595

EARTH MOVEMENTS

Recent crustal movements registered by the aid of rphoto interpretation p0030 A78-16534 rphoto interpretation

EARTH RESOURCES

Proceedings of the Eleventh International Symposium on Remote Sensing of Environment volume 1

[NASA-CR-155361] p0109 N78-14464 Industrial use of geological remote sensing from space p0037 N78-14474

Frequency band justifications for passive sensors 100 to 385 GHz chapter 1 -- for monitoring earth resources and the environment [NASA-CR-155530]

p0093 N78-15328

EARTH RESOURCES INFORMATION SYSTEM

Automated earth resources surveys using satellite and aircraft scanner data - A Finnish approach

DO077 A78-16518

EARTH RESOURCES PROGRAM

Earth resources information systems [GPO-95-881] p0108 N78-11450

EARTH RESOURCES SURVEY AIRCRAFT Automated earth resources surveys using satellite and

aircraft scanner data. A Finnish approach p0077 A78-16518

Design and fabrication of nosecone for WB-57F aircraft

fitted with APQ-102A side looking radar [NASA-CR-151592] pC p0102 N78-15028 EARTH RESOURCES SURVEY PROGRAM

The Italian ground receiving and processing facility for earth resources survey data DO071 A78-12927 Remote sensing from space and models of the management of renewable resources p0105 A78-12943 A survey of SAR image-formation processing for earth sources applications pools N78-14472

esources applications EARTH SATELLITES

The versatile satellite -- Book p0107 A78-17141 Use of earth satellite technology for telemetering hydrometeorological station data p0063 N78-11489

EARTH SURFACE

Radar measurement of stratified earth surface covers p0030 A78-15424 Russian book

Methods of analytic processing of various aerocosmic p0081 A78-19241 photoimages An introduction to orbit dynamics and its application to

atellite based earth monitoring systems p0099 N78-12113 INASA-RP-10091

Onsite control of sedimentation utilizing the modified block-cut method of surface mining [PB-272244/5] p0040 N78-15552

Estimation of ground temperature from GFCR radiometric

signal [NASA-CR 145291] p0102 N78-15626

EARTHQUAKES
Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study linears in the Friuli earthquake area p0075 A78 14886

The impact of remote sensing on United States geography - The past in perspective pres p0017 A78-14783 potentials

Land utilization and ecological aspects in the Sylhet-Mymensingh Haor region of Bangladesh - An analysis of Landest deep of Landsat data p0019 A78-14871

Skylab/EREP application to ecological geological and oceanographic investigations of Delaware [E78-10003]

p0050 N78-12492 Contributions of LANDSAT to natural resource protection

and future recreational development in the state of West Virginia -- Canaan Valley and Dolly Sods area p0024 N78-13501 [E78-10019]

Land utilization and ecological aspects in the Sylhet-Mymensingh Haor Region of Bangladesh An analysis of LANDSAT data p0026 N78 14565

**ECONOMIC DEVELOPMENT** 

The transfer of remote sensing technology in the p0106 A78-14796 developing nations - An observation Applications of Landsat data to the integrated economic development of Mindoro Philippines p0107 A78-14889

Technical assistance and the transfer of remote sensing technology --- for economic development p0110 N78 14487

Applications of LANDSAT data to the economic development of Mindoro Phillipines to the integrated n0011 N78 14583

**ECONOMIC IMPACT** 

Benefit assessment of ozone monitoring satellites p0021 A78-17574

Data acquisition in the specification of behavior models --- for ecological environment and earth th resources studies p0072 A78 12942

Estimation of old field ecosystem biomass using low p0003 A78-14828 altitude imagery

**FFFLUENTS** 

Instrumental sensing of stationary source emissions -sulphur dioxide remote sensing for coal-burning power plants p0015 A78-10056

EGYPT

Application of Landsat satellite imagery for iron ore prospecting in the western desert of Egypt p0035 A78-14887

Groundwater studies in arid areas in Egypt using Landsat stelline images p0057 A78 14888 satellite images Interpretation of multispectral and infrared thermal

surveys of the Suez Canal Zone Egypt p0076 A78-14905

Application of LANDSAT satellite imagery for iron ore prospecting in the Western Desert of Egypt

p0039 N78 14581

Groundwater studies in arid areas in Egypt using ANDSAT satellite images p0068 N78-14582 LANDSAT satellite images interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt

p0101 N78-14599

**ELECTRIC POWER PLANTS** 

Instrumental sensing of stationary source emissions --sulphur dioxide remote sensing for coal-burning power
plants p0015 A78-10056

**ELECTRICAL PROPERTIES** 

Electrical properties of water in rocks and soils p0060 A78-18864

**ELECTRICAL RESISTIVITY** 

Advances in surface geophysical techniques groundwater and soil moisture p0059 A78-18 p0059 A78-18862 **ELECTROMAGNETIC ABSORPTION** 

Development of airborne electromagnetic survey instrumentation and application to the search for buried sand and gravel a summary report
[PB-271331/1]

n0039 N78-14622

ELECTROMAGNETIC MEASUREMENT

Electromagnetic detection of soil water content - Prog report 11 p0059 A78-18863 moisture - Progress p0061 A78-20174 Electromagnetic detection of soil Report I

**ELECTRON BEAMS** 

Cartographic Electron Beam Recorder (EBR) system [AD-A044401] p0100 N78 12513 p0100 N78 12513

ELECTRON DISTRIBUTION
Significant initial results from the environmental measurements experiment on ATS-6 p0102 N78-15142

**ELECTRON PRECIPITATION** 

On the role of magnetic mirroring in the auroral phenomena D0098 A78-20164 **ELLIPSOMETERS** 

Remote sensing of vegetation and soil using microwave

ellipsometry
[NASA-CASE-GSC-11976-1] n0007 N78-10529

EMISSION SPECTRA

Estimation of the daytime and nighttime distribution of atmospheric ozone from ground-based wavelength measurements p0016 d-based millimeter p0016 A78-13617 Temperature sensing. The direct road to information p0086 N78-12607

**ENERGY POLICY** 

Energy resource development components p0022 A78-19616

**ENERGY TECHNOLOGY** 

Translations on USSR resources no 768 [JPRS-70524] DO111 N78-15557

ENGINEERING

Corps of Engineers applications for remote sensing of p0025 N78-14493

Multidate mapping of mosquito habitat p0056 A78-14851

**ENVIRONMENT EFFECTS** 

Tennessee-Tombigbee industrial siting project. A study of physical and environmental factors of potential industrial stess -- Mississippi Columbus Air Force Base and Lowndes
Clay Monroe Itawamba and Tishomingo Counties
[E78-10035] p0024 N78-13507

Remote sensing of environmental impact of land use p0025 N78-14490

SNVIRONMENT MANAGEMENT

An overview of remote sensing technology transfer in Canada and the United States p0106 A78-14795 e Valley Authority p0018 A78-14800 Remote monitoring and Tennessee programs Corps of Engineers applications for remote sensing of p0018 A78-14801 the environment

Interim hierarchical regional classification scheme for coastal ecosystems of the United States and its territo [PB-272691/7] p0027 N78 15553

ENVIRONMENT MODELS

Data acquisition in the specification of behavior models for ecological environment and earth resources studies p0072 A78 12942

**ENVIRONMENT PROTECTION** 

Contributions of LANDSAT to natural resource protection and future recreational development in the state of West Virginia - Canaan Valley and Dolly Sods area Virginia - - Ca [E78-10019]

178-10019] p0024 N78-13501 Quality assurance research plan fiscal year 1978 1982

B-272421/9] p0027 N78 14700

ENVIRONMENTAL MONITORING

Characterization of terrestrial service environments - The simultaneous occurrence of combined conditions of solar solation and climatic variables p0015 A78-11283
The use of the Landsat series satellites for the monitoring and management of territory p0105 A78 12926
Satellite application to data buoy requirements
[AIAA 77-1580] p0044 A78 13664

Surveying the earth's environment from space - Spectral areal temporal coverage trends

[AIAA 77 1585] Evaluation of p0105 A78 13667 chloride detector for p0017 A78-13843 Evaluation or a menuronmental monitoring p0017 A78-130-3
Plants as indicators of photochemical oxidants in the p0017 A78-14199 a hydrogen Ozone sounding correction pr rocedures and their p0017 A78-14448

implications The utility of short wavelength /less than 1 mm/ remote sensing techniques for the monitoring and assessment DO055 A78-14780

hydrologic parameters p
Operational utilization of remotely ser ensed data p0106 A78-14790

Current and future satellites for ocnic monitoring p0047 A78-14793 Multi-seasonal data analysis and some extensions for p0003 A78-14812 environmental monitoring Evaluation of change detection technical . Iques for monitoring p0048 A78-14875 coastal zone environments Thunderstorm monitoring from aeosynchronous

p0076 A78-15010 Automated earth resources surveys using satellite and aircraft scanner data. A Finnish approach

p0077 A78-16518
Observation of the development of individual clear air p0020 A78-17061 convective cells Aircraft versus spacecraft for remote monitoring of water p0021 A78-17576 quality in U.S. coastal zones p0021 A78-17576
Measurement and the law - Monitoring for compliance

with the Clean Air Amendments of 1970 p0022 A78-18456 Energy resource development The monitoring p0022 A78-19616

Development of environmental charging effect monitors properational satellites p0098 N78-10114 Monitoring equatic plants in Texas p0049 N78-10527 Skylab/ERP application to ecological geological and ceanographic investigations of Delaware Bay

[E78-10003] p0050 N78-12492 Computer-aided analysis of LANDSAT data for surveying Texas coastal zone environments --- Pass Cavallo and Port

[E78-10018] Proceedings of the Eleventh International Symposium on Remote Sensing of Environment volume 1
[NASA-CR-155361] p0109 N78-14484

Sensing the earth's environment from space User needs d technology opportunities p0109 N78-14465 and technology opportunities p0109 N78-14465
The utility of short wavelength (1mm) remote sensing techniques for the monitoring and assessment of hydrologic

ssment of hydrologic p0065 N78-14467 plogic parameters p0065 N78-14468 Microwave remote sensing of hydrole

Operational data processing The first ten years are the hardest --- National Environmental Satellite Service p0088 N78-14476 Operational utilization of remotely se

p0109 N78-14477 programs
Current and future satellites for ocea p0051 N78-14484

Coastal wetlands The present and future role of remote p0066 N78-14485 sensing Remote monitoring and Tennessee Valley Authority ograms p0066 N78-14492 programs

Corps of Engineers applications for remote sensing of environment p0025 N78-14493 the environment Multi-seasonal data analysis and some extensions for

p0025 N78-14504 environmental monitoring Proceedings of the Eleventh International Symposium on Remote Sensing of Environment volume 2 - application

and processing of remotely sensed data p0110 N78-14529 [NASA-CR-155362] Potential applications of digital visible and infrared data from geostationary environmental satellites

o0101 N78-14532

Indicators of international remote sensing activities p0111 N78-14535

Processing of satellite imagery at the National Environmental Satellite Service p0089 N78-14548

Evaluation of change detection tech iques for monitoring p0090 N78-14569 coastal zone environments

SUBJECT INDEX Quality assurance research plan fiscal year 1978 -[PB-272421/9] Atmospheric physics as a means of environmental [DLR-IB-553 75/7] Significant initial results from measurements experiment on ATS-6 [NASA-TP-1101] Frequency band justifications for passive sensors 1 to 10 GHz -- for monitoring earth resources and the nvironment [NASA-CR-155531] Frequency band justifications for passive sensors 10 0 to 385 GHz chapter 1 --- for monitoring earth resources nd the environment [NASA-CR-155530] Frequency band justifications for passive sensors 100 to 385 GHz chapter 2 - for monitoring earth resources and the environment [NASA-CR-155532] Development and application of operational techniques for the inventory and monitoring of resources and uses for the Texas coastal zone Volume 1 The use of canonical correlation analysis for measuring urban environmental health quality p0027 N78-15592 Precipitation (radar) project of the IFYGL lake meteorology PB-272152/01 ENVIRONMENTAL RESEARCH SATELLITES LACIE - A look to the future --- Large Area Crop Experiment Processing of satellite imagery at the National prironmental Satellite Service p0074 A78-14854 **ENVIRONMENTAL SURVEYS** International Symposium on Remote Sensing of Environment 11th University of Michigan Ann Arbor Mich April 25 29 1977 Proceedings Volumes 1 & 2 p0106 A78-14776 The impact of remote sensing on United States geography - The past in perspective present realities future Remote sensing of environmental impact of land use activities Application of Landsat data to wetland study and land use classification in West Tennessee p0058 A78-14818 Present and future operational NOAA satellite oceanographic products - An introduction Salvut-4

DO047 A78-14820 Application of aerial photography to water-related ograms in Michigan p0056 A78-14835 programs in Michigan p0056 A78-14835 Large scale 70mm photography for range resources analysis in the western United States p0005 A78-14902 investigation of natural resources from orbital station p0020 A78-16506 Analysis of some models of atmospheric optical properties p0020 A78-16539 according to space photo surveys Environmental mapping of the French coastal zone by mote sensing p0031 A78-18102 A digital technique for manual extraction of data from grial photography p0091 N78-14579 Development of an integrated data base for land use id water quality planning pO026 N78-14584
Lake water quality mapping from LANDSAT and water quality planning p0026 N78-14587

Interim hierarchical regional classification scheme for coastal ecosystems of the United States and its territories [PB-272691/7] p0027 N78-15553 [PB-272691/7]

## EQUATORIAL ELECTROJET

Some characteristics of the equatorial electrojet in hippina /East Africa/ p0098 A78-17101

## EQUIPMENT SPECIFICATIONS

Space radar system specifications - for surveys of hydrology agriculture and geology Space radar system specifications p0101 N78-14495

# EROS (SATELLITES)

A cost benefit evaluation of the LANDSAT flow on onerational syste p0108 N78-13510 NASA-TM-78052]

EROSION

The use of LANDSAT digital data and computer implemented techniques for an erosion hazard reforestation needs assessment --- Yalobusha Co Calhoun Co and Grenada Co Mississippi [£78-10050]

p0012 N78-15540

### ERROR ANALYSIS Ozone sounding correction procedures and their plications p0017 A78-14448 Testing the accuracy of remote se

nsing land use maps p0074 A78-14819 Test on the mapping application of Landsat imagery p0077 A78-16527

Analytical aerial triangulation with corrections for retematic errors p0086 N78-13498 systematic errors Testing the accuracy of remote sensing land use maps p0025 N78-14511

Evaluation of algorithms for geological thermal inertia p0039 N78-14562

# mapping ERROR CORRECTING DEVICES

correction of large p0080 A78-18649 Data handling for the geometric ımaqes

#### **ESTUARIES**

p0027 N78-14700

p0027 N78-14732

the environmental

p0102 N78-15142

p0092 N7B 15327

p0093 N78 15328

p0093 N78-15329

p0053 N78-15537

p0069 N78-15660

p0002 A78-14804

Remote Sensing of

p0017 A78-14783

p0018 A78-14798

Text

Spectral reflection measurements of water with particle suspensions for an analysis of the water quality on the basis of multispectral recordings p0058 A78-16514 Experience with the per-point classification algorithms for the mapping of estuarine areas from Landsat

#### p0058 A78-18243 ETHIOPIA

Some characteristics of the equatorial electrojet in thiopia /East Africa/ p0098 A78-17101 Ethiopia /East Africa/ EUROPE

Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy

p0004 A78-14879 Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Friuli earthquake area p0075 A78-14886

NOAA satellite monitoring of snow cover in the northern hemisphere during the winter of 1977
[IAF PAPER 77-121] p0057 A78-15935 Ouck-look capability in a European earth resources satellite data network. Volume 2 Appendices 5 to 7 [FUI5-4 VOL-2 APP-5-7] Ouck-look capability in a European earth resources

satellite data network, volume 1 --- Earthnet [FU15-4-VOL-1] p0109 N78-13519

#### EUROPEAN SPACE AGENCY

The European Space Agency and remote sensing b p0105 A78-13495 satellite

#### EUROPEAN SPACE PROGRAMS

Remote sensing for the medium-scale assessment of ground-level thermal and hydrologic variations - An application to the local prediction of storms by use of the Project Tellus system p0055 A78-12930

The European Space Agency and remote sensing by tellite p0105 A78-13495 satellite Test system for earth observation - SPOT Volume 1

Systems analysis and development plan platform noting first land use mission p0092 N78-14617

Test system for earth observation - SPOT Volume 3 Multimission platform - subsystems p0092 N78-14818 SPOT Volume 4 p0092 N78-14619 Test system for earth observation

First mission payload -- land use Test system for earth observation - SPOT Volume 4bis First mission payload and microwave payload compatibility study --- land use p0092 N78-14820 p0092 N78-14620

SPOT Volume 5 Test system for earth observation Multipurpose ground facilities and dedicated image stations
-- land use p0092 N78-14621

#### FUTROPHICATION

Application of LANDSAT to the surveillance of lake eutrophication in the Great Lakes basin - - Saginaw Bay Michigan [E78 10023]

p0064 N78-13503 On multidisciplinary research on the application of remote sensing to water resources problems - - Wisconsin [E78 10028] p0064 N78-13504

### **EVAPOTRANSPIRATION**

Remote sensing aided systems for snow quantification vapotranspiration estimation and their application p0056 A78-14834 hydrologic models Using Landsat data to estimate evapotranspiration of inter wheat p0008 A78-15392

winter wheat Water utilization evapotranspiration and soil moisture nonitoring in the south east region of south Australia [E78-10001] p0062 N78-11447

Remote sensing-aided systems for snow qualification evapotranspiration estimation and their application in hydrologic models p0067 N78-14527

FAR INFRARED RADIATION
Far-infrared photometry with an 0 4-meter liquid helium

cooled balloon-borne telescope [NASA-CR-155234]

LWIR (7-24-micrometer) measurements from the launch of a rocket borne spectrometer into a quiet atmosphere (1974)

#### [AD-A045466] p0100 N78 13684

## FARM CROPS

Results of a remote sensing study of the effects of hail on vegetation p0001 A78-12878

Agricultural applications of satellite remote sensing - The measurement and prediction of principal harvests p0001 A78 12931

LACIE A look to the future - - Large Area Crop Inventory Experiment p0002 A78 14804

#### FARMLANDS

LACIE A look to the future --- Large Area Crop II Experiment p0002 A78-14804 Estimation of old field ecosystem biomass using low altitude imagery n0003 A78-14828

Differentiation of selected annual field crops throughout the growing season by their properties spectral reflectance p0007 A78-20172

Use of remote sensing for land use policy formulation Michigan [E78-10020] p0008 N78 13502

Monitoring irrigated land acreage using LANDSAT imagery An application example p0066 N78 14501

#### FEATHER RIVER BASIN (CA)

Remote sensing-aided systems for snow quantification evapotranspiration estimation and their application in p0056 A78 14834 hydrologic models

#### FINITE DIFFERENCE THEORY

HCMM energy budget data as a model input for assessing regions of high potential groundwater pollution [E78-10010] p0061 N78-10535

#### FINLAND

Landsat digital data for water pollution and water qu p0018 A78-14841 studies in southern Scandinavia Engineering geological interpretation of black and white

p0036 A78-16503 color and false color air photos On the possibilities of using aerial photographs in the

planning of the recreational use of waterways and p0058 A78-16505 conservation

A Finnish system for forest management planning using photographs p0006 A78 16508 aenal photographs Automated earth resources surveys using satellite and

aircraft scanner data - A Finnish approach p0077 A78 16518

The use of balloons for geodetic research p0031 A78 18183

Investigation of LANDSAT imagery on correlations between ore deposits and major shield structures in

Finland [F78-10012] p0036 N78 10537

LANDSAT menhaden and thread herring resources --- Gulf of Mexico

[E78-10024] n0050 N78-12500 Remote sensing of oceanic parameters during the

Skylab/gamefish experiment [NASA-RP 1012] p0051 N78 12644

Design of a laser interferometer for measurement of extremely small biological motions. Application to crayfish p0051 N78-14381

#### FLOOD PLAINS

Roodplain delineation using multispectral scanner data p0081 N78 10528 Satellite land use acquisition and applications to hydrologic planning models
FLOOD PREDICTIONS p0068 N78 14564

The application of remote sensing to water resources planning watershed modelling and real-time flood forecasting p0059 A78 18861

forecasting pC
Effect of antecedent on frozen ground
[PB-270632/3] pC DO065 N78 13522

### FLORIDA

Three approaches to the classification and mapping of and wetlands p0057 A78-14906 Cold climate mapping using satellite high resolution inland wetlands thermal imagery - weather forecasting improvement

p0076 A78-14978 Determination of aerosol content in the atmosphere from

ANDSAT data

[E78-10004] LANDSAT/coastal processes DO022 N78-10531

[E78-10011] p0061 N78-10536 Analysis of synthetic aperture radar ocean wave data

ollected at Marineland and Georges Bank p0050 N78-10678 [PB-268675/6]

An intercomperison of satellite images and radar rainfall rates --- Miami Florida [PB-270299/1] p0063 N78-11647

Remote sensing of aquatic plants - New York, Florida Texas Louisiana Mississippi South Carolina

p0052 N78-14530 Three approaches to the classification of inland wetlands --- Dismal Swamp Tennessee and Florida p0068 N78-14600

## FLOW MEASUREMENT

Application of electronic distance measuring devices to measurement of discharge and sediment deposition p0062 N78-11467

Ultrasonic river gauging Site calibration of electromagnetic and ultrasonic river p0062 N78-11470

Hydrometry under Arctic conditions n0062 N78-11475

Aerial methods of measuring water discharges p0063 N78-11480

## **FLUORESCENCE**

Airborne Oceanographic Lidar System

p0048 A78-14878 Preliminary results from the Lidar system at the University of L Aquila --- stratospheric aerosols and outrogen dioxi fluorescence observations
FLUORINE COMPOUNDS p0022 A78-18476

Trichlorofluoromethane a new hydr p0069 N78-15531 and dating ground water

The microstructure of California coastal fog and stratus p0072 A78-14314

#### **FORECASTING**

Wheat yield forecasts using Landsat data

p0004 A78-14876 p0009 N78-14496 LACIE A look to the future

FOREST FIRE DETECTION An application of Landsat digital technology to forest a firel type mapping p0004 A78-14863 fire fuel type mapping

adian fire sites p0005 A78-15308 Convective cloud plumes mark Car

An application of LANDSAT digital technology to forest p0011 N78-14557 fire fuel type mapping

SUBJECT INDEX FOREST MANAGEMENT

Remote sensing and geographically based information stems p0075 A78 14866 FOREST MANAGEMENT ency band justifications for passive sensors 100 to 385 GHz chapter 1 - - for monitoring earth resources Remote sensing and today's forestry issues systems p0002 A78 14792 Remote sensing and geographically Use of multispectral data in design of forest sample pool A78 14808 Forestland type identification and analysis in Western [NASA-CR-155530] DO090 N78 14560 p0093 N78-15328 Frequency band justifications for passive sensors 10.0 GEOGRAPHY The transfer of the contents of satellite pictures onto to 385 GHz chapter 2 - for monitoring earth resources Massachusetts - A linkage of a Landsat forest inventory and the environment [NASA-CR-155532] eographic mans to an optimization study p0005 A78-14901 [BLLD-M-24900-(5828 4F)] n0093 N78-15329 p0033 N78-14453 Assessment of forest plantations from low altitude aerial The impact of remote sensing on United States **FURLABLE ANTENNAS** p0005 A78-14903 geography The past in perspective present realities future An entree for large space antennas p0097 A78 16699 A Finnish system for forest management planning using proof A78 16508 p0109 N78-14470 ntials A hinnish system.

Approaches for solving forestry problems by utilizing poole A78 18515 poole Correlated errors in satellite altimetry geoids p0029 A78-13760 GEOIDS G Mean annual volume growth from sequential volume Preliminary eastern Indian Ocean goold from GEOS-3 determination on permanent aerial photographic plots GALACTIC STRUCTURE p0006 A78 16522 [AD-A043788] n0050 N78-10675 Far infrared photometry with an 0.4-meter liquid helium Improved ground truth geoid for the GEOS-3 calibration Optimum ratio of photo-field plots for aerial volume and cooled balloon-borne telescope aerial volume growth regression construction --- for spruce [NASA-CR-155234] p0099 N78 11449 area p0006 A78 16523 [NASA-CR 141431] p0032 N78-12510 GAMMA RAY ABSORPTIOMETRY **GEOLOGICAL FAULTS** Use of multispectral data in design of forest sample independent with Nucleonic coal detector p0009 N78 14500 Integration of remote sensing and surface g hydropneumatic suspension [NASA-CR-150465] p0035 A78-14867 FORESTS in the detection of faults p0036 N78-11454 Forest type mapping of the Atchafalaya River Basin from satellite and aircraft imagery p0002 A78 13068 Investigation of LANDSAT imagery on correlations between ore deposits and major shield structures in MMA RAY ABSORPTION Aenal gamma-ray and magnetic survey of the Red River area Block C Texas and Oklahoma volume 2 Pre-visual detection of stress in pine forests Finland p0004 A78-14847 [E78-10012] [GJBX-17(77)-VOL 2] p0037 N78-13517
GARP ATLANTIC TROPICAL EXPERIMENT p0036 N78-10537 Integration of remote sensing and surface geophysi Computer aided classification for remote sensing in p0038 N78-14561 agriculture and forestry in Northern Italy in the detection of faults
GEOLOGICAL SURVEYS Analysis of GATE radar data for a tropical cloud cluster p0004 A78-14879 p0079 A78-17068 in an easterly wave Application of the DIBIAS image processing system on Landsat pictures of central Morocco and Southern The influence of multispectral scanner spatial resolution Meteorological sensors and related technology for the eighties - - GARP Atlantic Tropical Experiment p0004 A78-14880 forest feature classification p0035 A78-12934 Application of LANDSAT images to wetland study and p0088 N78-14475 Germany Seasonal color-infrared photographs for mapping inland etlands on US Geological survey 7.5-minute classification in west Tennessee part 1
031] p0063 N78-12505 land use class [E78-10031] GAS ANALYSIS wetlands on US Geological Comparability of CO2 measurements p0035 A78-13069 Evaluation of Skylab (EREP) data for forest and rangeland quadrangles between standards and sample p0015 A78 12405 Unique ambient carbon monoxide monitor based on gas A model for microwave intensity propagation in an anomogeneous medium p0096 A78-13971 p0007 N78 12521 [PB-270543/2] inhomogeneous medium filter correlation Performance and application Industrial use of geological remote sensing from space p0035 A78-14787 Forest land management by satellite LANDSAT derived DO020 A78 16771 information as input to a forest inventory system --- North The fate of nitrogen oxides in the atmosphere p0023 N78-10619 -- for surveys of p0073 A78-14803 Space radar system specifications [PB 267784/7] Inversion of infrared limb emis [E78-10038] p0008 N78 14455 hydrology agriculture and geology on measurements for Landsat detection of hydrothermal alteration in the Nogal Canyon Cauldron New Mexico p0029 A78-14815 Agricultural scene understanding [E78-10043] temperature and trace gas concentrations p0008 N78-14459 p0084 N78-12594 Alteration mapping at Goldfield Nevada by cluster and Investigation of techniques for inventorying forested **GAS CHROMATOGRAPHY** criminant analysis of Landsat digital data - mapping The determination of volatile organic compounds in city air by gas chromatography combined with standard addition Volume 1 Reflectance modeling and empirica pectral analysis of forest canopy coof hydrothermally altered volcanic rocks p0029 A78-14833 Interpretation of multispectral and infrared thermal p0009 N78-14462 selective subtraction infrared spectrometry and mass Investigation of techniques for inventorying forested surveys of the Suez Canal Zone Egypt GAS DETECTORS regions Volume 2 Forestry information system p0076 A78-14905 requirements and joint use of remotely sensed and ancillar The arrangement of atmospheric pollution detectors by means of a minicomputer and a multicomponent chemical Image data application obtained from space to geological vestigations in the USSR p0035 A78-16502 p0016 A78-12975 investigations in the USSR p0035 A78-16502
Localization of an experimental ecological unit in the p0009 N78 14463 [E78-10047] A study of gas solid reactions and air pollution Remote sensing and today's forestry issues Maradi region of Nigeria p0009 N78 14483 detectors [NASA-TM 75085] p0027 N78-15601 p0032 N78-12553 [AD-ADARRAR] Use of multispectral data in design of forest sample Tennessee Tombigbee industrial siting project: A study of physical and environmental factors of potential industrial sites --- Mississippi: Columbus Air Force Base and Lowndes GAS INJECTION p0009 N78 14500 surveys In situ laser retorting of oil shale Pre-visual detection of stress in pine forests [NASA-CASE-LEW-12217-1] D0037 N78-14452 p0010 N78-14541 Clay Monroe Itawamba and Tishomingo Counties **GAS SPECTROSCOPY** p0024 N78-13507 Computer-aided classification for remote sensing in [E78-10035] Tunable dual-line CO2 laser for atmos spheric spectroscopy p0017 A78-14082 agriculture and forestry in Northern Italy Quaternary geologic map of Minnesota and pollution monitoring p0038 N78-14526 p0011 N78 14573 GAS-SOLID INTERFACES The influence of multispectral s er spatial resolution al remote sensing from space A study of gas solid reactions and air pollution p0011 N78 14574 p0039 N78-14615 on forest feature classification [TID-27689] detectors [AD-A046646] Development of airborne electromagnetic survey instrumentation and application to the search for buried Forestland type identification and analysis in Western DO027 N78-15601 Massachussetts A linkage of a LANDSAT forest inventory GASES p0012 N78-14595 sand and gravel a summary report [PB-271331/1] Atlas of infrared [NASA-CR-2925] to an optimization study d absorption lines p0086 N78-12608 DO039 N78-14622 Assessment of forest plantations from low altitude aerial photography --- North Carolina coastal plains p0012 N78-14597 GEOCHEMISTRY GEOLOGY Rare earth and trace element geochemistry of A comparative study of the amount and types of geologic metabasalts from the Point Sal ophiolite California information received from visually interpreted U-2 and Landsat imagery p0035 A78-13492 The use of LANDSAT digital data and computer p0036 A78-20097 implemented techniques for an erosion hazard-reforestation needs assessment --- Yalobusha Co Calhoun Co and Landsat imagery GEODERIC LINES Skylab/EREP application to eco ogical geological and A mathematical theory of equivalent transformations during the equalizing of geodesic networks Grenada Co Mississinoi oceanographic investigations of Delaware Bay p0012 N78-15540 [E78-10050] [E78-10003] p0050 N78-12492 p0031 A78-19236 Preparation of a geologic photo map and hydrologic study FORMALDEHYDE GEODESY Photochemical reactions among formaldehyde chlori the Yemen Arab Republic Norwegian marine geodetic projects p0017 A78 14174 and nitrogen dioxide in all [E78 10008] p0037 N78-12494 p0048 A78-17648 **FORTRAN** Investigations using data from LANDSAT-2 National geodetic satellite program part 1 p0083 N78-12502 CAM-Cartographic Aut documentation 5th edition [PB-270304/9] [E78-10026] Automatic Mapping program n0032 N78-11550 Geological and hydrogeological investigations in west Updated system for calculations of coordinates for p0032 N78-11498 (ocating points on computer GEO 2 [AD A045434] FRACTURE MECHANICS n0032 N78-12503 p0033 N78-13514 [E78-10027] Integration of remote sensing and in the detection of faults surface geophysics p0038 N78-14561 GEODETIC SATELLITES Industrial use of geological remote sensing from space p0037 N78-14474 National geodetic satellite program part 2 p0032 N78-11556 FRANCE LANDSAT detection of hydrothermal alteration in the Inventory of ricefields in France using Landsat and aircraft GEODETIC SURVEYS Nogal Canyon Cauldron New Mexico p0037 N78-14507 p0005 A78-14900 data GDM/GPS receiver hardware implementat Image analysis techniques with special reference to p0030 A78-15589 Applications of the ERTS 1 Satellite to traditional analysis and interpretation of geological features fro Pretiminary differences in mean w p0030 A78-16510 level between tide p0038 N78-14544 cartography LANDSAT imagery --- India

gauges along the South American Pacific coast

The use of balloons for geodetic research

during the equalizing of geodesic networks

GEOGRAPHIC APPLICATIONS PROGRAM

A mathematical theory of equivalent transformations

Recent vertical crustal movements from geodetic

measurements. Alaska and the eastern United States

The impact of remote sensing on United States geography - The past in perspective present realities future

p0048 A78-17650

n0031 A78-18183

p0031 A78-19236

p0033 N78-15622

p0017 A78-14783

Application of remote sensing to geothermal anomaly

Application of remote sensing to geological and mineral

Techniques for ocean bottom measurements of magnetic

deposits surveys of the northern Minas Gerais state utilizing images from LANDSAT

Geological remote sensing from space [TID-27689]

fields with a superconducting magnetometer

p0039 N78 14610

p0039 N78-14611

p0039 N78-14615

p0041 A78 10389

the Caldas Novas County Goias

[INPE-1129 TPT/070]

[INPE-1096-PE/073]

GEOMAGNETISM

A-10

remote sensing

FRENCH SPACE PROGRAMS

French space program

FREQUENCY ASSIGNMENT

[NASA-CR-155531]

ERTS topology of France /First results/

Environmental mapping of the French coastal zone by mote sensing p0031 A78 18102

Inventory of ricefields in France using LANDSAT and

Frequency band justifications for passive sensors 1 to 10 GHz -- for monitoring earth resources and the

p0036 A78 16511

p0012 N78-14594

p0109 N78-13978

p0092 N78 15327

SUBJECT INDEX HEIGHT

Landsat-1 identification of groundwater regimes in a eat Lake basin p0061 A78-18871 Characteristics of polar cap sun-aligned arcs GRAND CANYON (AZ) p0095 A78 13083 Relationship of tectonic structure to equifer mechanics the western Grand Canyon District. Arizona Great Lake basin Use of Landsat imagery in studies of spring icings and A vector aeromagnetometer instrument system p0068 N78-14624 p0095 A78 13239 [PB 272308/8] seasonally flooded karst in permafrost areas GRANULAR MATERIALS p0061 A78-18872 Dependence of substorm occurrence probability on the Imaging natural materials with a quasi-microscope --interplanetary magnetic field and on the size of the auroral possible possi HCMM energy budget data as a model input for assessing tometry of granular materials regions of high potential groundwater pollution -CR-155250] p0099 N78-11813 p0061 N78-10535 [E78-10010] On the role of magnetic mirroring in the auroral GRAVELS phenomena p0098 A78 20164 Comprehensive Information Retrieval and Model Input Development of airborne electromagnetic survey instrumentation and application to the search for buried (CIRMIS) -- processing ground A method of inversion of satellite magnetic anomaly ground water data p0087 N78 13951 [BNWL 2235] sand and gravel a summary report [PB-271331/1] [NASA-TM-78039] Use of thermal-infrared imagery in ground water vestigations in Montana p0067 N78 14563 p0032 N78 11452 p0039 N78-14622 investigations in Montana GEOMORPHOLOGY GRAVITY WAVES Pulsating aurora - Local and global rr Stationary waves in the Southern Hemisphere Groundwater studies in and areas in Egypt using ANDSAT satellite images p0068 N78-14582 p0035 A78 13082 LANDSAT satellite images mid latitude zone revealed from average brightness charts GEOPHYSICAL SATELLITES p0071 A78-10543 Recent developments in modeling groundwater A method of inversion of satellite magnetic anomaly Waves and turbulence in the vicinity of a chinook arch p0076 A78-15455 data [LBL 5209] n0068 N78-14616 GREAT LAKES (NORTH AMERICA) [NASA TM-78039] p0032 N78 11452 Relationship of tectonic structure to aquifer mechanics Convective cloud plumes mark Canadian fire sites in the western Grand Canyon District Arizona **GEOPHYSICS** p0005 A78-15308 [PB-272308/8] p0068 N78-14624 The floor structure of the southwest Pacific Ocean -Russian book p0047 A78-13899 Aircraft versus spacecraft for remote monitoring of water uality in U.S. coastal zones p0021 A78-17576 Trichlorofluoromethane a new hydrologic tool for tracing quality in U S coastal zones and dating ground water GULF OF MEXICO p0069 N78-15531 uality in U.S. coastal zones

Landsat-1 identification of groundwater regimes in a Integration of remote sensing and surface geophysics p0035 A78-14867 in the detection of faults Remote sensing of chlorophyll concentration from high Great Lake basin Geophysics Applied to Detection and Delineation of p0042 A78-12838 On the use of microwave radiation for Great Lakes ice Non-energy Non renewable Resources Workshop on Hydrographic charting from Landsat satellite comparison with aircraft imagery p0042 A78-1 physics p0051 N78-12632 p0042 A78-12839 [PB 271254/5] [PB-271952/4] p0037 N78-13622 Application of LANDSAT to the surveillance of lake Winter intrusions of the Loop Current -- water circulation Geological remote sensing from space p0043 A78-13116 autrophication in the Great Lakes basin - - Saginaw Bay in Gulf of Mexico p0039 N78-14615 A multispectral analysis of algal bloom in the Gulf of GEORGIA p0064 N78-13503 Mexico [F78 10023] Satellite land use acquisition hydrologic planning models and applications to p0057 A78-14870 Precipitation (radar) project of the IFYGL lake meteorology [AIAA 77-1565] p0044 A78-13657 An overview of oceanic features and air-sea interaction GEOS SATELLITES (ESA) [PB 272152/0] p0069 N78-15660 GREAT PLAINS CORRIDOR (NORTH AMERICA) processes as viewed from the NOAA operational Convective cloud plumes mark Canadian fire sites . satellites p0005 A78-15308 [AIAA 77-1569] LACIE - A look to the future - - Large Area Crop Invento DO044 A78-13660 p0002 A78-14804 Sea surface temperature gradient analysis from digital **GEOS 3 SATELLITE** Ocean current surface measurement using dynamic Convective cloud plumes mark Canadian fire sites meteorological satellite data p0005 A78-15308 [AIAA 77-1604] p0046 A78-13676 elevations obtained by the GEOS-3 radar altimeter Evaluating soil moisture and yield of winter wheat Surface temperatures and temperature gradient features of the U S Gulf coast waters p0048 A78-14912 Preliminary study of the present and possible future oil [AIAA 77-1566] p0044 A78-13658 p0007 A78-18249 the Great Plains using Landsat data
GROUND STATIONS The computation of ocean wave heights from GEOS 3 satellite radar altimeter data [AIAA 77-1571] The Italian ground receiving and processing facility for earth resources survey data p0071 A78-12927 nd gas development of areas immediately surrounding the n0044 A78-13662 Interior Salt Domes Upper Gulf Coast Salt Dome basins Preliminary eastern Indian Ocean geoid from GEOS-3 Four metre antenna system for Landsat and NOAA of east Texas, north Louisiana, and Missission data p0036 N78-10545 p0081 A78-20168 [ORNL/SUB-75/87988] reception [AD A043788] DO050 N78-10675 LANDSAT menhaden and thread herring resources Localization of an experimental ecological unit in the Improved ground truth geoid for the GEOS-3 calibration Maradi region of Nigeria [NASA-TM-75085] stination --- Gulf of Mexico area p0032 N78-12553 [E78-10024] DO050 N78-12500 [NASA-CR-141431] p0032 N78-12510 A low cost system for reception and processing of Remote sensing of oceanic parameters during the The analysis of GEOS-3 altimeter data in the Tasman line scan data from LANDSAT and other source Skylab/gamefish experiment [NASA RP-1012] and Coral seas [NASA-TM-78032] p0089 N78-14523 p0051 N78-12644 p0053 N78-15550 GROUND SUPPORT EQUIPMENT Surface temperatures and temperat of the US Gulf Coast waters ure gradient features p0053 N78-14606 **GEOTHERMAL RESOURCES** Test system for earth observation - SPOT Volume 5 The significance of an arc shaped dark patch on the Nimbus III /HRIR/ imagery of India p0077 A78-16507 Multipurpose ground facilities and dedicated image stati p0092 N78-14621 Н Application of remote sensing to geothermal anomaly mapping in the Caldas Novas County Goias GROUND TRUTH Experiments on the radar backscatter of sno p0055 A78-10386 p0039 N78-14610 [INPE 1129 TPT/070] **HABITATS** The influence of multispectral scanner spatial resolution GERMANY Multidate mapping of mosquito habitat p0004 A78-14880 on forest feature classification Application of the DIBIAS image processing system on Landsat pictures of central Morocco and Southern p0056 A78-14851 Optimal spatial sampling techniques for ground truth data Application of remote sensing technology in South Dakota in microwave remote sensing of soil moi noisture p0058 A78-18247 p0035 A78-12934 to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify The application of IR- and MSS-data in the Ruhr district Methods of assessment of ground truth soil moisture Germany --- aerial photography of heat distribution cell selection criteria for spatial data n0060 A78-18867 [E78-10053] p0074 A78-14838 p0013 N78-15542 Investigations using data from LANDSAT-2 HAIL Textural analysis by statistical parameters and its p0083 N78-12502 Results of a remote sensing study of the effects of hail vegetation p0001 A78-12878 [E78-10026] application to the mapping of flow-structures in wetlands / Mudflat area at the German coast of the North Sea/ Forest land management by satellite LANDSAT-derived on vegetation nformation as input to a forest inventory system - North HARBORS p0056 A78-14856 Development and application of operational techniques Monitoring of polluted rivers by remote sensing [E78-10038] p0008 N78-14455 for the inventory and monitoring of resources and uses for the Texas coastal zone. Volume 2. Appendices D0020 A78-16530 methods Signature extension preprocessing for LANDSAT MSS The application of IR and MSS-data in the Ruhr District p0053 N78-15538 [E78-10048] p0089 N78-14531 HAZARDS [E78-10040] n0087 N78-14457 Textural analysis by statistical parameters and its Detection identification and quantification techni-Application of LANDSAT imagery for snow mapping in application to the mapping of flow-structures in wetlands p0067 N78-14550 p0026 N78-14608 for spills of hazardous chemicals p0065 N78-14458 The digital processing of Scanning Radiometer (SR) data An evaluation of the signature extension approach to ine digital processing or Scanning Radiometer (Sr) data from NOAA weather satellites as carried out in the Meteorological Institute of the Free University of Berlin Part 1 Linearising the SR data [BLL-M-24896-(5828 4F)] p0102 N78-14750 Textural analysis by statistical parameters and its arge area crop inventories utilizing space image data -lansas and North Dakota application to the mapping of flow-structures in wetlands p0067 N78-14550 p0007 N78-12496 [F78 10016] Procedures for gathering ground truth information for a supervised approach to a computer-implemented land cover Evaluation of signature extension algorithms --- Kansas GLACIERS and North Dakota classification of LANDSAT-acquired multispectral scanner Glaciological and marine biological studies at perimeter p0083 N78-12498 Procedure B A multisegment training selection and roportion estimation procedure for processing LANDSAT of Dronning Maud Land Antarctica p0049 N78-10532 [NASA-RP-1015] [E78-10006] pO027 N78 15549 Application of LANDSAT imagery for snow mapping in GROUND WATER agricultural data Use of thermal-infrared imagery D0008 N78-14456 y in ground water p0057 A78 14869 £78 100391 [E78-10029] investigations in Montana p0064 N78-13505 Signature extension preprocessing for LANDSAT MSS GLOBAL POSITIONING SYSTEM Groundwater studies in and areas in Egypt using Landsat stellite images p0057 A78 14888 data GDM/GPS receiver hardware impl [E78 10040] p0087 N78-14457 satellite images p0030 A78-15589 HEALTH Remote sensing of soil moisture and groundwater Proceedings of the Workshop Toronto Canada November 8 10 1976 p0059 A78 18869 GOE SATELLITES The use of canonical correlation analy Potential applications of digital visible and infrared data urban environmental health quality p0027 N78-15592 from geostationary environmental satellites HEAT Groundwater projects problems Saskatchewan and Alberta Canada and parameters in p0059 A78 18860 p0074 A78-14839 Agricultura [E78-10043] ral scene understanding Processing of satellite imagery Environmental Satellite Service at the National n0008 N78-14459 Advances in surface geophysical al techniques for p0059 A78 18862 p0074 A78-14854 HEAT ISLANDS Applications of HCMM satellite data [E78-10033] groundwater and soil moisture Data retransmission by satellite for operation perational purposes p0063 N78-11490 Integration of remote sensing techniques applied to p0064 N78 12507 Canadian water management p0060 A78-18865 amundwater investigations An operational multistate earth observation data Height measurements from satellite im Airborne thermal infra-red sensing of soil moisture and

p0060 A78 18866

management system

p0110 N78-14515

p0071 A78-10519

SUBJECT INDEX HIGH RESOLUTION

HYDROMETERS SEAHT A computer program for the use of intersecting International Symposium on Remote Sensing of Modern developments in hydrometry volume 2 --arcs of altimeter dat [NASA-CR-141432] ata for sea surface height refine Environment 11th University of Michigan Ann Arbor Mich April 25 29 1977 Proceedings p0083 N78 12511 conference proceedings [WMO-427] p0106 A78-14776 HIGH RESOLUTION p0062 N78-11455 HRPT ground station -- High Transmission from NOAA satellites HOMOMORPHISMS High Resolution Picture Remote sensing data processing Two years ago today p0072 A78 14784 Hydrometry under Arctic conditions p0081 A78-20171 p0062 N78-11475 and two years from today A survey of SAR image-formation processing for earth p0073 A78 14785 HYSTERESIS Homomorphic processing of Landsat data resources applications On the hysteresis of the sea surface and its applicability p0081 A78-20173 A perspective on the state of the art of photographic to wave height predictions [AIAA 77-1588] p0073 A78 14786 HORIZON SCANNERS interpretation p0045 A78-13669 IRFES - Infra-Red Fan beam Earth Sensor Prototype Operational data processing. The first ten years are the remote sensing p0073 A78-14789 hardest --- in meteorological satellite re model IFSA-CR(P)-974 p0100 N78 13518 Remote sensing of environmental mpact of land use p0018 A78-14798 HUMIDITY Investigation of LANDSAT imagery on correlations activities between ore deposits and major shield structures in Landsat D thematic mapper simi lation using aircraft p0073 A78-14806 ICE Finland Aerial photointerpretation of a small ice jam [AD-A045870] p0064 multispectral scanner data On the photographic processing and digital texture for remote sensing of Kujukuri coast of Chiba in Japan [E78-10012] p0036 N78 10537 p0064 N78-13513 HUMIDITY MEASUREMENT ICE FORMATION Passive microwave remote sensing of soil moisture p0073 A78-14814 Scatterometer results from shorefast and floating sea p0005 A78 14915 Special Sensor H data processing at AFGWC - Preliminary ndsat II digital data p0056 A78-14816 Automated image processing of La p0047 A78-14822 for watershed runoff prediction Use of Landsat imagery in studies of spring icings and stern Alaska from results - - IR temperature-humidity-ozone Reindeer range inventory in we seasonally flooded karst in permafrost ar p0097 A78 14972 computer-aided digital classification of Landsat data DO061 A78-18872 p0003 A78 14824 HUNGARY Glaciological and marine biological studies at perimeter Recent crustal movements registered by the aid of rphoto interpretation p0030 A78 16534 A low cost system for reception and processing of of Dronning Maud Land Antarctica [E78-10006] airphoto interpretation HURRICANES line-scan data from Landsat and other sources p0049 N78-10532 p0074 A78 14831 ICE MAPPING Processing of satellite imagery Environmental Satellite Service at the National Ocean wave nameros under Hurricane Gloria -Computer processing of SAR L-band imagery - -Observation with an airborne synthetic ap Synthetic Aperture Radar for ice mappi Production of a water quality map of Saginaw Bay by p0047 A78 14126 p0055 A78-10524 HYDROCARBON COMBUSTION computer processing of Landsat-2 data In-situ laser retorting of oil shale [NASA-CASE-LEW 12217-1] p0057 A78 14857 Landsat image interpretation aids - - for Large Area Crop Scatterometer results from shorefast and floating sea DO037 N78-14452 ventory Experiment po004 A78-14884
Blob - An unsupervised clustering approach to spatial eprocessing of MSS imagery p0075 A78-14883 HYDROGEN CHLORIDES NOAA satellite monitoring of snor v cover in the northern Evaluation of a hydrogen environmental monitoring detector hemisphere during the winter of 1977 [IAF PAPER 77-121] p0017 A78 13843 preprocessing of MSS imagery
A digital technique for manual p0057 A78-15935 extraction of data from The vertical distribution of HCI in the stratos ance A study p0049 A78-20169 Systems approach to ice reconna e stratosphere p0019 A78 15890 aerial photography --- for land use/land cover studies p0075 A78 14885 HYDROGEOLOGY Scatterometer results from shorefast and floating sea p0052 N78 14514 Groundwater projects problems and parameters in Saskatchewan and Alberta Canada p0059 A78-18860 Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study linears in the Friuli earthquake area p0075 A78 148 ICE REPORTING p0075 A78 14886 Interactive image processing for meteorological applications at NASA/Goddard Space Flight Center p0076 A78 15004 Advances in surface geophysical techniques Monitoring open water and sea ice in the Bering Strait radar p0041 A78-10388 groundwater and soil moisture p0059 A78-18862 by radar Electrical properties of water in rocks a cs and soils p0060 A78-18864 OCS environmental research technology in ice-covered p0043 A78-12845 Landsat-1 identification of grounds water p0076 A78 15330 water regimes in a p0061 A78-18871 Digital image processing Real time satellite imagery for sea ice forecasting Great Lake basin The Gestalt Photomapping System p0030 A78 15730 [AIAA 77 1601] p0046 A78-13675 HYDROGRAPHY The complex of optical-photographical transformation Computer processing of SAR L-band imagery --Scatterometer results from shorefast and floating sea p0047 A78-14822 methods of aerial and space images used for study of natural Synthetic Aperture Radar for ice mapping resources p0077 A78-16501 p0055 A78-10524 Systems approach to ice reconna sance - A study p0049 A78-20169 magery --- Landsat p0078 A78-16532 Digital rectification of multispectral Hydrographic charting from Landsat satellite data processing p0042 A78 12839 comparison with aircraft imagery Radar systems for a polar mission [NASA-CR-156640] volume 1 Digital preprocessing and classification of multispectral Establishment of the hydro-morphometric characteristics n0049 N78 10344 p0078 A78-16542 earth observation data using Aerial ice reconnaissance and satellite ice information Geometrical models for satellite scanner imagery p0078 A78 16545 remote-sensing recordings ncrofilm file 1976 supplement 1 HYDROLOGY [AD A043046] p0050 N78-11491 The utility of short wavelength /less than 1 mm/ remote Analysis of MSS digital imagery with the aid of principal On the use of microwave radiation for Great Lakes ice sensing techniques for the monitoring and assessment of hydrologic parameters p0055 A78-14780 component transform --- Landsat multispectral scannin rveillance p0078 A78 16547 [PB-271254/5] p0051 N78-12632 Microwave remote sensing of hydrologic parameters p0055 A78 14781 A block adjustment for SLAR-imagen ICEBERGS p0079 A78 16548 Glaciological and marine biological studies at perimeter Utilization of remote sensing observations in hydrologic A mathematical model for digital rectification of remote insing data p0079 A78 16549 nO055 A78-14782 of Dronning Maud Land Antarctica [E78-10006] sensing data p0049 N78-10532 Remote sensing-aided systems for snow quantification Analysis of GATE radar data for a tropical cloud cluster evapotranspiration estimation and their application in ILLINOIS p0079 A78-17068 an easterly wave hydrologic models p0056 A78-14834 The auxiliary use of LANDSAT data in estimating crop Clustering of ERTS data using various orthogonal Use of thermal-infrared imagery Results of the 1975 Illinois crop-acreage acreages n ground water p0057 A78-14869 p0079 A78-17543 transforms investigations in Montana Satellite land use acquisition and applications to hydrologic planning models p057 A78 1487. The application of remote sensing to water resource planning watershed modelling and real-time floor nd applications to p0057 A78 14870 [E78-10049] transform coding of p0079 A78-18071 p0012 N78-15539 multispectral data IMAGE CONTRAST Computer elaboration and visualization of remote-sens Image analysis techniques with special reference to analysis and interpretation of geological features from data -- from Landsat for cartography p0080 A78 18241 forecasting p0059 A78-18861 p0029 A78-14850 Landsat imagery The use of Landsat imagery for terrain analysis Soviet studies of the Arctic and Southern Oceans in the p0080 A78-18244 MAGE ENHANCEMENT p0049 A78-19850 current stage Image analysis techniques with special reference to Data handling for the geometric correction of large p0080 A78 18649 Preparation of a geologic photo map and hydrologic study Landsat imagery p0029 A78-14850
Digital image processing p0076 A78-15330 ımages of the Yemen Arab Republic Methods of analytic processing of various aerocosmic p0081 A78 19241 [E78-10008] n0037 N78 12494 Digital image processing Practical experience in the rectificati photoimages Geological and hydrogeological investigations in west Homomorphic processing of Lai dsat data --- image p0081 A78 20173 n0077 A78-16520 p0032 N78 12503 [E78-10027] enhancement Landsat-radar synergism - - image nhancement through p0079 A78-16554 78-1002/]
Application of LANDSAT images to wetland study and no use classification in west Tennessee part 1 78-10031]
p0063 N78-12505 compositing techniques Resampling study [E78-10014] nOO82 N78 12495 Homomorphic processing of Landsat data --- imag p0081 A78-20173 Cartographic Electron Beam Rec [AD-A044401] [E78-10031] order (EBR) system p0100 N78 12513 Applications of HCMM satellite data Image analysis techniques with special reference to enalysis and interpretation of geological features from LANDSAT imagery --- India p0038 N78-14544 p0064 N78-12507 [E78-10033] Texture tone feature extraction and analysis [AD-A045542] p0086 N78 13412 The utility of short wavelength (1mm) remote sensing echniques for the monitoring and assessment of hydrolog IMAGE PROCESSING A survey of SAR image-formation processing for earth sources applications p0087 N78 14472 p0065 N78-14467 Computer processing of SAR L-band imagery Synthetic Aperture Radar for ice mapping narameters resources applications Microwave remote sensing of hydrologic parameters p0065 N78-14468 Operational data processing. The first ten years are the p0055 A78-10524 hardest -- National Environmental Satellite Service Computer image processing ເກ marine resource p0088 N78 14476 Utilization of remote sensing obse p0041 A78-12828 DO065 N78 14469 Digital exploitation of synthetic aperture radar Earth Resources Management system for analyzing p0088 N78-14505 Remote sensing aided systems for snow qualification remotely sensed data motely sensed data p0071 A78-12928 Application of the DIBIAS image processing system on evapotranspiration estimation and their Automated image processing of LANDSAT 2 digital data p0067 N78-14527 p0066 N78-14508 hydrologic models for watershed runoff prediction Landsat pictures of central Morocco and Satellite land use acquisition nd applications to p0068 N78-14564 p0035 A78-12934 Processing of satellite imagery Environmental Satellite Service at the National hydrologic planning models An application of numerical filtering and data compression p0089 N78-14548 Trichlorofluoromethane a new hydrologic tool for tracing to the elaboration of earth resources imagery p0071 A78-12935 The digital processing of Scanning Radiometer (SR) data from NOAA weather satellites as carried out in the and dating ground water n0069 N78-15531 Meteorological Institute of the Free University of Berlin
Part 1 Linearising the SR data
[BLL-M-24896-(5828 4F)] p0102 N78-14750 HYDROMETEOROLOGY Detection and measurement of interfaces in remotely Use of earth satellite technology for telemetering informateorological station data p0063 N78 11489 acquired data using a digital computer [AIAA 77 1616]

p0096 A78-13688

nO102 N78-14750

hydrometeorological station data

SUBJECT INDEX INSTRUMENT RECEIVERS

Boundary detection in images Optical formulation in terms of signal detection theory - photointerpretation of satellite imagery [INPE-1118 TPT 067] p0092 N78-14894 IMAGE RESOLUTION

Investigation of thematic mapper spatial radiometric and spectral resolution p0088 N78-14518

IMAGERY investigation of natural environment by space means Geobotany Geomorphology soil sciences agricultural

ds landscape study [NASA TM-75041] nO108 N78-11448 Image modeling with application to measurement

IMAGES

LANDSAT image interpretation aids p0089 N78-14558

p0082 N78-12491

IMAGING TECHNIQUES p0071 A78-10325 Side-looking airborne radar Height measurements from satellite images

p0071 A78-10519 Real time satell [AIAA 77-1601] ice forecasting p0046 A78-13675 satellite imagery for

obtained from space to geological SR p0035 A78-16502 Image data application investigations in the USSR Imaging natural materials with quasi-microscope ectrophotometry of granular materials

[NASA-CR 155250] D0099 N78-11813 IASA-CR 155250j Image modeling with application to measurement p0082 N78-12491

Digital image correlation techniques applied to LANDSAT nultispectral imagery

[E78-10022] p0083 N78-12499 BLOB An unsupervised clustering approach to spatial reprocessing of MSS imagery p0090 N78-14577

preprocessing of MSS imagery p0090 N78-14577
Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Friuli earthquake area p0091 N78
IMPROVED TIROS OPERATIONAL SATELLITES

NOAA satellite

Present and future operational oceanographic products - An introduction p0047 A78-14820

Image analysis techniques with special reference to analysis and interpretation of geological featu p0029 A78-14850 Landsat imagery

The significance of an arc shaped dark patch on the Nimbus III /HRIR/ imagery of India p0077 A78-16507 The dry deciduous forests of Bastar Central India on

indsat-1 p0006 A78-18551
Visual interpretation of Landsat MSS imagery for a reconnaissance soil survey of a part of the Indo-Ga p0006 A78-16555 plain India

Image analysis techniques with special reference to analysis and interpretation of geological features
LANDSAT imagery - India p0038 N78p0038 N78-14544

INDIAN OCEAN

IDIAN OCEAN
Stationary waves in the Southern neurospinion
mid-latitude zone revealed from average brightness charts
p0071 A78-10543
from 6FOS-3

Preliminary eastern Indian Ocean goold from GEOS-3 data [AD-A043788]

p0050 N78-10675

INDIANA

Comparing soil boundaries delineated by digital analysis of multispectral scanner data from high and low spatial resolution systems - Tippencanoe County Indiana
[E78-10017] p0008 N78-13500

Evaluation of algorithms for geological thermal-ine p0039 N78-14562 Quantification of soil mapping by digital analysis of LANDSAT data --- Clinton County Indiana

p0091 N78-14602 [REPT-6690]

INDUSTRIAL AREAS

Tennessee Tombigbee industrial siting project. A study of physical and environmental factors of potential industrial sites --- Mississippi Columbus Air Force Base and Lowndes Clay Monroe Itawamba and Tishomingo Counties [E78-10035] p0024 N78p0024 N78-13507 INDUSTRIES

Industrial use of geological remote sensing from space p0037 N78-14474

Remote sensing and today's forestry p0009 N78-14483

INERTIA PRINCIPLE Evaluation of algorithms for geologic

p0039 N78-14562 INERTIAL NAVIGATION

Use of an inertial navigation system for accurate track recovery and coastal oceanographic measurem p0096 A78-14892

Use of an inertial navigation system for accurate track recovery and coastal oceanographic measurements p0053 N78-14586

INFESTATION

Pre-visual detection of stress in pine forests n0004 A78-14847

The use of remote sensing in the detection of damage p0006 A78-16513 Application of remote sensing to state and regional

p0024 N78-13506 [F78-1003A]

INFORMATION DISSEMINATION

Progress and needs in agricultural research, development and applications programs p0009 N78-14482

Satellite land use acquisition and applications hydrologic planning models

IFORMATION MANAGEMENT n0068 N78-14564

Gathering and using information on a global scale p0109 N78-14479

INFORMATION RETRIEVAL

Information Retrieval and Model Input prehensive information housest ground water data nce (CIRMIS) - processing ground water data -22351 p0087 N78-13951 [BNW1-2235]

y based information p0090 N78-14560 Remote sensing and geograph

INFORMATION SYSTEMS

Remote sensing and geographically based information p0075 A78-14866 LANDSATS role in an earth resources information

system National Aeronautics and Space Administration Office of Science and Technology Policy
[NASA-CR-155217] p p0108 N78-10968

Earth resources information systems [GPO-95-881]

p0108 N78-11450 A case study using ECHO(Extraction and Classificate of Homogeneous Objects) for analysis of multispectral

p0083 N78-12504 [E78-10030]

Earth resources information system

[GPO-94-462] pO108 N78-12509 Investigation of techniques for inventorying forested Forestry information system Volume 2 requirements and joint use of remotely sensed and ancillary

[E78-10047] n0009 N78-14463 An operational multistate earth observation data management system nO110 N78-14515 Remote sensing and geographs p0090 N78-14560

systems Pilot study of the potential contributions of LANDSAT data in the construction of area sampling frames

[E78-10037] pO012 N78-15536

INFRARED ABSORPTION

The remote sensing of atmospheric pollutants by a CO2 p0016 A78-12982

INFRARED DETECTORS Estimating clear radiances - A report and a new decision rule --- IR measurement in lower atmosphere p0097 A78-14971

lultilayered (Hg Cd)Te infrared detector p0099 N78-11453 [NASA-CR-151548]

INFRARED FILTERS

Unique ambient carbon monoxide monitor based on gas filter correlation Performance and application

p0020 A78 16771 INFRARED IMAGERY

Analysis of the marine en vironment in DMSP imagery

focusing on island barrier effects [AIAA 77-1596] p0045 A78-13671 Remote sensing of ocean temperature

[AIAA 77-1599] p0045 A78-13674 Use of thermal-infrared imagery y in ground-water p0057 A78-14869 investigations in Montana

Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt p0076 A78-14905

Surface temperatures and temperature gradient features the U S Gulf coast waters p0048 A78-14912 of the US Gulf coast waters

The significance of an arc shaped dark patch on the Nimbus III /HRIR/ imagery of India p0077 A78-16507 Estimation of old field ecosystem biomass using low titude imagery p0088 N78-14520 altitude imagery Study of the Brazil and Falkland currents using their

images of Nimbus 5 and oceanographic data in 1972 1973 p0052 N78-14533 View angle effect in LANDSAT imagery

p0089 N78-14542

Use of thermal-infrared imagery y in ground-water p0067 N78-14563 investigations in Montana

INFRARED LASERS

Remote infrared spectroscopy of the earth --mineralogical and petrological obse p0029 A78-14849

Pulsed coherent lidar systems for airborne and satellite p0076 A78-15012 ased wind field measurement

INFRARED PHOTOGRAPHY

Detection of oak wilt with color IR serial photography p0001 A78-10522

Spectral reflectance deduced from color infrared photos for forest damage detection p0002 A78-13066

Surface resource inventory of eastern Montana rangelands utilizing high altitude color infrared aerial p0002 A78-13067 photography

Seasonal color infrared photographs for mapping inland retlands on U.S. Geological survey 7.5-minute wetlands on US quadrangles Geological survey 7 5-minute p0035 A78-13069 Three approaches to the classification

ion and mapping of p0057 A78-14908 inland wetlands Thunderstorm monitoring from geosynchronous

p0076 A78-15010 Photo interpretative procedures in assessing river preation potential p0080 A78-18271 ecreation potential

INFRARED RADIATION

Polarimeter measures sea state characteristics using emitted infrared radiation p0047 A78-14821

Further tests of the Suits reflectance model -- for crop p0003 A78-14827

Inversion of infrared limb emission measurements for temperature and trace gas concentratio

p0084 N78-12594

The utility of short wavelength (1mm) remote sensing techniques for the monitoring and assessment of hydrolog p0065 N78-14487

INFRARED RADIOMETERS

Remote optical sensing of the concentration and mass flow of particulate and gaseous pollutents in smoke plumes p0016 A78-12981 discharged through chimneys

Potential applications of digital visible and infrared data from geostationary environmental satellites p0074 A78-14839

Study of the Brazil and Falkland currents using THIR images of Nimbus V and oceanographic data in 1972 to 1973 p0047 A78-14840

Capabilities of operational infrared sounding systems from satellite altitude p0096 A78-14873 Cloud properties from satellite infrared and visible easurements p0097 A78-14973

Potential applications of digital visible, and infrared data from geostationary environmental satellites

p0101 N78-14532 Study of the Brazil and Falkland currents using their

images of Nimbus 5 and oceanographic data in 1972 p0052 N78-14533

INFRARED REFLECTION

Analysis of infrared reflectivity in the presence of asymmetrical phonon lines - phonon spectra of mineral crystals p0035 A78-13932 Polarimeter measures sea state

characteristics using p0047 A78-14821 emitted infrared radiation INFRARED SCANNERS

The application of IR- and MSS-data in the Ruhr district - aerial photography of heat distribution p0074 A78-14838

Special Sensor H data processing at AFGWC - Preliminary results --- IR temperature-humidity-ozone so

p0097 A78-14972 Airborne thermal infra-red sensing of soil moisture and roundwater p0060 A78-18866 groundwater Soil moisture determination by thermal infrared remote

p0060 A78-18870 Evaluation of an infrared line scanner for the study of

coastal water circulation [NIWARS-PUBL-41] nOO99 N78-11496 IRFES Infra-Red Fan beam Earth Sensor Prototype

IESA-CR(P) 974 p0100 N78-13518 The application of IR- and MSS-data in the Ruhr District

Germany p0089 N78-14531 Potential applications of digital visible and infrared data from geostationary environmental satellites

p0101 N78-14532 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the p0067 N78-14536

Airborne monitoring of crop canopy temperatures for irrigation scheduling and yield prediction

p0011 N78-14591

INFRARED SPECTRA The vertical distribution of HCI in the stratos

p0019 A78-15890 Infrared absorption spectra attributed to ion-nucleated

water clusters [AD-A044861] n0064 N78-12518 INFRARED SPECTROMETERS

of a rocket borne spectrometer into a quiet atmosphere (1974)

[AD-A045466] nO100 N78-13684 Rocketborne measurement of an infrared enhancement associated with a bright auroral breakup [AD-A048474] p0

p0102 N78-15632 INFRARED SPECTROSCOPY

Analysis of infrared reflectivity in the presence of asymmetrical phonon lines --- phonon spectra of mineral p0035 A78-13932 of the earth -crystals

mineralogical and petrological observations p0029 A78-14849 Field infrared method to discriminate natural seeps from

non-seeps Santa Barbara California area
[AD-A042861] pC p0023 N78-10608

Atlas of infrared absorption lines p0086 N78-12608 [NASA CR-2925]

Remote infrared spectroscopy of the earth p0038 N78-14543 A study of gas solid reactions and air pollution detectors

[AD-A046646] p0027 N78-15601

INPUT/OUTPUT ROUTINES

Comprehensive Information Retneval and Model Input Sequence (CIRMIS) -- processing ground water data (BNWL 2235) p0087 N78-13951 INSECTS

Multidate mapping of mosquito habitat ··· Nebraska South Dakota p0067 N78-14545 INSOLATION

Characterization of terrestrial service environments - The simultaneous occurrence of combined conditions of solar p0015 A78-11283 nsolation and climatic variables INSTRUMENT RECEIVERS

GDM/GPS receiver hardware implementation p0030 A78-15589

INTERNAL TRANSPORMATIONS	IONA	Miles and and an arrangement of the second o
INTEGRAL TRANSFORMATIONS  Generalization of the relaxation method for the inverse	Infrared absorption spectra attributed to ion-nucleated	Wheat productivity estimates using LANDSAT data [E78-10009] p0007 N78-10534
solution of nonlinear and linear transfer equations	water clusters	Planting data and wheat yield models Kansas South
p0084 N78-12590	[AD-A044661] p0064 N78-12518	Dakota and USSR
INTERCOSMOS SATELLITES	IOWA	[E78-10013] p0007 N78-10538
Intercosmos laser ranging stations p0031 A78-18108	Production of a map of land-use in Iowa through manual	Evaluation of signature extension algorithms Kansas
INTERFACES  Detection and measurement of interfaces in remotely	interpretation of Landsat imagery p0018 A78-14837	and North Dakota [E78 10021] p0083 N78-12498
acquired data using a digital computer	Land classification of south-central lows from computer	[E78 10021] p0083 N78-12498 Investigations of spectral separability of small grains early
[AIAA 77-1616] p0096 A78-13688	enhanced images [E78-10005] p0082 N78-12493	season wheat detection and multicrop inventory planning
INTERFEROMETERS	•	- North Dakota and Kansas
Design of a laser interferometer for measurement of	IRON ORES  Application of Landsat satellite imagery for iron ore	[E78-10015] p0008 N78-13499
extremely small biological motions. Application to crayfish	prospecting in the western desert of Egypt	Two phase sampling for wheat acreage estimation -
giant axon p0051 N78-14381	p0035 A78-14887	large area crop inventory experiment p0010 N78-14538
INTERNAL WAVES Temperature measurement array for internal wave	Application of LANDSAT satellite imagery for iron ore	LANDSAT data from agricultural sites Crop signature analysis - Kansas p0012 N78-14593
observations in upper ocean p0042 A78-12842	prospecting in the Western Desert of Egypt	KARST
The magnetic field and magnetic field gradients of the	p0039 N78-14581	Use of Landsat imagery in studies of spring icings and
NUC oceanographic research tower	IRRADIANCE	seasonally flooded karst in permafrost areas
[AD-A045161] p0051 N78-13289	influence of ground level SO2 on the diffuse to direct	p0061 A78-18872
INTERNATIONAL COOPERATION	irradiance ratio in the middle ultraviolet	KENTUCKY
Indicators of international remote sensing activities	p0018 A78-14810	Remote monitoring and Tennessee Valley Authority
p0107 A78-14842 Spacelab - A new tool for cooperative research	IRRIGATION  Monitoring irrigated land acreage using Landsat imagery	programs p0018 A78-14800 Tennessee-Tombigbee industrial siting project A study
p0108 A78-19595	An application example in Klamath River basin of	of physical and environmental factors of potential industrial
Gathering and using information on a global scale	Oregon p0003 A78 14809	sites Mississippi Columbus Air Force Base and Lowndes
p0109 N78-14479	Airborne monitoring of crop canopy temperatures for	Clay Monroe Itawamba and Tishomingo Counties
US initiatives for remote sensing applications in the	irrigation scheduling and yield prediction	[E78 10035] p0024 N78-13507
developing world p0110 N78-14480	p0004 A78-14897	Remote monitoring and Tennessee Valley Authority
INTERNATIONAL LAW	Wheat productivity estimates using LANDSAT data	programs p0066 N78-14492
The present status of remote sensing in the United Nations 8 April 1977 p0110 N78-14481	[E78-10009] p0007 N78-10534	KOLMOGOROFF-SMIRNOFF TEST
Nations 8 April 1977 p0110 N78-14481 international relations	HCMM energy budget data as a model input for assessing	Estimating clear radiances - A report and a new decision rule IR measurement in lower atmosphere
Remote sensing utilization of developing countries An	regions of high potential groundwater pollution	p0097 A78-14971
appropriate technology p0111 N78 14552	[E78-10010] p0061 N78-10535	p==== • 14011
INTERPLANETARY MAGNETIC FIELDS	Airborne monitoring of crop canopy temperatures for	1
Dependence of substorm occurrence probability on the	rrigation scheduling and yield prediction p0011 N78 14591	L
interplanetary magnetic field and on the size of the auroral	ISLANDS	
oval p0080 A78-18730	Analysis of the marine environment in DMSP imagery	LABORATORY EQUIPMENT
Significant initial results from the environmental measurements experiment on ATS-6	focusing on island barrier effects	Laboratory requirements for in situ and remote sensing
[NASA-TP-1101] p0102 N78-15142	[AIAA 77-1596] p0045 A78 13671	of suspended material [NASA-CR-145263] p0098 N78-10539
INVENTORY MANAGEMENT	Development and application of operational techniques	[NASA-CR-145263] p0098 N78-10539 LABRADOR
Reindeer range inventory in western Alaska from	for the inventory and monitoring of resources and uses	The use of Landsat imagery to locate uncharted coastal
computer-aided digital classification of Landsat data	for the Texas coastal zone Volume 2 Appendices	features on the Labrador Coast p0074 A78-14832
p0003 A78-14824	[E78-10048] p0053 N78 15538	A low-cost system for reception and processing of
Inversion Methods in Atmospheric Remote Sounding	ISRAEL	line-scan data from LANDSAT and other sources
[NASA-CP-004] p0084 N78 12586	Monitoring surface albedo change with Landsat p0029 A78 13766	p0089 N78-14523
Some aspects of the inversion problem in remote	ITALY	Quantitative evaluation of water bodies dynamic by
sensing p0084 N78-12589	The Italian ground receiving and processing facility for	means of thermal infrared and multispectral surveys on the
Statistical principles of inversion theory	earth resources survey data p0071 A78 12927	Venetian lagoon p0067 N78-14536
p0084 N78-12591	Commission and advantage of the commission of	LAKE ERIE
	computer-aided classification for remote sensing in	
Inverse solution of the pseudoscalar transfer equation	Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy	Applications of HCMM satellite data
through nonlinear matrix inversion p0084 N78-12592	agriculture and forestry in Northern Italy p0004 A78-14879	Applications of HCMM satellite data [E78-10033] p0064 N78-12507
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding	agriculture and forestry in Northern Italy p0004 A78-14879 Application of conventional and advanced techniques for	Applications of HCMM satellite data [E78-10033] p0064 N78-12507 LAKE ONTARIO
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of cone and temperature profiles from remote sounding data p0084 N78-12593	agriculture and forestry in Northern Italy p0004 A78-14879 Application of conventional and advanced techniques for the interpretation of Landset 2 images for the study of	Applications of HCMM satellite data [E78-10033] p0064 N78-12507
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 inversion of infrared limb emission measurements for	agriculture and forestry in Northern Italy p0004 A78-14879 Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Friuli earthquake area p0075 A78-14886	Applications of HCMM satellite data [E78-10033] p0064 N78-12507 LAKE ONTARIO Rader observed land/lake precipitation differences p0058 A78-17074 Applications of HCMM satellite data
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data Inversion of infrared limb emission measurements for temperature and trace gas concentrations	agriculture and forestry in Northern Italy p0004 A78-14879 Application of conventional and advanced techniques for the interpretation of Landset 2 images for the study of	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO Radar observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507
through nonlinear matrix inversion p0084 N78-1259 of Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594	agriculture and forestry in Northern Italy p0004 A78-14879 Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruiti earthquake area p0075 A78-14888 Remote sensing of water quality in 7 lakes in northern	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO Rader observed land/lake precipitation differences p0058 A78-17074 Applications of HCMM satellite data [E78 10033] Precipitation (rader) project of the IFYGL lake meteorology
through nonlinear matrix inversion p0084 NT8-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding p0084 NT8-12593 Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 NT8-12594 Inversion of scattered radiance horizon profiles for	agriculture and forestry in Northern Italy p0004 A78-14879 Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruiti earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern ltaly p0058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed tand/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL take meteorology program
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters	agriculture and forestry in Northern Italy p0004 A78-14879 Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruit earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-18528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536	Applications of HCMM satellite data [E78-1003] p0064 N78-12507  LAKE ONTARIO Rader observed land/lake precipitation differences p0058 A78-17074 Applications of HCMM satellite data [E78 10033] p0064 N78-12507 Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15660
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78 12595	agriculture and forestry in Northern Italy pOOO4 A78-14879 Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Friuli earthquake area pOO75 A78-14886 Remote sensing of water quality in 7 lakes in northern poO58 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon Computer-added classification for remote sensing in	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed tand/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507 Precipitation (rader) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15680  LAKES
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters	agriculture and forestry in Northern Italy pOOO4 A78-14879 Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruiti earthquake area pOO75 A78-14886 Remote sensing of water quality in 7 lakes in northern ltaly Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon pOO67 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy	Applications of HCMM satellite data [E78-1003] p0064 N78-12507  LAKE ONTARIO Rader observed land/lake precipitation differences p0058 A78-17074 Applications of HCMM satellite data [E78 10033] p0064 N78-12507 Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15660
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78 12595 Inversion of solar aureole measurements for determining aerosol characteristics	agriculture and forestry in Northern Italy p0004 A78-14879 Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruit earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern ltaly Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15680  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the
through nonlinear matrix inversion p0084 N78-12592  Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78 12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78 12596	agriculture and forestry in Northern Italy pOOO4 A78-14879 Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruiti earthquake area pOO75 A78-14886 Remote sensing of water quality in 7 lakes in northern ltaly Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon pOO67 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed tand/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15660  LAKES Use of clear lakes as standard reflectors for atmospheric measurements On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water
through nonlinear matrix inversion p0084 N78-12592  Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78-12596 Inversion of passive microwave remote sensing data from satellites p0085 N78-12599 Inversion methods in temperature and aerosol remote	agriculture and forestry in Northern Italy pOOO4 A78-14879 Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil earthquake area pOO75 A78-14886 Remote sensing of water quality in 7 lakes in northern pOO58 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the venetian lagoon pOO67 N78-14530 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy pOO11 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruil earthquake area	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507 Precipitation (rader) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15660  LAKES Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830 On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-16505
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding date p0084 N78-12593 inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78-12596 Inversion of passive microwave remote sensing data from satellities p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding.	agriculture and forestry in Northern Italy p0004 A78-14879 Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Firuli earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern Italy p0058 A78-18528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispactral surveys on the Venetian lagoon p0067 N78-14536 Computer-added classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15680  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-16505  Resempling study
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78-12596 Inversion of passive microwave remote sensing data from stellites p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches p0085 N78-12601	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruil earthquake area p0091 N78-14580 ITERATIVE 20UITION Analytical aerial triangulation - Its obtention through a	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed tand/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15660  LAKES Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830 On the possibilities of using aeral photographs in the planning of the recreational use of waterways and water conservation  Resampling study [E78 10014] p0082 N78-12495
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78 12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78 12596 Inversion of passive microwave remote sensing data from satellites p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Friuli earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern ltaly p0058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-added classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area p0091 N78-14580 ITERATIVE SOLUTION  Analytical aenal triangulation - Its obtention through a simple algorithm p0078 A78 16533	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed tand/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] Precipitation (radar) project of the IFYGL take meteorology program [P8-272152/0]  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830 On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-16505  Resampling study [E78 10014] Airborne spectroradiometer data compared with ground
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78-12599 Inversion of passive microwave remote sensing data from satellites p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches p0085 N78-12601 Application of modified Twomey techniques to invert lidar angular scatter and solar extinction data for determining	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruil earthquake area p0091 N78-14580 ITERATIVE SOLUTION Analytical aerial triangulation - Its obtention through a simple algorithm for remote sensing of density	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed tand/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15660  LAKES Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830 On the possibilities of using aeral photographs in the planning of the recreational use of waterways and water conservation  Resampling study [E78 10014] p0082 N78-12495
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78 12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78 12596 Inversion of passive microwave remote sensing data from satellites p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches	agriculture and forestry in Northern Italy p0004 A78-14879 Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Firuli earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-18528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-added classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area p0091 N78-14580 ITERATIVE SOLUTION Analytical aerial triangulation - Its obtention through a simple algorithm p0078 A78 16533 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed tand/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15660  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-16505  Resampling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbuidty measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78 12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78 12595 Inversion of passive microwave remote sensing data from satellites p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some p0085 N78-12609 Application of modified Twomey techniques to invert lidar angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12602	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruil earthquake area p0091 N78-14580 ITERATIVE 20UTION Analytical aerial triangulation - Its obtention through a simple algorithm p0078 A78 16533 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL take meteorology program [P8-272152/0] p0069 N78-15660  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-16505  Resampling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbuity measurements at Lake Powell Utah Correlation and quantification of data
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78 12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78 12596 Inversion of passive microwave remote sensing data from satellities p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches p0085 N78-12601 Application of modified Twomey techniques to invert lidar angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12602  The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements p0085 N78-12603	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruit earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-added classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area p0091 N78-14580 ITERATIVE SOLUTION  Analytical sensit triangulation - Its obtention through a simple algorithm p0078 A78 16533 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL take meteorology program [P8-272152/0] p0069 N78-15660  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-16505  Resampling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514  On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding date p0084 N78-12593 inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78-12595 Inversion of passive microwave remote sensing data from satellities p0085 N78-12599 Inversion emitods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches p0085 N78-12601 Application of modified Twomey techniques to invert lidar angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12603. The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements p0086 N78-12603.	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruil earthquake area p0091 N78-14580 ITERATIVE 20UTION Analytical aerial triangulation - Its obtention through a simple algorithm p0078 A78 16533 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (rader) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15680  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-156505  Resampling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-15529] p0100 N78-12514  On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028]
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78 12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78 12596 Inversion of passive microwave remote sensing data from satellities p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches p0085 N78-12601 Application of modified Twomey techniques to invertilidar angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12602 The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements p0086 N78-12603 Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruit earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-added classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area p0091 N78-14580 ITERATIVE SOLUTION  Analytical sensit triangulation - Its obtention through a simple algorithm p0078 A78 16533 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed tand/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78-10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15660  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements On the possibilities of using aeral photographs in the planning of the recreational use of waterways and water conservation  Resampling study [E78-10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514 On multidsciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] Use of clear lake as standard reflectors for atmospheric
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78 12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78 12596 Inversion of passive microwave remote sensing data from satellites p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some p0085 N78-12609 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some p0085 N78-12602 Application of modified Twomey techniques to invert lidar angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12602 The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements p0086 N78-12603 Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement p0086 N78-12603	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruit earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-added classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area p0091 N78-14580 ITERATIVE SOLUTION  Analytical sensit triangulation - Its obtention through a simple algorithm p0078 A78 16533 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL take meteorology program [P8-272152/0] p0069 N78-15660  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-16505  Resampling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbuitry measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514  On multidiscipilinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] p0064 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14520
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding date p0084 N78-12593 Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78-12595 Inversion of passive microwave remote sensing data from satellities p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches p0085 N78-12601 Application of modified Twomey techniques to invert lidar angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12603. The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements p0086 N78-12603. Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment p0086 N78-12604.	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruit earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-added classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area p0091 N78-14580 ITERATIVE SOLUTION  Analytical sensit triangulation - Its obtention through a simple algorithm p0078 A78 16533 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15680  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation Resampling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-15529] p0100 N78-12514  On multidisciplinary research on the application of remote sensing to water resources problems Wisconsin [E78-10028] p0064 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement Lake water quality mapping from LANDSAT
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78 12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78 12596 Inversion of passive microwave remote sensing data from satellites p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches p0085 N78-12601 Application of modified Twomey techniques to invert lidar angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12602 The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements p0086 N78-12603 Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment p0086 N78-12604 Experience with the inversion of Nimbus 4 BUV measurements to retrieve the ozone profile	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil rearrhquake area p0075 A78-14886. Remote sensing of water quality in 7 lakes in northern p0058 A78-16528. Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536. Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573. Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruil earthquake area p0091 N78-14580. ITERATIVE SOLUTION  Analytical sensit triangulation - Its obtention through a simple algorithm p0078 A78 16533. A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910. Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix p0085 N78-12598.	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed tand/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15660  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation Resampling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p1000 N78-12514 On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-13504 Lake water quality mapping from LANDSAT
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78 12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78 12595 Inversion of passive microwave remote sensing data from satellites p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some p0085 N78-12509 Application of modified Twomey techniques to invert lidar angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12602  The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements p0086 N78-12603  Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment p0086 N78-12604  Experience with the inversion of Nimbus 4 8UV measurements to retrieve the ozone profile	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruit earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-added classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area p0091 N78-14580 ITERATIVE SOLUTION  Analytical sensit triangulation - Its obtention through a simple algorithm p0078 A78 16533 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (rader) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15680  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-156505  Resampling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514  On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] p0084 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14522  Lake water quality mapping from LANDSAT p0026 N78-14587  Application of remote sensing technology in South Dakota
through nonlinear matrix inversion p0084 N78-12592  Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding date p0084 N78-12593 Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78-12595 Inversion of passive microwave remote sensing data from satellites p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches p0085 N78-12601 Application of modified Twomey techniques to invert lidar angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12602 The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements p0086 N78-12603 Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment p0086 N78-12604 Experience with the inversion of Nimbus 4 8UV measurements to retrieve the ozone profile p0086 N78-12606	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Firuli earthquake area Remote sensing of water quality in 7 lakes in northern Italy poots A78-18528  Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon poots 7 N78-14536  Computer-added classification for remote sensing in agriculture and forestry in Northern Italy poot 11 N78-14573  Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area ITERATIVE SOLUTION  Analytical senal triangulation - Its obtention through a simple algorithm poots A78-14580 poots A78-185910  Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods  JAPAN  Multi-seasonal date analysis and some extensions for environmental monitoring poots 3 A78-14812	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15660  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aeral photographs in the planning of the recreational use of waterways and water conservation  Resampling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514  On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] p0064 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14522  Lake water quality mapping from LANDSAT 14527  Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78-12595 Inversion of passive microwave remote sensing data from satellites p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches p0085 N78-12601 Application of modified Twomey techniques to invert lidar angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12602 The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements p0086 N78-12603 Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment p0086 N78-12604 Experience with the inversion of Nimbus 4 8UV measurements to retrieve the ozone profile p0086 N78-12606	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruit earthquake area po 2075 A78-14886 Remote sensing of water quality in 7 lakes in northern po058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon po067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy po011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area po091 N78-14580 ITERATIVE SOLUTION Analytical aerial triangulation - Its obtention through a simple algorithm po078 A78 16533 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses po080 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods  Japan Multi-seasonal data analysis and some extensions for environmental monitoring po003 A78-14812 On the photographic processing and digital texture for	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78-10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272-152/0] p0069 N78-15680  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-16505  Resempling study [E78-10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514  On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] p0064 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement  Lake water quality mapping from LANDSAT p008 N78-14522  Lake water quality mapping from LANDSAT p0026 N78-14587  Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0088 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78-12596 Inversion of passive microwave remote sensing data from satellities p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches p0085 N78-12599 Inversion formodified Twomey techniques to invert lider angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12602 The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements p0086 N78-12603 Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment p0086 N78-12604 Experience with the inversion of Nimbus 4 8UV measurements to retrieve the ozone profile	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil rearrhquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruil earthquake area p0091 N78-14580 ITERATIVE SOLUTION Analytical sensal triangulation - Its obtention through a simple algorithm p0078 A78 16533 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods po085 N78-12598  JAPAN Multi-seasonal data analysis and some extensions for environmental monitoring p0003 A78-14812 On the photographic processing and digital texture for remote sensing of Kujukuri coast of Chiba in Japan	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78-10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15660  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation  Resampling study [E78-10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0064 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14522  Lake water quality mapping from LANDSAT  Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection cirteria for spatial data  [E78-10053]
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78 12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78 12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some p0085 N78-12509 Inversion of solar extinction data for determining aerosol size distributions p0085 N78-12602  The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements p0086 N78-12603  Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment p0086 N78-12604  Experience with the inversion of Nimbus 4 8UV measurements to retrieve the ozone profile p0086 N78-12606  ION DISTRIBUTION  Significant initial results from the environmental measurements experiment on ATS-6 [NASA-TP-1101]	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-16828 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy  Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area p0071 N78-14573 Analytical aerial triangulation - Its obtention through a simple algorithm p0091 N78-14580 ITERATIVE SOLUTION  Analytical aerial triangulation - Its obtention through a simple algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods  Japan  Multi-seasonal data enalysis and some extensions for environmental monitoring p0003 A78-14812 On the photographic processing and digital texture for remote sensing of Kujukuri coast of Chiba in Japan p0073 A78-14814	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL take meteorology program [P8-272152/0] p0069 N78-15660  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-16505  Resampling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514  On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] p0064 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14522  Lake water quality mapping from LANDSAT p0026 N78-14587  Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data [E78 10053]  LAMINAR MIXING
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78-12595 Inversion of passive microwave remote sensing data from satellities p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches p0085 N78-12601 Application of modified Twomey techniques to invert lidar angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12602. The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements p0086 N78-12603. Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment p0086 N78-12604. Experience with the inversion of Nimbus 4 BUV measurements to retrieve the ozone profile p0086 N78-12606. [NASA-TP-1101] p0102 N78-15142.	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruit earthquake area p075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 timages for the study of linears in the Fruiti earthquake area p0091 N78-14580 ITERATIVE 20LUTION Analytical aerial triangulation - Its obtention through a simple algorithm p0078 A78 16533 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods p0085 N78-12598  JAPAN Multi-seasonal data analysis and some extensions for environmental monitoring p0003 A78-14812 On the photographic processing and digital texture for remote sensing of Kujukuri coast of Chiba in Japan p0073 A78-14814 Synoptic observations of the oceanic frontal system east	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78-10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272-152/0] p0069 N78-15680  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation Resampling study [E78-10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514 On multidisciplinary research on the application of remote sensing to water resources problems Wisconsin [E78-10028] p0064 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14522  Lake water quality mapping from LANDSAT Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data [E78-10053] p0013 N78-15542  LAMIMAR MIXING Some assects of the mixed layer of the upper ocean
Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data pools inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78-12596 Inversion of passive microwave remote sensing data from satellities p0085 N78-12596 Inversion methods in temperature and aerosol remote sounding. Their commonality and differences and some unexplored approaches p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding. Their commonality and differences and some unexplored approaches p0085 N78-12601 Application of modified Twomey techniques to invertidar angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12602. The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements p0086 N78-12603. Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment p0086 N78-12604 Experience with the inversion of Nimbus 4 BUV measurements experiment on ATS-6 [NASA-TP-1101] p0102 N78-15142 ION TEMPERATURE	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil earthquake area poop 25 A78-14886. Remote sensing of water quality in 7 lakes in northern poops. A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon poop 7 N78-14536. Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy poop 1 N78-14533. Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruili earthquake area poop 1 N78-14580. ITERATIVE SOLUTION Analytical aenal triangulation - Its obtention through a simple algorithm poop 3 A78-14580. Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods. Japan poop 3 A78-14814. Synoptic observations of the oceanic frontal system east of Japan poop 48 A78-17326 Multi-seasonal data analysis and some extensions for more even of the seasonal data analysis and some extensions for environmental monitoring poop 3 A78-14814. Synoptic observations of the oceanic frontal system east of Japan poop 48 A78-17326 Multi-seasonal data analysis and some extensions for more extensions for environmental monitoring poop 48 A78-17326 Multi-seasonal data analysis and some extensions for environmental monitoring poop 48 A78-17326 Multi-seasonal data analysis and some extensions for environmental monitoring poop 48 A78-17326 Multi-seasonal data analysis and some extensions for environmental monitoring poop 48 A78-17326 Multi-seasonal data analysis and some extensions for environmental monitoring poop 48 A78-17326 Multi-seasonal data analysis and some extensions for	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78-10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15680  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14930  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation Resampling study [E78-10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbulity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514 On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14522 Lake water quality mapping from LANDSAT p0026 N78-14587  Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data [E78-10053] p0013 N78-15542  LAMIMAR MIXING Some aspects of the mixed layer of the upper ocean [AIAA 77-1590] p0045 A78-13670
through nonlinear matrix inversion p0084 N78-12592 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data p0084 N78-12593 inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters p0085 N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics p0085 N78-12599 Inversion of passive microwave remote sensing data from satellites p0085 N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches p0085 N78-12509 Application of modified Twomey techniques to invert lidar angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12602 The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements p0086 N78-12603 Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment p0086 N78-12604 Experience with the inversion of Nimbus 4 8UV measurements to retrieve the ozone profile p0088 N78-12604 ION DISTRIBUTION Significant initial results from the environmental measurements experiment on ATS-6 [NASA-TP-1101] ION TEMPERATURE Ion temperature estimation with ion trap data from p0098 A78-17113	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruit earthquake area Remote sensing of water quality in 7 lakes in northern Italy poods A78-1852 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispactral surveys on the Venetian lagoon poods 7.78-14536 Computer-added classification for remote sensing in agriculture and forestry in Northern Italy pool 1.78-14536 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruith earthquake area ITERATIVE SOLUTION Analytical senal triangulation - Its obtention through a simple algorithm pool 8.78-18580 Treative Solution of the duality between iterative and inverse matrix methods  Japan Multi-seasonal data analysis and some extensions for remote sensing of Kujukuri coast of Chiba in Japan pool 73. A78-14812  On the photographic processing and digital texture for remote sensing of Kujukuri coast of Chiba in Japan pool 73. A78-14814  Synoptic observations of the oceanic frontal system east of Japan pool 5 N78-14506  Multi-seasonal data analysis and some extensions for senvironmental monitoring pool 8.78-1810  Multi-seasonal data analysis and some extensions for semote sensing of Kujukuri coast of Chiba in Japan pool 73. A78-14814  Synoptic observations of the oceanic frontal system east of Japan pool 5 N78-14504	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78-10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [PB-272-152/0] p0069 N78-15680  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-15605  Resampling study [E78-10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-15529] p0100 N78-12514  On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] p0064 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14522  Lake water quality mapping from LANDSAT p0026 N78-14587  Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection cirteria for spatial data [E78-10053] p0013 N78-15542  LAMINAR MIXING  Some aspects of the mixed layer of the upper ocean [AIAA 77-1590] p0045 A78-13670
Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data polyater profiles from remote sounding data polyater profiles from remote sounding data inversion of infrared limb emission measurements for temperature and trace gas concentrations polyater profiles for gaseous concentrations and aerosol parameters polyater profiles for gaseous concentrations and aerosol synthesis polyater profiles for gaseous concentrations and aerosol remote sounding Their commonality and differences and some unexplored approaches polyater and aerosol remote sounding Their commonality and differences and some unexplored approaches polyater profiles from spacecraft solar extinction data for determining aerosol size distributions polyater profiles from spacecraft solar extinction measurements polyater profiles from spacecraft solar extinction measurement (ASTP/SAM) experiment polyater	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northering p0058 A78-16828 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy  Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruil earthquake area p0071 N78-14573  Analytical aerial triangulation - Its obtention through a simple algorithm p0091 N78-14580 ITERATIVE SOLUTION  Analytical aerial triangulation - Its obtention through a simple algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods between iterative and digital texture for remote sensing of Kujukuri coast of Chiba in Japan p0073 A78-14814  Synoptic observations of the oceanic frontal system east of Japan p0048 A78-17326 Multi-seasonal data analysis and some extensions for environmental monitoring p0025 N78-13264 On the photographic processing and digital texture for environmental monitoring p0025 N78-13264 On the photographic processing and digital texture for environmental monitoring p0025 N78-13264 On the photographic processing and digital texture for environmental monitoring p0025 N78-18598	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15660  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aeral photographs in the planning of the recreational use of waterways and water conservation p0058 A78-16505  Resampling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514  On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] use of clear lake as standard reflectors for atmospheric measurement p0088 N78-13504  Lake water quality mapping from LANDSAT p0026 N78-14522  Lake water quality mapping from LANDSAT p0026 N78-14587  Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data [E78 10053] p0013 N78-15542  LAMIMAR MIXING  Some aspects of the mixed layer of the upper ocean [AIAA 77-1590] p0045 A78-13670  LAMIMATES  Multilayered (Hg Cd)Te infrared detector
Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data pools inversion of infrared limb emission measurements for temperature and trace gas concentrations pools N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters pools N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics pools N78-12596 Inversion of solar aureole measurements for determining aerosol characteristics pools N78-12599 Inversion of passive microwave remote sensing data from satellites pools N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches pools N78-12599 Inversion of startospheric aerosol and ozone vertical profiles from spacecraft solar extinction data for determining aerosol size distributions pools N78-12602  The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements pools N78-12603  Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment pools N78-12604  Experience with the inversion of Nimbus 4 8UV measurements to retrieve the ozone profile for temperature estimation with ion trap data from rockets and satellites pools A78-17113  ION TRAPS (INSTRUMENTATION)  Ion temperature estimation with ion trap data from rockets and satellites pools A78-17113	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruit earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area p0091 N78-14580 ITERATIVE SOLUTION  Analytical aerial triangulation - Its obtention through a simple algorithm p0078 A78 16533 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods powers and digital texture for remote sensing of Kujukuri coast of Chiba in Japan p0073 A78-14814 Synoptic observations of the oceanic frontal system east of Japan P0048 A78-17326 Multi-seasonal data analysis and some extensions for environmental monitoring p0048 A78-17326 Multi-seasonal data analysis and some extensions for environmental monitoring p0048 A78-17326 Multi-seasonal data analysis and some extensions for environmental monitoring p0025 N78-14504 On the photographic processing and digital texture for remote sensing of Kujukuri Coast of Chiba in Japan p0048 A78-17326 On the photographic processing and digital texture for remote sensing of Kujukuri Coast of Chiba in Japan p0048 A78-17326 on the photographic processing and digital texture for remote sensing of Kujukuri Coast of Chiba in Japan p0048 A78-17326 on the photographic processing and digital texture for remote sensing of Kujukuri Coast of Chiba in Japan p0048 A78-17326 on the photographic processing and digital texture for remote sensing of Kujukuri Coast of Chiba	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15680  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14930  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation Resampling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514 On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-13504 Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14522 Lake water quality mapping from LANDSAT p0026 N78-14587 Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data [E78 10053] p0013 N78-15542  LAMINAR MIXING Some asspects of the mixed layer of the upper ocean [AIAA 77-1590] p0045 A78-13670  LAMINATES  Multilayered (Hg Cd)Te infrared detector [NASA-CR-151548] p0099 N78-11453
Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data polyal po	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northering p0058 A78-16828 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy  Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruil earthquake area p0071 N78-14573  Analytical aerial triangulation - Its obtention through a simple algorithm p0091 N78-14580 ITERATIVE SOLUTION  Analytical aerial triangulation - Its obtention through a simple algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods between iterative and digital texture for remote sensing of Kujukuri coast of Chiba in Japan p0073 A78-14814  Synoptic observations of the oceanic frontal system east of Japan p0048 A78-17326 Multi-seasonal data analysis and some extensions for environmental monitoring p0025 N78-13264 On the photographic processing and digital texture for environmental monitoring p0025 N78-13264 On the photographic processing and digital texture for environmental monitoring p0025 N78-13264 On the photographic processing and digital texture for environmental monitoring p0025 N78-18598	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15680  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-16505  Resempling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514  On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] p0064 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement  Lake water quality mapping from LANDSAT p0026 N78-14522  Lake water quality mapping technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data  [E78 10053] p0013 N78-15542  LAMINAR MIXING  Some aspects of the mixed layer of the upper ocean [AIAA 77-1590] p0045 A78-13670  LAMINATES  Multilayered (Hg Cd)Te infrared detector [NASA-CR-151548]  LAND MANAGEMENT
Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data pools inversion of infrared limb emission measurements for temperature and trace gas concentrations pools N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters pools N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics pools N78-12596 Inversion of solar aureole measurements for determining aerosol characteristics pools N78-12599 Inversion of passive microwave remote sensing data from satellites pools N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches pools N78-12599 Inversion of startospheric aerosol and ozone vertical profiles from spacecraft solar extinction data for determining aerosol size distributions pools N78-12602  The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements pools N78-12603  Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment pools N78-12604  Experience with the inversion of Nimbus 4 8UV measurements to retrieve the ozone profile for temperature estimation with ion trap data from rockets and satellites pools A78-17113  ION TRAPS (INSTRUMENTATION)  Ion temperature estimation with ion trap data from rockets and satellites pools A78-17113	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-1528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area p10078 A78-14580 ITERATIVE SOLUTION  Analytical senial triangulation - Its obtention through a simple algorithm p0078 A78 16533 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods  Japan  Multi-seasonal data analysis and some extensions for remote sensing of Kujukuri coast of Chiba in Japan p0078 A78-14814 Synoptic observations of the oceanic frontal system east of Japan p0078 A78-14814 On the photographic processing and digital texture for remote sensing of Kujukuri Coast of Chiba in Japan p0055 N78-14508	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15680  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14930  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation Resampling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514 On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-13504 Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14522 Lake water quality mapping from LANDSAT p0026 N78-14587 Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data [E78 10053] p0013 N78-15542  LAMINAR MIXING Some asspects of the mixed layer of the upper ocean [AIAA 77-1590] p0045 A78-13670  LAMINATES  Multilayered (Hg Cd)Te infrared detector [NASA-CR-151548] p0099 N78-11453
Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding date pools and temperature profiles from remote sounding linversion of infrared limb emission measurements for temperature and trace gas concentrations pools N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters pools N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics pools N78-12595 Inversion of passive microwave remote sensing data from satellities pools N78-12599 Inversion of passive microwave remote sensing data from satellities pools N78-12599 Inversion data from the pools N78-12599 Inversion data from the pools N78-12599 Inversion data from the pools N78-12501 Application of modified Twomey techniques to invert lidar angular scatter and solar extinction data for determining aerosol size distributions pools N78-12602 The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements pools N78-12603 Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment pools N78-12603 Measurements to retrieve the ozone profile pools N78-12604 Experience with the inversion of Nimbus 4 BUV measurements to retrieve the ozone profile pools N78-12606 ION DISTRIBUTION  Significant initial results from the environmental measurements experiment on ATS-6 [NASA-TP-1101]  10N TEMPERATURE  Ion temperature estimation with ion trap data from pools A78-17113 ION TRAPS (INSTRUMENTATION) Ion temperature estimation with ion trap data from pools A78-17113 IONOSPHERIC COMPOSITION  Vertical lifting of ionization during geomagnetic storms from satellite measurements of ion composition pool79 A78-16730	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruit earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-16528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area p0091 N78-14580 ITERATIVE SOLUTION  Analytical aerial triangulation - Its obtention through a simple algorithm p0078 A78 16533 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods powers and digital texture for remote sensing of Kujukuri coast of Chiba in Japan p0073 A78-14814 Synoptic observations of the oceanic frontal system east of Japan P0048 A78-17326 Multi-seasonal data analysis and some extensions for environmental monitoring p0048 A78-17326 Multi-seasonal data analysis and some extensions for environmental monitoring p0048 A78-17326 Multi-seasonal data analysis and some extensions for environmental monitoring p0025 N78-14504 On the photographic processing and digital texture for remote sensing of Kujukuri Coast of Chiba in Japan p0048 A78-17326 On the photographic processing and digital texture for remote sensing of Kujukuri Coast of Chiba in Japan p0048 A78-17326 on the photographic processing and digital texture for remote sensing of Kujukuri Coast of Chiba in Japan p0048 A78-17326 on the photographic processing and digital texture for remote sensing of Kujukuri Coast of Chiba in Japan p0048 A78-17326 on the photographic processing and digital texture for remote sensing of Kujukuri Coast of Chiba	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78-10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272-152/0] p0069 N78-15680  LAKES  Use of clear lakes as standard reflectors for atmospheric p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-16505  Rasampling study [E78-10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514  On multidisciplinary research on the application of remote sensing to water resources problems Wisconsin [E78-10028] p0064 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14522  Lake water quality mapping from LANDSAT  Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data  [E78-10053] p0013 N78-15542  LAMINAR MIXING  Some aspects of the mixed layer of the upper ocean [AIAA 77-1590] p0099 N78-11453  LAMINARES  Multilayered (Hg Cd)Te infrared detector [NASA-CR-151548]  LAND MANAGEMENT  A modern tool for land design aerial photomapping p0071 A78 10075  The use of the Landsat series satellites for the monitoring
Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data possible p	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil earthquake area p0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-1528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon p0067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy p0011 N78-14573 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area p10078 A78-14580 ITERATIVE SOLUTION  Analytical senial triangulation - Its obtention through a simple algorithm p0078 A78 16533 A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods  Japan  Multi-seasonal data analysis and some extensions for remote sensing of Kujukuri coast of Chiba in Japan p0078 A78-14814 Synoptic observations of the oceanic frontal system east of Japan p0078 A78-14814 On the photographic processing and digital texture for remote sensing of Kujukuri Coast of Chiba in Japan p0055 N78-14508	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78-10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15660  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation  Resampling study [E78-10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0064 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14522  Lake water quality mapping from LANDSAT  Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data [E78-10053] p0013 N78-15542  LAMIMAR MIXING  Some aspects of the mixed layer of the upper ocean [AIAA 77-1590] p0099 N78-11453  LAMIMARES  Multilayered (Hg Cd)Te infrared detector [NASA-CR-151548] p0099 N78-11453  LAND MANAGEMENT  A modern tool for land design aerial photomapping p0071 A78-10075  The use of the Landsat series satellites for the monitoring and management of territory p0105 A78-12926
Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data pools inversion of infrared limb emission measurements for temperature and trace gas concentrations pools N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters pools N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics pools N78-12596 Inversion of solar aureole measurements for determining aerosol characteristics pools N78-12596 Inversion of passive microwave remote sensing data from satellites pools N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches pools N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches pools N78-12509 Application of modified Twomey techniques to invert lidar angular scatter and solar extinction data for determining aerosol size distributions pools N78-12603. The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements (ASTP/SAM) experiment pools N78-12603. Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment pools N78-12604. Experience with the inversion of Nimbus 4 8UV measurements to retrieve the ozone profile pools N78-12604. Experience with the inversion of Nimbus 4 8UV measurements experiment on ATS-6 [NASA-TP-1101]  10N TEMPERATURE  10n temperature estimation with ion trap data from rockets and satellites pools A78-17113 10NOSPHERIC COMPOSITION  Vertical lifting of ionization during geomagnetic storms from satellite measurements of ion composition pool99 A78-16730 10NOSPHERIC CONDUCTIVITY  Some characteristics of the equatorial electrojet in	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Firuli earthquake area Remote sensing of water quality in 7 lakes in northern Italy po058 A78-18528  Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispactral surveys on the Venetian lagoon po067 N78-14536  Computer-added classification for remote sensing in agriculture and forestry in Northern Italy po011 N78-14573  Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruith earthquake area ITERATIVE SOLUTION  Analytical senal triangulation - Its obtention through a simple algorithm p0078 A78-18530  Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods  Japan  Multi-seasonal date analysis and some extensions for remote sensing of Kujukuri coast of Chiba in Japan p0073 A78-14814  Synoptic observations of the oceanic frontial system east of Japan p0073 A78-14814  Synoptic observations of the oceanic frontial system east of Japan p0073 A78-14814  On the photographic processing and digital texture for remote sensing of Kujukuri coast of Chiba in Japan p0073 A78-14814  On the photographic processing and digital texture for remote sensing of Kujukuri coast of Chiba in Japan p0075 N78-14506  K	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [PB-272152/0] p0069 N78-15680  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830 On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-15605  Resempling study [E78 10014] p0082 N78-12495 Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-15529] p0100 N78-12514 On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] p0064 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14522  Lake water quality mapping from LANDSAT p0026 N78-14587  Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data [E78 10053] p0013 N78-15542  LAMINAR MUKING Some aspects of the mixed layer of the upper ocean [AIAA 77-1590] p0045 A78-13670  LAMINATES  Muttilayered (Hg Cd)Te infrared detector (NASA-CR-151548)  LAM MANAGEMENT A modern tool for land design - aerial photomapping p0071 A78 10075  The use of the Landsat series satellites for the monitoring and management of territory p0105 A78-12926  Surface resource inventory of eastern Montana
Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding date pools and temperature profiles from remote sounding attendance in the pools of inference in the inversion of inference in the i	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil earthquake area and poops and poops and poops are the study of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil earthquake area and poops and poops are the study of means of thermal infrared and multispectral surveys on the Venetian lagoon poops of N78-14536. Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy pool 1 N78-14573. Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruil earthquake area poors A78 16533. A numerical algorithm poors A78 16533. A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses poops A78-18910. Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods.  Japan  Multi-seasonal data analysis and some extensions for environmental monitoring poops A78-14814. Synoptic observations of the oceanic frontal system east of Japan poops A78-14814. Synoptic observations of the oceanic frontal system east of Japan poops A78-14814. On the photographic processing and digital texture for remote sensing of Kujukuri coast of Chiba in Japan poops A78-14814. Chiba in Japan poops A78-14814.  Kansas  Two phase sampling for wheat acreage estimation	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78-10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272-152/0] p0069 N78-15660  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aeral photographs in the planning of the recreational use of waterways and water conservation p0058 A78-16505  Resampling study [E78-10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514  On multidisciplinary research on the application of remote sensing to water resources problems Wisconsin [E78-10028] p0064 N78-13504  Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14522  Lake water quality mapping from LANDSAT  Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data [E78-10053] p0013 N78-15542  LAMIMAR MIXING  Some aspects of the mixed layer of the upper ocean [AIAA 77-1590] p0074 A78-13670  LAMIMATE  Multilayered (Hg Cd)Te infrared detector [NASA-CR-151548]  LAND MANAGEMENT  A modern tool for land design aerial photomapping p0071 A78-10075  The use of the Landsat series satellites for the monitoring and management of territory p0105 A78-12926  Surface resource inventory of aestern Montana rangelands utilizing high altitude color infrared aerial
Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data pools inversion of infrared limb emission measurements for temperature and trace gas concentrations pools N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters pools N78-12594 Inversion of solar aureole measurements for determining aerosol characteristics pools N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics pools N78-12595 Inversion of passive microwave remote sensing data from satellities pools N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches pools N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches pools N78-12503 Inversion of solar extinction data for determining aerosol size distributions pools N78-12602. The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements pools N78-12603. Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment pools N78-12604. Experience with the inversion of Nimbus 4 8UV measurements to retrieve the ozone profile pools N78-12604. [NASA-TP-1101] pools N78-12606. [NASA-TP-1101] pools N78-12607. [NASA-TP-1101] pools N78-12608 pools N78-12609 A78-17113. [ON TRAPS (INSTRUMENTATION) In temperature estimation with ion trap data from rockets and satellites pools A78-17113. [ONOSPHERIC COMPOSITION Vertical lifting of ionization during geomagnetic storms from satellite measurements of ion composition pools A78-17101. [ONOSPHERIC CONDUCTIVITY Some characteristics of the equatorial electrojet in pools A78-17101.	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Firuli earthquake area Remote sensing of water quality in 7 lakes in northern Italy poods A78-18528  Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispactral surveys on the Venetian lagoon poods 7.78-14536  Computer-added classification for remote sensing in agriculture and forestry in Northern Italy pool 11 N78-14537  Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruith earthquake area ITERATIVE SOLUTION  Analytical senal triangulation - Its obtention through a simple algorithm poo78 A78-18580  ITERATIVE SOLUTION  Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods  J  JAPAN  Multi-seasonal data analysis and some extensions for remote sensing of Kujukuri coast of Chiba in Japan poo73 A78-14814  Synoptic observations of the oceanic frontal system east of Japan poo75 N78-14506  K  KANSAS  Two phase sampling for wheat acreage estimation poo03 A78-14844	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15660  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation Resampling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514  On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14522  Lake water quality mapping from LANDSAT p0026 N78-14587  Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data [E78 10053] p0013 N78-15542  LAMIMAR MIXING  Some aspects of the mixed layer of the upper ocean [AIAA 77-1590] p0045 A78-13670  LAMIMATES  Multilayered (Hg Cd)Te infrared detector [NASA-CR-151548] p0099 N78-11453  LAND MANAGEMENT  A modern tool for land design aerial photomapping p0071 A78 10075  The use of the Landsat series satellites for the monitoring and management of territory p1015 A78-12926  Surface resource inventory of eastern Montana rangelands utilizing high altitude color infrared aerial photography p0002 A78 13067
Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data poloation to retrieval of ozone and temperature profiles from remote sounding data poloation to retrieval of ozone and temperature profiles from remote sounding poloation of infrared limb emission measurements for temperature and trace gas concentrations poloation of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters poloation of solar aureole measurements for determining aerosol characteristics poloation poloation of poloation poloation of poloation poloation of poloation poloation poloation poloation poloation of poloation of poloation pol	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Fruil earthquake area P0075 A78-14886 Remote sensing of water quality in 7 lakes in northern p0058 A78-18528 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the Venetian lagoon P0067 N78-14536 Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy  Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruit earthquake area ITERATIVE SOLUTION  Analytical senial triangulation - Its obtention through a simple algorithm p0091 N78-14580 ITERATIVE SOLUTION  Analytical senial triangulation - Its obtention through a simple algorithm p0098 A78-18910 Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods  Japan  Multi-seasonal data analysis and some extensions for remote sensing of Kujukuri coast of Chiba in Japan p0098 A78-14814  Synoptic observations of the oceanic frontal system east of Japan p0048 A78-17326 Multi-seasonal data analysis and some extensions for environmental monitoring p0025 N78-14814  Synoptic observations of the oceanic frontal system east of Japan p0048 A78-17326  Multi-seasonal data analysis and some extensions for environmental monitoring p0025 N78-14814  Synoptic observations of the oceanic frontal system east of Japan p0048 A78-17326  KKANSAS  Two phase sampling for wheat acreage estimation p0052 N78-14508	Applications of HCMM satellite data [E78-10033]  PO064 N78-12507  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] P0069 N78-15680  Lakes Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830 On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation P0058 A78-16505 Resempling study [E78 10014] Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-15529] On multidisciplinary research on the application of remote sensing to water resources problems Wisconsin [E78-10028] Use of clear lake as standard reflectors for atmospheric measurement Lake water quality mapping from LANDSAT p0026 N78-14522 Lake water quality mapping technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data [E78 10053]  LAMIMAR MIXING Some aspects of the mixed layer of the upper ocean [AIAA 77-1590]  AMIAATES Multilayered (Hg Cd)Te infrared detector [NASA-CR-151548]  LAND MANAGEMENT A modern tool for land design aerial photomapping p0071 A78 10075 The use of the Landsat series satellites for the monitoring and management of territory p1005 A78-13807  LAND MANAGEMENT A modern tool for land design aerial photomapping p0071 A78 10075  The use of the Landsat series satellites for the monitoring and management of territory p1005 A78-13296  Surface resource inventory of eastern Montana rangelands utilizing high altitude color infrared aerial photography Monitoring irrigated land acreage using Landsat imagery
Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles from remote sounding data pools inversion of infrared limb emission measurements for temperature and trace gas concentrations pools N78-12594 Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol parameters pools N78-12594 Inversion of solar aureole measurements for determining aerosol characteristics pools N78-12595 Inversion of solar aureole measurements for determining aerosol characteristics pools N78-12595 Inversion of passive microwave remote sensing data from satellities pools N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches pools N78-12599 Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches pools N78-12503 Inversion of solar extinction data for determining aerosol size distributions pools N78-12602. The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements pools N78-12603. Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol Measurement (ASTP/SAM) experiment pools N78-12604. Experience with the inversion of Nimbus 4 8UV measurements to retrieve the ozone profile pools N78-12604. [NASA-TP-1101] pools N78-12606. [NASA-TP-1101] pools N78-12607. [NASA-TP-1101] pools N78-12608 pools N78-12609 A78-17113. [ON TRAPS (INSTRUMENTATION) In temperature estimation with ion trap data from rockets and satellites pools A78-17113. [ONOSPHERIC COMPOSITION Vertical lifting of ionization during geomagnetic storms from satellite measurements of ion composition pools A78-17101. [ONOSPHERIC CONDUCTIVITY Some characteristics of the equatorial electrojet in pools A78-17101.	Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Firuli earthquake area Remote sensing of water quality in 7 lakes in northern Italy poods A78-18528  Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispactral surveys on the Venetian lagoon poods 7.78-14536  Computer-added classification for remote sensing in agriculture and forestry in Northern Italy pool 11 N78-14537  Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruith earthquake area ITERATIVE SOLUTION  Analytical senal triangulation - Its obtention through a simple algorithm poo78 A78-18580  ITERATIVE SOLUTION  Comparison of linear inversion methods by examination of the duality between iterative and inverse matrix methods  J  JAPAN  Multi-seasonal data analysis and some extensions for remote sensing of Kujukuri coast of Chiba in Japan poo73 A78-14814  Synoptic observations of the oceanic frontal system east of Japan poo75 N78-14506  K  KANSAS  Two phase sampling for wheat acreage estimation poo03 A78-14844	Applications of HCMM satellite data [E78-10033] p0064 N78-12507  LAKE ONTARIO  Rader observed land/lake precipitation differences p0058 A78-17074  Applications of HCMM satellite data [E78 10033] p0064 N78-12507  Precipitation (radar) project of the IFYGL lake meteorology program [P8-272152/0] p0069 N78-15660  LAKES  Use of clear lakes as standard reflectors for atmospheric measurements p0074 A78-14830  On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation Resampling study [E78 10014] p0082 N78-12495  Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290] p0100 N78-12514  On multidisciplinary research on the application of remote sensing to water resources problems - Wisconsin [E78-10028] Use of clear lake as standard reflectors for atmospheric measurement p0088 N78-14522  Lake water quality mapping from LANDSAT p0026 N78-14587  Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data [E78 10053] p0013 N78-15542  LAMIMAR MIXING  Some aspects of the mixed layer of the upper ocean [AIAA 77-1590] p0045 A78-13670  LAMIMATES  Multilayered (Hg Cd)Te infrared detector [NASA-CR-151548] p0099 N78-11453  LAND MANAGEMENT  A modern tool for land design aerial photomapping p0071 A78 10075  The use of the Landsat series satellites for the monitoring and management of territory p1015 A78-12926  Surface resource inventory of eastern Montana rangelands utilizing high altitude color infrared aerial photography p0002 A78 13067

SUBJECT INDEX MAGNETIC FIELDS

Remote sensing in operational range management p0019 A78 14862 Test system for earth observation SPOT Volume 5 LASER DRILLING Multipurpose ground facilities and dedicated image stations In situ laser retorting of oil shale [NASA-CASE LEW-12217-1] programs in Western Canada p0092 N78-14621 n0037 N78 14452 Satellite land use acquisition and applications to p0057 A78-14870 Pilot study of the potential contributions of LANDSAT hydrologic planning models LASER RANGER/TRACKER the construction of area sampling frames Intercosmos laser ranging stations p0031 A78-18108 Land-use change detection from Landsat and Skylab [E78 10037] p0012 N78-15536 p0020 A78-16550 Development and application of operational techniques Forest land management by satellite LANDSAT derived Design of a laser interferometer for measurement of for the inventory and monitoring of resources and uses extremely small biological motions Application to crayfish giant axon p0051 N78 14381 information as input to a forest inventory system -- North for the Texas coastal zone Volume 1 Text Carolina p0053 N78-15537 [E78 10038] n0008 N78 14455 Development and application of operational techniques Rare earth and trace element geochemistry of letabasalts from the Point Sal ophiolite California p0036 A78 20097 LAND USE for the inventory and monitoring of resources and uses for the Texas coastal zone. Volume 2. Appendices metabasalts from the Point Sal ophiolite Plants as indicators of photochemical oxidants in the p0017 A78-14199 USA [E78 10048] n0053 N78-15538 LEE WAVES Application of remotely sensed land-use information to Remote sensing and today's forestry issues p0002 A78-14792 Waves and turbulence in the vicinity of a chinook arch improve estimates of streamflow characteristics volume p0076 A78-15455 cloud Remote sensing of environmental impact of land use p0018 A78-14798 8 - - Maryland Virginia and Delaware [E78 10052] LEVEL (HORIZONTAL) p0069 N78-15541 activities Telemetering river level from a large remote tropical LANDFORMS Application of Landsat data to wetland study and land Description of landform patterns on air photos p0063 N78-11476 use classification in West Tennessee p0056 A78 14818 p0020 A78 16529 LIRVA A The use of balloons for geodetic research p0031 A78-18183 Testing the accuracy of remote sensing land use maps LANDSAT detection of hydrothermal alteration in the p0074 A78 14819 Nogal Canyon Cauldron New Mexico p0037 N78-14507 Production of a map of land-use in lows through manual interpretation of Landsat imagery p0018 A78-14837 LANDSAT FOLLOW-ON MISSIONS LIGHT EMITTING DIODES Some aspects of adaptive transform A PbSe diode laser spectrometer to be used in air pollution codina Necessity to adapt land use and land cover classification p0079 A78-18071 monitoring and mineral [CTH IEM TR 7636] multispectral data systems to readily accept radar data p0018 A78-14852 Investigation of thematic mapper spatial radiometric ar n0101 N78-14699 Satellite land use acquisition and applications to spectral resolution p0088 N78-14518 LIGHT SCATTERING p0057 A78-14870 hydrologic planning models LANDSAT SATELLITES Remote sensing using tunable lasers nO015 A78-11811 utilization and ecological aspects in the Urban area delineation and detection of change along Sylhet-Mymensingh Haor region of Bangladesh - An analysis the urban-rural boundary as derived from LANDSAT digital est and floating sea p0052 N78-14514 Scatterometer results from shorefast p0019 A78-14871 of Landsat data [NASA-TM X-71413] n0023 N78-10540 LIGHT SOURCES digital technique for manual extraction of data from ASA-TM X-/1413]
The use of LANDSAT imagery to locate uncharted coastal p0089 N78-14524 A mask correlation remote sensor for measurements of SO2 optical depths on long light source Instrument aerial photography -- for land use/land cover studies p0075 A78-14885 features on the Labrador coast Lake water quality mapping from LANDSAT p0016 A78-12938 Development of an integrated data base for land use n0028 N78-14587 p0057 A78-14890 LIMESTONE and water quality planning LANDSAT 1 Compression wave studies in [SAND 76-0279] On the possibilities of using aerial photographs in the Landsat-1 identification of groundwater regimes in a p0037 N78-13688 planning of the recreational use of waterways and water p0061 A78 18871 Great Lake basin LIMINOLOGY p0058 A78-16505 Application of the DIBIAS image processing system on Land-use change detection from Landsat and Skylab tellites p0020 A78-16550 Comment on Relative atmospheric aerosol content from Landsat pictures of central Morocco and Southern ERTS observations by Yu Mekler H Quenzel G Ohring and I Marcus p0017 A78-13837 p0035 A78-12934 Photo interpretative procedures in assessing river Lake water quality mapping from Landsat p0057 A78-14893 DOORO A78-18271 LARGE AREA CROP INVENTORY EXPERIMENT recreation potential Urban area delineation and detection of change along the urban-rural boundary as derived from LANDSAT digital LACIE A look to the future - Large Area Crop In-LINE SPECTRA Experiment p0002 A78 1900Experiment p0002 A78 1900Experiment p0004 A78 19846

p0004 A78 19846

p0004 A78 19846

p0004 A78 18864 Atlas of infrared absorption lines [NASA-CR-2925] p0086 N78-12608 [NASA-TM X-71413] p0023 N78-10540 LINEARIZATION Skylab/EREP application to ecological geological and eanographic investigations of Delaware Bay The digital processing of Scanning Radiometer (SR) data from NOAA weather satellites as carried out in the Meteorological Institute of the Free University of Berlin
Part 1 Linearising the SR data
[BLL-M-24896-(5828 4F)] p0102 N78-14750 Performance tests of signature extension algorithms -p0050 N78-12492 for large area crop inventory experiment Land classification of south central lowa from computer p0005 A78-14904 p0102 N78-14750 inhanced images LIQUID LEVELS [E78-10005] Determination of aerosol content in the atmosphere from n0082 N78-12493 Some specific problems in the operation of a gauging Computer-aided analysis of LANDSAT data for surveying p0062 N78-11468 [E78-10004] p0022 N78-10531 Texas coastal zone environments --- Pass Cavallo and Port LOGIC DESIGN Wheat productivity estimates using LANDSAT data [E78-10009] p0007 N78-10534 [E78-10018] Classification of Landsat agricultural data based upon p0082 N78-12497 p0003 A78-14845 vestigations using data from LANDSAT-2 Planting data and wheat yield models - Kansas South p0083 N78-12502 [E78-10026] LOUISIANA Dakota and USSR Forest type mapping of the Atchafalaya River Basin from Application of LANDSAT images to wetland study and [E78-10013] p0007 N78-10538 p0002 A78-13068 land use classification in west Tennessee part 1 satellite and aircraft imagery p0002 A78-13068
A technique for the determination of Louisiana marsh Resampling study [E78-10014] [E78-10031] n0063 N78-12505 p0082 N78 12495 Contributions of LANDSAT to natural resource prote salinity zone from vegetation mapped by multispectral An evaluation of the signature extension approach to scanner data. A comparison of satellite and aircraft data and future recreational development in the state of West Virginia --- Canaan Valley and Dolly Sods area [E78-10019] p0024 N78-13501 p0061 N78-10541 large area crop inventories utilizing space image data --- Kansas and North Dakota [NASA TM-58203] Preliminary study of the present and possible future oil [E78-10016] p0007 N78-12496 and gas development of areas immediately surrounding the Interior Salt Domes Upper Gulf Coast Salt Dome basins Use of remote sensing for land use policy formulation Evaluation of signature extension algorithms --- Kansas and North Dakota of east Texas north Louisiana and Mississippi [E78-10020] o0008 N78-13502 Page 10/8/988] p0036 N78-10545
Remote sensing of aquatic plants - New York Electrical National Page 10 New York Electrical National Na [ORNL/SUB 75/87988] [E78-10021] p0083 N78 12498 Application of LANDSAT to the surveillance of lake eutrophication in the Great Lakes basin - - Saginaw Bay Indexing screening coding and cataloging of earth sources aircraft mission data Texas Louisiana Mississippi South Carolina p0052 N78-14530 p0108 N78-12508 [E78-10023] p0064 N78-13503 [NASA CR-151549] LOW COST Investigations of spectral separability of small grains, early On multidisciplinary research on the application of remote sensing to water resources problems -[E78-10028] A low-cost system for reception and processing of eason wheat detection and multicrop inventory planning
-- North Dakota and Kansas - Wiecone line-scan data from Landsat and other so p0064 N78-13504 p0074 A78-14831 Tennessee Tombigbee industrial siting project: A study of physical and environmental factors of potential industrial [E78-10015] p0008 N78-13499 LOWER CALIFORNIA (MEXICO) Agricultural scene understanding Remote sensing exploration for metallic mineral reso in central Baja California p0035 A78-1 - Mississippi Columbus Air Force Base and Lowndes p0008 N78 14459 [E78-10043] p0035 A78-14825 Clay Monroe Itawamba and Tishomingo Counties [E78-10035] p0024 N78-13507 p0009 N78-14496 LACIE A look to the future Remote sensing exploration for metallic mineral resource central Baja California p0038 N78 145 Remote sensing of environmental impact of land use p0025 N78-14490 Two phase sampling for wheat acreage estimation -- large area crop inventory experiment p0010 N78-14538 p0038 N78 14517 LUMINESCENCE Inversion of infrared limb emission measurements for temperature and trace gas concentrations LANDSAT image interpretation aids Monitoring irrigated land acreage using LANDSAT imagery. An application example p0066 N78-14501 p0089 N78-14558 p0084 N78-12594 LASER APPLICATIONS Testing the accuracy of remote sensing land use maps Troposphenc photochemical and photophysical processes --- timable laser application to air pollution monitoring p0015 A78-11809 **LUNAR PROGRAMS** p0025 N78 14511 Pending issues before the Legal Sub-Committee of the United Nations Committee on the Peaceful Uses of Outer Necessity to adapt land use and land cover classification Necessity to adapt tand use and land cover classification systems to readily accept radar data p0025 NP 14548
Satellite land use acquisition and applications to hydrologic planning models p0088 N78-14564
Land utilization and ecological aspects in the Sylhet-Mymensingh Haor Region of Bangladesh An analysis of LANDSAT data p0026 N78-14565
Development of an interprated data base for land was p0105 A78-10353 Photochemistry in the stratospi here p0015 A78-11810 LUNAR TIDES Remote sensing using tunable lasers Application of digital filtering to satellite geo p0015 A78-11811 p0082 N78 12486 The remote sensing of atmospheric pollutants by a CO2 ser apparatus p0015 A78-12982 laser apparatus Development of an integrated data base for land use M PROBE - A new technique for measuring the density rofile of a specific constituent using counterpropagating and water quality planning p0026 N78 14584
Test system for earth observation - SPOT Volume 1 counterpropagating p0096 A78-13943 laser pulses Systems analysis and development plan --- multimission MAGNETIC FIELD CONFIGURATIONS Tunable dual-line CO2 laser for atmospheric spectroscopy pool 7 A78-14082 platform noting first land use mission p0092 N78-14617 Test system for earth observation - SPOT Volume 4 vector aeromagnetometer instrument and pollution monitoring p0095 A78-13239 First mission payload -- land use p0092 N78-14619
Test system for earth observation - SPOT Volume 4bis
First mission payload and microwave payload compatibility Quantitative remote measurements of pollutants from MAGNETIC FIELDS

stationary sources using Raman lidar p0020 A78-17000

p0022 A78 20067

Use of lidar to detect oil pollution of the sea surface

p0092 N78-14620

p0100 N78-12618

Measurement of embient magnetic field gradients using super conducting magnetic gradiometer

[AD A044997]

Quantification of soil mapping by digital analysis of The magnetic field and magnetic field gradients of the Computation of theoretical brightness temperatures NUC oceanographic research tower [AD-A045161] ANDSAT data --- Clinton County India corresponding to the Cape Cod Canal radiometer p0091 N78-14602 p0051 N78-13289 [REPT-6690] measurements INASA-CR-1452771 MAGNETIC MEASUREMENT Application of remote sensing to geothermal anomaly p0100 N78 13716 Forestland type identification and analysis in Western Massachussetts A linkage of a LANDSAT forest inventory Techniques for ocean bottom measurements of magnetic mapping in the Caldas Novas County Goias fields with a superconducting magnetometer [INPE-1129-TPT/070] p0039 N78-14610 p0041 A78-10389 to an optimization study
MATHEMATICAL MODELS p0012 N78-14595 Application of remote sensing to ge ological and mineral Aerial gamma-ray and magnetic survey of the Red River deposits surveys of the northern Minas Gerais state utilizing images from LANDSAT [INPE 1096-PE/073] p0039 N78-14611 area Block C Texas and Oklahoma volu [GJBX-17(77)-VQL-2] pC Utilization of remote sensing observations in hydrologic odels p0055 A78-14782 p0037 N78-13517 MAGNETIC MIRRORS Multispectral system analysis thi rough modeling and p0075 A78-14884 MAPS On the role of magnetic mirroring in the auroral simulation Production of a water quality map of Saginaw Bay by D0098 A78-20164 A mathematical model for digital rectification of remote computer processing of LANDSAT-2 data p0079 A78-16549 MAGNETIC STORMS sing data p0067 N78-14551 Vertical lifting of ionization during geomagnetic storms from satellite measurements of ion composition The application of remote sensing to water resources MARINE BIOLOGY watershed modelling and Glaciological and marine biological studies at perimeter Dronning Maud Land Antarctica p0059 A78-18861 p0079 A78-16730 forecasting Models for the identification of topographic objects during the deciphering of serial photographs, p0031 A78-19243 Some characteristics of the equatorial electr p0049 N78-10532 p0098 A78-17101 [E78-10006] Ethiopia / East Africa MARINE ENVIRONMENTS MAGNETIC VARIATIONS Utilization of remote sensing observ vations in hydrologic p0065 N78-14469 Marine decision aids from space A vector aeromagnetometer instrument system [AIAA 77 1611] p0046 A78-13683 Multispectral system analysis through modeling and mulation p0090 N78-14578 p0095 A78-13239 **MAGNETOMETERS** Change detection in coastal zone Landsat MSS data analysis p0048 A78-17198 Recent developments in Techniques for ocean bottom measurements of magnetic modeling groundwater fields with a superconducting magnetometer Use of radio controlled miniature aircraft for marine p0041 A78-10389 [LBL-5209] p0068 N78-14616 atmosphere sampling p0049 A78-20485 A vector aeromagnetometer instrum nent system p0095 A78-13239 MATHEMATICAL PROGRAMMING Monitoring aquatic plants in Texas p0049 N78-10527 Air pollutant monitor network design using mathematical Current and future satellites for oceanic monitoring DO027 N78-15593 Measurement of ambient magnetic field gradients using n0051 N78-14484 MATRICES (MATHEMATICS) super conducting magnetic gradiometer Coastal wetlands. The present and future role of remote p0100 N78 12618 AD-A0449971 inverse solution of the oseudoscalar transfer equation p0066 N78-14485 rough nonlinear matrix inversion p0084 N78 12592
Comparison of linear inversion methods by examination the duality between iterative and inverse matrix athods The magnetic field and magnetic field gradients of the through nonlinear matrix inversion MARINE METEOROLOGY NUC oceanographic research tower An overview of oceanic features and air-sea interaction n0051 N78-13289 of the duality between iterative processes as viewed from the NOAA operational MAGNETOSPHERIC ELECTRON DENSITY p0085 N78 12598 satellites [AIAA 77-1569] MEASUREMENT Remote sensing experiment for magnetospheric electric fields parallel to the magnetic field p0080 A78-18440 DO044 A78-13660 Use of an inertial navigation system for accurate track recovery and coastal oceanographic measurements Determination of design and operational criteria for MALAYA p0053 N78-14586 offshore facilities [AIAA 77-1577] Geological and hydrogeological investigations in west Malaysia MEASURING INSTRUMENTS [E78-10027] DO032 N78 12503 Current and future satellites for ocean anic monitoring p0047 A78-14793 Detection identification and quantification techniques for spills of hazardous chemicals MAN MACHINE SYSTEMS in rivers lakes and p0019 A78-14914 Application of the DIBIAS image processing system on oceans Role of cumulonimbus in the evolution of cyclonic cco and Southern p0035 A78 12934 Landsat pictures of central Morocco Nucleanic coal disturbances in Mediterranean regions detector Germany nydropneumatic suspension p0077 A78-16364 Interactive image processing for meteorological applications at NASA/Goddard Space Flight Center [NASA-CR-150465] n0036 N78-11454 The SEASAT-A project. Where it stands today. National Aeronautics and Space Administration. National Oceanic Some specific problems in the operation of a gauging p0062 N78-11468 D0076 A78 15004 and Atmospheric Administration MANAGEMENT PLANNING Ultrasonic river gauging p0062 N78-11469 [PB 272004/3] p0053 N78-14772 A Finnish system for forest management planning using Sensing the earth's environment from space User needs dischnology opportunities p0109 N78-14465 A preliminary study of the applicability of Nimbus 6 ESMR aerial photographs
MANAGEMENT SYSTEMS p0006 A78 16508 and technology opportunities to surface wind speed estimates [AD-A046629] n0102 N78-15643 MEDITERRANEAN SEA Earth Resources Management system for analyzing remotely sensed data
MANUAL CONTROL MARINE RESOURCES Oceanic morphogenesis --- catastrophe theory approach p0071 A78-12928 Oceans 76 Proceedings of the Second Annual Combined Conference Washington D.C. September 13-15, 1976 for current patterns using Landsat data p0042 A78-12837 A digital technique for manual extraction of data fro aerial photography p0091 N78-1457 p0041 A78-12827 p0091 N78-14579 Role of cumulonimbus in the evolution of cyclonic disturbances in Mediterranean regions MAP MATCHING GUIDANCE Computer image processing ın manne p0077 A78-16364 p0041 A78-12828 Interactive aids cartography and photo exploration for MERCURY TELLURIDES interpretation Ocean minir requirements -- satellite support A043418] p0031 N78-10543 [AIAA 77-1581] p0044 A78-13665 Multilayered (Hg Cd)Te infrared detector [NASA-CR-151548] pO p0099 N78-11453 MAPPING Future onshore and offshore exploration by remote METEOROLOGICAL FLIGHT Composite sampling for digital terrain models sensing from space [AIAA 77-1550] p0072 A78 13493 p0046 A78-13681 Remote sensing as a tool in assessing the impact of Experience with the per-point classification algorithms LANDSAT menhaden and thread herring resources topographical alterations on the microclin p0029 A78-11099 for the mapping of estuarine areas from Landsat stigation --- Gulf of Mexico p0058 A78-18243 [E78-10024] p0050 N78-12500 Ocean wave patterns under Hurricane Gloria A mathematical theory of equivalent transformations Remote sensing of aquatic plants - New Texas Louisiana Mississippi South Carolina New York Florida Observation with an airborne synthetic-aperture radai during the equalizing of geodesic networks p0047 A78-14126 p0031 A78-19236 p0052 N78-14530 METEOROLOGICAL PARAMETERS Interactive aids for cartography and photo MARINE TECHNOLOGY Characterization of terrestrial service environments The Oceans 76 Proceedings of the Second Annual Com simultaneous occurrence of combined conditions of sola [AD-A043418] p0031 N78-10543 Conference Washington D.C. September 13-15, 1976 insolation and climatic variables p0015 A78-11283 p0041 A78-12827 An analysis of LANDSAT systems for cartographic and Remote sensing using tunable lasers rain information Satellite applications to marine technology Conference by Orleans La November 15-17 1977 Collection of p0015 A78-11811 p0031 N78-10544 La November 15-17 [AD-A044431] Remote sensing for the medium scale assessment of p0043 A78 13651 Technical Papers CAM-Cartographic Automatic Mapping program ground-level thermal and hydrologic variations -Application of satellite-borne synthetic aperture radar to documentation 5th edition application to the local prediction of storms by use of the Project Tellus system p0055 A78-12930 p0032 N78-11498 marine operations [AIAA 77-1610] [PB-270304/9] p0046 A78-13687 Geometric processing for digital mapping with multiseries METEOROLOGICAL RADAR MARITIME SATELLITES p0082 N78-12489 remote sensing data Pulsed coherent lidar systems for airborne and satellite based wind field measurement p0076 A78-15012 Current and future satellites for oceanic monitoring The application of LANDSAT-1 imagery for monitoring p0047 A78 14793 strip mines in the new river watershed in northeast Radar observed land/lake precipitation differences MARSHLANDS Tennessee part 2 [E78-10032] p0058 A78-17074 A technique for the determination of Louisiana marsh salinity zone from vegetation mapped by multispectral p0037 N78-12506 Precipitation (radar) project of the IFYGL lake meteorology Application of LANDSAT imagery for snow mapping in scanner data. A comparison of satellite and aircraft data program p0061 N78-10541 Norway [NASA TM-58203] [PR-272152/0] n0069 N78-15660 p0064 N78-13505 [£78-10029] Three approaches to the classification of inland wetlands METEOROLOGICAL SATELLITES Application of LANDSAT imagery for snow mapping in -- Dismal Swamp Tennessee and Florida Operational data processing - The first ten years are the p0068 N78-14600 hardest - - in meteorological satellite remote sensing [E78-10041] p0065 N78-14458 MARYLAND p0073 A78-14789 Resampling study [E78-10014] Application of LANDSAT data to wetland study and land Interactive image processing for meteorological applications at NASA/Goddard Space Flight Center p0082 N78-12495 use classification in west Tennessee p0086 N78-14510 Application of remotely sensed land-use information to n0076 A78 15004 The use of LANDSAT imagery to locate uncharted coastal improve estimates of streamflow characteristics volume features on the Labrador coast p0089 N78-14524 Meteorological sensors and related technology for the --- Maryland Virginia and Delaware Alteration mapping at Goldfield Nevada by cluster and discriminant analysis of LANDSAT digital data GARP Atlantic Tropical Experiment [F78 10052] p0069 N78 15541 p0088 N78-14475 MASS FLOW RATE p0038 N78-14525 Operational data processing. The first ten years are the Remote optical sensing of the concentration and mass flow of particulate and gaseous pollutants in smoke plumes

hardest -- National Environmental Satellite Service

Current and future satellites for oc-

multichannel passive

temperature sounding system

p0016 A78 12981

DO088 N78-14476

p0051 N78-14484

p0101 N78 14568

anic monitoring

South Dakota

fire fuel type mapping

Quaternary geologic map of Minnesota

Multidate mapping of mosquito habitat

An application of LANDSAT digital technology to forest te fuel type mapping p0011 N78-14557

p0038 N78-14526

p0067 N78-14545

-- Nebraska

discharged through chimneys

Forestland type identification and analysis in Western Massachusetts - A linkage of a Landsat forest inventory to an optimization study p0005 A78-14901

METEOROLOGICAL SERVICES		
Operational utilization of remotely	sensed data p0106 A78	14790
METEOROLOGY	po 100 A70	14700

Meteorological support for remote ensing programs p0091 N78 14585

METHANE Trichlorofluoromethane a new hydrologic tool for trac and dating ground water p0069 N78 15531

MEXICO A study of suspended solids in the Requena Dam by remote sensing p0073 A78 14807 A study of suspended solids in the Requena Dam by p0066 N78-14499 remote sensing

Application of remote sensing to geological and mineral deposits surveys of the northern Minas Gerais state utilizing images from LANDSAT

[INPE-1096-PE/073] p0039 N78-14611 MICHIGAN

Application of aerial photography to water-related p0056 A78-14835 programs in Michigan

Production of a water quality map of Saginaw Bay by computer processing of Landsat-2 data p0057 A78-14857

Use of remote sensing for land use policy formulation - Michigar

[E78-10020] p0008 N78-13502 Application of LANDSAT to the surveillance of lake eutrophication in the Great Lakes basin - Saginaw Bay

[E78-10023] p0064 N78-13503 Application of aerial photography to water-related programs in Michigan p0067 N78-14528

Production of a water quality map of Saginaw Bay by computer processing of LANDSAT 2 data p0067 N78-14551

MICROCLIMATOLOGY

Remote sensing as a tool in assessing the impact of topographical alterations on the microclimate p0029 A78-11099

MICROMETEOROLOGY

The microstructure of California coastal fog and stratus p0072 A78-14314

MICROPROCESSORS

oposal for an extension of the CAMAC standard suitable to low power data acquisition systems for oceanographic stations on marine platforms and buoys

p0043 A78 12941 MICROSCOPES

Imaging natural materials with a quasi-microscope -- spectrophotometry of granular materials

D0099 N78 11813

[NASA CR-155250]
MICROWAVE ATTENUATION

Simulation of attenuation by rainfall at a wavelength of p0058 A78 17019 The 20 and 30 GHz attenuation measurements using the ATS-6 satellite DO093 N78 15340

MICROWAVE EMISSION

A model for microwave intensity propagation in p0096 A78 13971 inhomogeneous medium Passive microwave remote sensing of soil moisture

p0005 A78 14915 Influence of temperature on the emissivity of moist soil the microwave range p0081 A78-19114 in the microwave range Microwave emission from sea ice

(REPT-S-90) p0050 N78 11292

ICROWAVE EQUIPMENT Passive microwave remote sensing of soil moisture p0068 N78 14609

MICROWAVE FREQUENCIES Frequency band justifications for passive sensors 1 to 10 GHz --- for monitoring earth resources and the

environment p0092 N78 15327 [NASA-CR-155531]

Frequency band justifications for passive sensors 100 to 385 GHz chapter 1 --- for monitoring earth resources and the environment p0093 N78-15328 [NASA-CR-155530]

Frequency band justifications for passive sensors 100 to 385 GHz chapter 2 - - for monitoring earth resources

p0093 N78-15329 MICROWAVE HOLOGRAPHY

Side-looking airborne radar MICROWAVE IMAGERY p0071 A78-10325 On the use of microwave radiation for Great Lakes ice

[PR-271254/5] n0051 N78-12632

B-271254/5]
Microwave multispectral investigations of snow p0068 N78-14509 MICROWAVE RADIOMETERS

Measuring soil moisture with an airborne imaging passive microwave radiometer p0001 A78-10523

Seasat-A Scanning Multichannel Microwave eter p0095 A78-12831 Radiometer

Space instruments for oceanography [AIAA 77 1612] p0046 A78-13679 Remote sensing of earth resources using microwave radiometer - - onboard Skylab using a spaceborne

p0098 A78-17377 Analysis of 1.4 GHz radiometric measurements from p0098 A78-18245

cyleb
Microwave radiometry for soil moisture sensing
p0060 A78-18869

Microwave emission from sea ice

[REPT-S-90] p0050 N78-11292 Computation of theoretical brights corresponding to the Cape Cod Canal radiometer measurements

[NASA-CR-145277] p0100 N78-13716 A multichannel passive microwave wave atmospheric p0101 N78-14568 temperature sounding system

Data processing for the DMSP crowave radiometer DO101 N78-14605

MICROWAVE SCATTERING

Microwave scattering from the sea [ESA TT-422] surface p0051 N78-13313

MICROWAVE SENSORS

The Seasat-A satellite scatterometer p0095 A78-12832

The Seasat surface truth experiments p0042 A78-12834

Measurement of sea surface by means of microwave A computer simulation for system evaluation p0095 A78-12836

Earth remote sensing using microwave /radar/ p0072 A78-12944 techniques microwave systems Predictions on future use of active for all weather sensing of the earth [AIAA 77-1584]

p0072 A78-13686 Application of satellite-borne synthetic aperture radar to marine operations [AIAA 77-1610] n0046 A78 13687

The problems and opportunities remote sensing of p0106 A78-14777 ocean surface Microwave remote sensing of hydrologic parameters p0055 A78 14781

A survey of SAR image-formation processing for earth sources applications p0073 A78 14785 resources applications Ontimal spatial sampling techniques for ground truth data in microwave remote sensing of soil mois

moisture p0058 A78 18247 ote sensing data from p0085 N78-12599 Inversion of passive microwave remote

Technology advances in active and nassive microwave sensing through 1985 -- microwave technology Seasat-A and Nimbus-G satellites p0087 N78 p0087 N78 14466 Microwave remote sensing of hydrologic parameters p0065 N78-14468

Necessity to adapt land use and land cover classification systems to readily accept radar data p0025 N78-14546 Frequency band justifications for passive sensors 1 to 10 GHz -- for monitoring earth resources and the

[NASA-CR-155531] p0092 N78-15327 Frequency band justifications for passive sensors 10 0 to 385 GHz chapter 1 - - for monitoring earth resources

and the environment [NASA-CR-155530] p0093 N78 15328 Frequency band justifications for passive sensors 10 0 to 385 GHz chapter 2 - - for monitoring earth resources and the environment

[NASA-CR-155532] p0093 N78 15329

MICROWAVE SPECTRA

Estimation of the daytime and nighttime distribution of atmospheric ozone from ground-based millimeter n0016 A78 13617 wavelength measurements Microwave multispectral investigations of sno

p0056 A78-14817

MICROWAVE SPECTROMETERS Experiments on the radar backscatter of snow

p0055 A78-10388 Atmospheric sounding with passive microwaves Review d prognosis p0018 A78-14802 and prognosis Atmospheric sounding with passive

p0088 N78-14494 and prognosis MICROWAVE TRANSMISSION The 20 and 30 GHz attenuation measurements using

the ATS-6 satellite p0093 N78-15340 MICROWAVES

Microwave remote sensing and its application to soil moisture detection volumes 1 and 2 p0068 N78-15529 MIDLATITUDE ATMOSPHERE

MINE DETECTORS Nucleonic coal det hydropneumatic suspension [NASA-CR 150465] detector independent with n0038 N78-11454

MINERAL DEPOSITS

Ocean mining requirements -- satellite supp [AIAA 77-1581] p0044 p0044 A78-13665

MINERAL EXPLORATION Industrial use of geological remote sensing from space

p0035 A78-14787 Landsat datection of hydrothern alteration in the Mr Canyon Cauldron New Mexico p0029 A78-14815 Ilic mineral resources p0035 A78-14825 Remote sensing exploration for meta in central Baia California

Alteration mapping at Goldfield Nevada by cluster and discriminant analysis of Landsat digital data -- mapping of hydrothermally altered volcanic rocks

p0029 A78-14833 Application of Landsat satellite imagery for iron ore plication of Landsat satering integers, ... pecting in the western desert of Egypt p0035 A78-14887

Industrial use of geological remote sensing from space p0037 N78 14474

Remote sensing exploration for metallic mineral reso in central Baia California p0038 N78-14517

A PbSe diode laser spectrometer to be used in air pollution monitoring and mineral prospecting [CTH-IEM-TR-7636] p0101 N78-14699

MERALOGY

Analysis of infrared reflectivity in the presence of asymmetrical phonon lines --- pho spectra of mineral p0035 A78-13932 of the earth

Remote infrared spectroscopy of mineralogical and petrological observations p0029 A78-14849

Asteroid surface materials characterizations from reflectance spectra [NASA-CR-154510] pO Mineralogical p0036 N78 10992

MINERALS

Investigation of LANDSAT imagery on correlations between one deposits and major shield structures in

[E78-10012] p0036 N78 10537 Application of HCMM satellite data to mineral exploration

- - Yerington Nevada [E78-10036] p0037 N78-13508

Remote infrared spectroscopy of the earth p0038 N78-14543

MINES (EXCAVATIONS)

The application of LANDSAT-1 imagery for monitoring strip mines in the new river watershed in northeast Tennessee part 2 [E78-10032] n0037 N78-12506

Application of HCMM satellite data to mineral exploration Yerington Nevada

[F78-10036] p0037 N78-13508 Integration of remote sensing and surface geophysics the detection of faults p0038 N78 14561 in the detection of faults

Onsite control of sedimentation utilizing the modified block-cut method of surface mining [PB-272244/5] p0040 N78-15552

MINICOMPUTERS

The arrangement of atmospheric pollution detectors by means of a minicomputer and a multicomponent chemical p0016 A78-12975

Cartographic Electron Beam Recorder (EBR) system [AD-A044401] p0100 N78-12513

MINING Ocean mining requirements - satellite support

IAA 77-1581] p0044 A78-13865 Contributions of LANDSAT to natural resource protection and future recreational development in the state of West Cansan Valley and Dolly Sods area
9) p0024 N78-13501 Virginia --- Ca [E78-10019]

Geophysics Applied to Detection and Delineation of Non-energy Non renewable Resources Workshop on Mining Geophysics

p0037 N78-13622

MINNESOTA

Quaternary geologic map of Minnesota p0038 N78-14526

MISSION PLANNING Surveying the earth s environment from space - Spectral

areal temporal coverage trends [AIAA 77-1585] DO105 A78-13667

MISSISSIPPI

Preliminary study of the present and possible future oil and gas development of areas immediately surrounding the Interior Salt Domes Upper Gulf Coast Salt Dome basins of east Texas north Louisiana and Mississippi [ORNL/SUB-75/87988] p0036 N78-10545

Tennessee-Tombigbee industrial siting project: A study of physical and environmental factors of potential industrial sites - Mississippi Columbus Air Force Base and Lowndes
Clay Monroe Itawamba and Tishomingo Counties
[E78-10035] p0024 N78-13507

Remote sensing of aquatic plants - New York, Flonda Texas Louisiana Mississippi South Carolina The use of Laura implemented techniques for an erosion hazard-reforestation needs assessment --- Yalobusha Co Calhoun Co and Grenade Co Mississippi [E78-10050] p0012 N78-15540

MISSOURI

p0016 A78-12971

MODELS Planting data and wheat yield models -- Kansas South Dakota and USSR

The growth of serosol in an urban plum

[F78-10013] p0007 N78-10538 MODULATION TRANSFER FUNCTION

Modulation transfer analysis of serial imagery p0078 A78 16538

MOISTURE CONTENT

Measuring soil moisture with an airborne imaging passive icrowave radiometer p0001 A78-10523 microwave radiometer Electromagnetic detection of soil water content - Progress port II p0059 A78-18863

Electrical properties of water in rocks and soils p0060 A78-18864

Methods of assessment of ground truth soil moisture p0060 A78-18867

An evaluation of radar as a soil moisture sensor p0060 A78-18868 Soil moisture determination by thermal infrared remote insing p0060 A78 18870 sensing

A-17

MOJAVE DESERT (CA) SUBJECT INDEX

influence of temperature on the emissivity of moist soil in the microwave range p0081 A78 19114
The use of LANDSAT digital data to detect and monitor vegetation water deficiencies -- South Dakota

p0010 N78-14540

#### MOJAVE DESERT (CA)

Large scale 20mm photography for range resources analysis in the Western United States --- Casa Grande Arizona Mercury Nevada and Mojave Desert p0012 N78-14596

#### MONTANA

of eastern Montana inventory rangelands utilizing high altitude color infrared aeria p0002 A78-13067 Use of thermal-infrared imagery n ground water p0057 A78-14869 investigations in Montana

Use of thermal-infrared investigations in Montana

#### MONTE CARLO METHOD

Monte Carlo simulation of wave sensing with a short nulse radai DO081 N78-10341

[NASA-TM-X-71412] MOROCCO

Application of the DIBIAS image processing system on Landsat pictures of central Morocco and p0035 A78 12934 MOUNTAINS

Application of LANDSAT imagery for snow mapping in

[F78-10029] DOOR4 N78-13505 Application of LANDSAT imagery for snow mapping in

Norway (F78-10041)

DO065 N78 14458 MOVING TARGET INDICATORS

Monitoring open water and sea ice in the Bering Strait by radar p0041 A78-10388 MULTIMISSION MODULAR SPACECRAFT

Test system for earth observation SPOT Volume 1 Systems analysis and development plan

platform noting first land use mission p0092 N78-14617 Test system for earth observation - SPOT Volume 3 - SPOT Volume 3 p0092 N78 14618 Multimission platform subsystems Test system for earth observation SPOT Volume 4 First mission payload --- land use p0092 N78-14619 Test system for earth observation SPOT Volume 4bis

First mission payload and microwave payload compatibilit p0092 N78-14620 study -- land use Test system for earth observation SPOT Volume 5
Multipurpose ground facilities and dedicated image stations
- land use p0092 N78-14621

#### MULTISPECTRAL BAND CAMERAS

Imaging natural materials with a quasi-microscope --pectrophotometry of granular materials

[NASA-CR-155250] p0099 N78-11813 Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt

nO101 N78-14599

#### MULTISPECTRAL BAND SCANNERS

The Seasat-A Scanning Multichannel Radiometer n0095 A78-12831 centration from Remote sensing of chlorophyll cop0042 A78-12838 Hydrographic charting from Li

comparison with aircraft imagery p0042 A78-12839 A multispectral analysis of algal bloo m in the Gulf of

[AIAA 77-1565] n0044 A78-13657 The use of Landsat for monitoring water parameters the coastal zone

DO045 A78 13672 [AIAA 77-1597] Detection and measurement of interfaces in remotely quired data using a digital computer

[AIAA 77-1616] p0096 A78-13688 Monitoring surface albedo change with Landsat

p0029 A78-13766 Comment on Relative atmospheric erosol content from ERTS observations by Yu Mekler H Quenzel G Ohring

ERTS observation -, p001/ A/o round and I Marcus p001/ A/o round Landsat-D thematic mapper simulation using aircraft p0073 A78-14806 Use of multispectral data in design of forest sam n0002 A78-14808

Microwave multispectral investiga DO056 A78-14817 Investigation of thematic mapper sp atial radiometric and p0096 A78-14826

spectral resolution The application of IR and MSS-data in the Ruhr district

Germany --- aerial photography of heat distribution p0074 A78-14838

w angle effect in Landsat image

DO074 A78-14848

Image analysis techniques with special reference to analysis and interpretation of geological features from p0029 A78-14850 Landsat imagery

Evaluation of spectral channels and wavelength regions for separability of agricultural cover types n0004 A78-14860

The influence of multispectral scan ner spatial resolution on forest feature classification p0004 A78-14880 Rich - An unsupervised clustering approach to spatial preprocessing of MSS imagery p0075 A78-14883 Multispectral system analysis through modeling and p0075 A78-14884

Prototype active scanner for nighttime oil spill mapping diclassification p0019 A78-14896 and classification

Multispectral analysis of ocean dumped materials DO019 A78-14913

A multiseries digital mapping system for positioning MSS and photographic remotely sensed data n0077 A78-16509

Practical experience in the rectification of MSS-images p0077 A78-16520

Digital rectification of multispectral imagery --- Landsat p0078 A78-16532 Geometrical models for satellite s nner (magery p0078 A78-16545

Analysis of MSS digital imagery ith the aid of principal component transform --- Landsat multispectral scanning p0078 A78-16547

Landsat-radar synergism -- image enhancement through compositing techniques p0079 A78-16554

Visual interpretation of Landsat MSS imagery for a reconnaissance soil survey of a part of the Indo-Gangetic plain India D0006 A78-16555

Change detection in coastal zone environments ndsat MSS data analysis p0048 A78-17198 Distinguishing vegetation from soil background information - by gray mapping of Landsat MSS data p0006 A78-17199

Some aspects of adaptive transform coding p0079 A78-18071 multispectral data Application of aircraft multispectral scanners quantitative analysis and mapping of water quality parameters in the James River Virginia

n0080 A78-18104 A multispectral analysis of the interface between the Brazil and Falkland currents from Skylab

p0049 A78-18246 Methods of analytic processing of various aerocosmic p0081 A78-19241 otoimages
Floodplain delineation using multispectral scanner data
p0081 N78-10528

Urban area delineation and detection of change along the urban rural boundary as derived from LANDSAT digital

[NASA-TM-X-71413] p0023 N78-10540 A case study using ECHO(Extraction and Classification of Homogeneous Objects) for analysis of multispectral

scanner data [E78-10030] p0083 N78-12504

sensing investigation for beach Basic remote econnaiss [AD A044836] p0083 N78-12515

Comparing soil boundaries delineated by digital analysis of multispectral scanner data from high and low spatial resolution systems --- Tippencanoe County Indiana [E78-10017]

p0008 N78-13500 Quantitative a data and mapping of water quality parameters in the James River in Virginia [NASA-TP-1021]

Signature extension preprocessing for LANDSAT MSS

[E78-10040] n0087 N78-14457 Investigation of techniques for inventorying forested gions. Volume 1. Reflectance modeling and empirical

ultispectral analysis of forest canopy co-[E78-10046] LANDSAT-D thematic mapper simulation using aircraft

p0088 N78-14498 ultispectral scanner data Use of multispectral data in design of forest sample pool N78 14500 Multi-seasonal data analysis and some extensions for p0025 N78-14504

environmental monitorino Digital exploitation of synthetic aperture rac p0088 N78 14505

Microwave multispectral investigation p0066 N78 14509 The application of IR- and MSS-data in the Ruhr District

p0089 N78-14531 Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral su

p0067 N78-14536 Venetian lagoon View angle effect in LANDSAT imagi p0089 N78-14542

Evaluation of spectral channels and wavelength regions for separability of agricultural cover types

p0010 N78-14554

Thermal imagery for census of ungulate p0010 N78-14555 Evaluation of change detection techniques for monitor

p0090 N78-14569 zone environments The influence of multispectral scar ner spatial resolution on forest feature classification
BLOB An unsupervised cluster
preprocessing of MSS imagery p0011 N78-14574 n0090 N78-14577 Multispectral system analysis rough modeling and p0090 N78-14578 simulation

Prototype active scanner for nigh me oil spill mapping p0026 N78-14590 classification Multispectral analysis of ocean di

p0026 N78-14607 Procedures for gathering ground truth information for a supervised approach to a computer-implemented land cover classification of LANDSAT-acquired multispectral scanner

[NASA-RP 1015]
MULTISPECTRAL PHOTOGRAPHY p0027 N78-15549

Evaluation of change detection tec coastal zone environments p0048 A78-14875

Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt

p0076 A78-14905 Spectral reflection measurements of water with particle ensions for an analysis of the water quality p0058 A78-16514 basis of multispectral recordings Approaches for solving forestry problems by utilizing aerospace methods p0006 A78-16515

Digital rectification of multispectral imagery --- Landsat data processing p0078 A78 16532 Digital preprocessing and classification of multispectral arth observation data p0078 A78-16542

applied to LANDSAT Digital image correlation tech pectral imagery [E78-10022] n0083 N78-12499

### Ν

#### NASA PROGRAMS

Uses of the Space Shuttle in the NASA Application p0107 A78 18189 LANDSATS role in an earth resources information system National Aeronautics and Space Administration
Office of Science and Technology Policy
[NASA-CR-155217] p0108 N78-10968

n0108 N78-10968 A survey of users of earth resources ces remote sensing p0111 N78 14553

The SEASAT A project. Where it stands today. National Aeronautics and Space Administration. National Oceanic and Atmospheric Administration

p0053 N78-14772 NATURAL GAS Preliminary study of the present and possible future oil and gas development of areas immediately surrounding the Interior Salt Domes Upper Gulf Coast Salt Dome basins of east Texas north Louisiana and Mississippi [ORNL/SUB-75/87988] p0036 N78 10545

NEAR INFRARED RADIATION A PbSe diode laser spectrometer to be used in air pollution

monitoring and mineral prospecting [CTH-IEM-TR 7636] p0101 N78-14699 NERRASKA

Multidate mapping of mosquito habital

p0056 A78-14851 Multidate mapping of mosquito h p0067 N78-14545 South Dakota

Evaluation of an infrared line scanner for the study of coastal water circulation [NIWARS-PUBL-41] p0099 N78-11496

WORK SYNTHESIS GDM/GPS receiver hardware implementation

p0030 A78-15589

#### NEVADA

Alteration mapping at Goldfield Nevada by cluster and discriminant analysis of Landsat digital data -- mapping of hydrothermally altered volcanic rocks

p0029 A78-14833 Application of HCMM satellite data to mineral exploration

Yerington Nevada [E78-10036] p0037 N78-13508

Alteration mapping at Goldfield Nevada by cluster and discriminant analysis of LANDSAT digital data

n0038 N78-14525 Digital color analysis of color-ratio composite LANDSAT scenes --- Nevada p0091 N78-14592

Large scale 20mm photography for range resources inalysis in the Western United States --- Casa Grande Arizona Mercury Nevada and Mojave Deser

#### p0012 N78-14596 NEW ENGLAND (US)

Analysis of photochemical oxidant and particulate pollution patterns in New England using remote sensing

[PB-268996/6] p0023 N78-10623 NEW GUINEA (ISLAND)

The floor structure of the southwest Pacific Ocean p0047 A78 13899 Description of landform patterns on air nhotos

p0020 A78-16529

## NEW JERSEY

Trichlorofluoromethane a new hydrologic tool for tracing and dating ground water p0069 N78-15531 NEW MEXICO

Landsat detection of hydrothermal alteration in the Canvon Cauldron New Mexico D0029 A78 14815 LANDSAT detection of hydrothermal alteration in the Nogal Canyon Cauldron New Mexico p0037 N78 14507 **NEW YORK** 

Quantitative mapping of suspended solids in wastewater sludge plumes in the New York Bight apex

p0015 A78-10658 Remote sensing of chlorophyll concentration from high

p0042 A78-12838 Multispectral analysis of ocean du ed materials p0019 A78 14913

Remote sensing of aquatic plants - - New Texas Louisiana Mississippi South Carolina New York Florida p0052 N78-14530

#### NEW ZEALAND

The floor structure of the southwest Pacific Ocean - ussian book p0047 A78 13899 Russian book

SUBJECT INDEX NIGERIA Localization of an experimental ecological unit in the Maradi region of Nigeria
[NASA TM-75085] p0032 N78 12553 MIGHT VISION rototype active scanner for nighttime oil spill mapping classification p0026 N78-14590 and classification NIMBUS G SATELLITE 1978 - A space focus for oceanology - ocean remote insors on Seasat-A and Nimbus G [AIAA 77-1564] n0043 A78-13656 Technology advances in active and passive microwave sensing through 1985 --- microwave technology for the Seasat-A and Nimbus-G satellites p0087 N78 14466 NIMBUS 5 SATELLITE Study of the Brazil and Falkland currents using THIR ages of Nimbus V and oceanographic data in 1972 to 73 p0047 A78 14840 NIMBUS 6 SATELLITE A preliminary study of the applicability of Nimbus 6 ESMR to surface wind speed estimates
[AD-A046629] p0102 N78 15643 NITRIC ACID Simultaneous measurements of nitrogen dioxide and nitric acid in the lower stratosphere
[ONERA TP NO 1977-154] p0020 A78 16214 NITROGEN Investigations of spectral separability of small grains early season wheat detection and multicrop inventory planning North Dakota and Kansas [E78-10015] p0008 N78-13499 NITROGEN DIOXIDE Photochemical reactions among formaldehyde chlorine d nitrogen dioxide in air p0017 A78 14174 and nitrogen dioxide in air Simultaneous measurements of nitrogen dioxide and nitric acid in the lower stratosphere [ONERA TP NO 1977-154] Preliminary results from the Lidar system at the University

#### NITROGEN OXIDES The fate of nitrogen oxides in the atmosphere [PB-267784/7] nnn23 All NOAA SATELLITES

fluorescence observations

An overview of oceanic features and air sea interaction processes as viewed from the NOAA operational stallitas [AIAA 77-1569] p0044 A78-13660

of L Aquila --- stratospheric aerosols and nitrogen dioxide

p0022 A78 18476

p0023 N78 10619

Present and future operational oceanographic products An introduction operational NOAA satellite p0047 A78 14820 NOAA satellite monitoring of snow cover in the northern

hemisphere during the winter of 1977 [IAF PAPER 77-121] p0057 A78 15935 Satellite observations of snowcover in the Sierra Nevadas during the great California drought p0059 A78 18250 Four metre antenna system for Landsat and NOAA pools A78 20168

Operational utilization of remotely sensed data -- NOAA p0109 N78 1447 programs Present and future operational NOAA satellite oceanographic products. An introduction

p0052 N78-14512

The digital processing of Scanning Radiometer (SR) data from NOAA weather satellites as carried out in the Meteorological Institute of the Free University of Berlin Notes on the digital filtering of satellite pictures -24895 (5828 4F)] p0102 N78 14747 [BLLD M-24895 (5828 4F)]

The digital processing of Scanning Radiometer (SR) data from NOAA weather satellites as carried out in the Meteorological Institute of the Free University of Berlin
Part 1 Linearising the SR data
[BLL-M-24896-(5828 4F)] p0102 N78 14750 p0102 N78 14750

#### NORTH AMERICA

Computer processing of SAR L-band imagery ---Synthetic Aperture Radar for ice mapping n0055 A78 10524

LACIE - A look to the future - - Large Area Crop Inventor p0002 A78 14804 Convective cloud plumes mark Canadian fire sites p0005 A78-15308

Waves and turbulence in the vicinity of a chinook arch p0076 A78-15455 cloud

NOAA satellite monitoring of snow cover in the northern hemisphere during the winter of 1977 [IAF PAPER 77 121] p0057 A78 15935

Aircraft versus spacecraft for remote monitoring of water pality in U.S. coastal zones p0021 A78 17576 quality in U.S. coastal zones Evaluating soil moisture and yield of winter wheat in the Great Plains using Landsat data p0007 A78 18249 Evaluating soil moisture and yield of winter wheat in ine Great Plains using Landsat data Landsat-1 identification of groundwater regimes in a p0061 A78-18871 On the use of microwave radiation for Great Lakes ice Great Lake basın

-----[PB-271254/5] Application of LANDSAT to the surveillance of lake autrophication in the Great Lakes basin - - Saginaw Bay

Michigan [E78-10023] D0064 N78-13503 Precipitation (radar) project of the IFYGL lake meteorology [PB-272152/0] p0069 N78-15660 NORTH CAROLINA

Forest land management by satellite LANDSAT-derived information as input to a forest inventory system - North D0008 N78-14455

Utilization of remote sensing observations in hydrologic odels p0065 N78-14469 Assessment of forest plantations from low altitude aerial photography - - North Carolina coastal plan

p0012 N78-14597 Three approaches to the classification of inland wetlands -- Dismal Swamp Tennessee and Florida

p0068 N78-14600

Evaluation of signature extension algorithms --- Kansas and North Dakota p0083 N78-12498 [F78 10021]

Investigations of spectral separability of small grains early season wheat detection and multicrop inventory planning North Dakota and Kansas

[E78 10015] p0008 N78-13499 NORTH SEA

Textural analysis by statistical parameters and its application to the mapping of flow-structures in wetlands /Mudflat area at the German coast of the North Sea/

NORTHERN HEMISPHERE

NOAA satellite monitoring of snow cover in the northern termisphere during the winter of 1977 [IAF PAPER 77 121] p0057 A78-15935

Landsat digital data for water pollution and water quality studies in southern Scandinavia Analysis of Landsat-1 data for mapping of surficial deposits Test area in Alta commune p0036 A78-16553

Norwegian marine geodetic projects DO048 A78-17648 Application of LANDSAT imagery for snow mapping in

Norway [E78-10029] p0064 N78-13505 Application of LANDSAT imagery for snow mapping in

[F78-10041] nOO65 N78-14458

Design and fabrication of nosecone for WB-57F aircraft fitted with APQ-102A side looking radar [NASA-CR-151592] p0102 N78-15028

NUCLEAR EXPLOSIONS Rocketborne measurement of an infrared enhancement

associated with a bright auroral breakup AD-A0464741 p0102 N78-15632

NUMERICAL ANALYSIS

Review of radiative transfer methods in scatterii p0084 N78-12588

NUMERICAL CONTROL Proposal for an extension of the CAMAC standard suitable to low power data acquisition systems for oceanographic

stations on marine platforms and buoys DO043 A78-12941

### 0

### OCEAN BOTTOM

Techniques for ocean bottom measurements of magnetic fields with a superconducting magnetomete p0041 A78-10389

Computer image processing in p0041 A78-12828 The floor structure of the southwest Pacific Ocean p0047 A78-13899

#### OCEAN CURRENTS

Satellite observations of mesoscale e the eastern tropical Pacific Ocean po p0041 A78-10027 Oceanic morphogenesis - catastrophe theory approach for current patterns using Landsat data

p0042 A78-12837 pu042 A78-12837

winter intrusions of the Loop Current — water circulation in Gulf of Mexico p0043 A78-13116

Ocean current surface measurement using dynamic elevations obtained by the GEOS-3 radar altimeter [AIAA 77 1566]

Study of the Brazil and Falkland currents using THIR images of Nimbus V and oceanographic data in 1972 to p0047 A78-14840 Synoptic observations of the oceanic frontal system east

of Japan p0048 A78-17326 A multispectral analysis of the interface between the Brazil and Falkland currents from Skylab

p0049 A78-18246 Study of the Brazil and Falkland currents using their images of Nimbus 5 and oceanographic data in 1972 p0052 N78-14533

#### OCEAN DATA ACQUISITIONS SYSTEMS

AN DATA ACQUISITIONS Seasat-A Synthetic Aperture Radar - Radar system p0095 A78-12833 imolementation Accuracy of moored current measurements p0042 A78-12840 Temperature measurement array for internal wave observations -- in upper ocean p0042 A78-12842 observations -- in upper ocean

Proposal for an extension of the CAMAC standard suitable to low power data acquisition systems for oceanographic stations on marine platforms and buoys

DO043 A78-12941

Use of an inertial navigation system for accurate track recovery and coastal oceanographic measu p0096 A78-14892

Characteristics of sea clutter measured from E-3A high p0097 A78-15664 radar platform

The magnetic field and magnetic field gradients of the NUC oceanographic research tower [AD-A045161] n0051 N78-13289

OCEAN MODELS

Some aspects of the mixed layer of the upper ocean [AIAA 77-1590] p0045 A78-13670 A numerical algorithm for remote sensing of density

profiles of a simple ocean model by acoustic pulses p0080 A78-18910 The analysis of GEOS 3 altimeter data in the Tasman

and Coral seas [NASA TM-78032] n0053 N78-15550

#### OCEAN SURFACE

One-parameter characterization of the ocean's inherent optical properties for remote sensing p0041 A78 10161 Ocean surface currents mapped by radar

p0041 A78-10344 rea-surface winds measurement from space of p0041 A78 12615
The Seasat A project An overview sea-surface winds

Design of the Seasat-A radar altimeter
The Seasat-A Scanning Multichannel Microwave p0095 A78 12831 Radiometer

The Seasat A satellite scatterometer p0095 A78 12832 Measurement of sea surface by means of microwave altimeters. A computer simulation for system evaluation p0095 A78 12836

Oceanic morphogenesis -- catastrophe theory approach for current patterns using Landsat data p0042 A78 12837

Winter intrusions of the Loop Current -- water circulation in Gulf of Mexico p0043 A78-13116 A model for sea backscatter intermittency at extreme n0043 A78 13312 grazing angles Ocean current surface measurement using dynamic

levations obtained by the GEOS-3 radar altimeter p0044 A78-13658 [AIAA 77-1566] On the hysteresis of the sea surface and its applicability

to wave height predictions [AIAA 77-1588] p0045 A78-13669

Some aspects of the mixed layer of the upper ocean IAA 77-1590] p0045 A78-13670 [AIAA 77-1590] Analysis of the marine environment in DMSP imagery focusing on island barrier effects
[AIAA 77-1596]

p0045 A78 13671 Remote sensing of ocean temperature p0045 A78 13674

Sea surface temperature gradient analysis from digital meteorological satellite data [AIAA 77-1604] p0046 A78 13676

Atmospheric transformation of solar radiation reflected p0047 A78 13803 Ocean wave patterns under Hurricane Gloria
Observation with an airborne synthetic aperture radar

p0047 A78 14126 The problems and opportunities --- remote sensing of

p0106 A78-14777 Radar detection of surface oil slicks p0021 A78-17197

Spectral structure of the solar radiation field reflected by the ocean-atmosphere system n0049 A78 20055 Use of lidar to detect oil pollution of the sea surface p0022 A78 20067

Microwave radiometric sensing of surface temperature

and wind speed from SEASAT
[PB-270323/9] p0098 N78 10549
SEAHT A computer program for the use of intersecting arcs of altimeter data for sea surface height refinement [NASA CR-141432] IASA CR-141432] pO083 N78 12511
Measurement of ambient magnetic field gradients using

super conducting magnetic gradiometer [AD-A044997] n0100 N78 12618

Microwave scattering from the sea surface [ESA-TT-422] po051 N78 13313 Present and future operational NOAA satellite oceanographic products An introduction

p0052 N78-14512

Polarimeter measures sea state characteristics using nitted infrared radiation p0052 N78 14513 emitted infrared radiation Remote sensing of ocean color and detection of p0052 N78 14549 chlorophyll conten

The analysis of GEOS-3 altimeter data in the Tasman nd Coral seas [NASA TM-78032] p0053 N78 15550

A preliminary study of the applicability of Nimbus 6 ESMR to surface wind speed estimates [AD-A046629]

n0102 N78 15643 Radar backscattering from a sea having an anisotropic large-scale surface part 2 [NAS CR-145278] p0054 N78 15863

1978 - A space focus for oceanology -- ocean remote insors on Seasat-A and Nimbus-G p0043 A78 13656 [AIAA 77-1564]

An overview of oceanic features and air-sea interaction processes as viewed from the NOAA operational atellites [AIAA 77-1569] p0044 A78 13660 **OCEANOGRAPHY** SUBJECT INDEX

ORBIT CALCULATION The computation of ocean wave heights from GEOS-3 Prototype active scanner for nighttime oil spill mapping satellite radar altimeter data [AIAA 77-1571] p0026 N78-14590 National geodetic satellite program part 2 and classification p0044 A78-13662 p0032 N78-11556 OKLAHOMA An introduction to orbit dynamics and its application to Determination of design and operational criteria for Simulation of attenuation by rainfall at at a wavelength of p0058 A78-17019 atellite-based earth monitoring systems offshore facilities 5 cm p0099 N78-12113 p0044 A78-13663 [NASA-RP-1009] [AIAA 77-1577] Aerial gamma-ray and magnetic survey of the Red River Present and future operational NOAA satellite oceanographic products - An introduction OREGON area Block C Texas and Oklahoma volume 2 [GJBX-17(77)-VOL-2] pO037 Monitoring irrigated land acreage using Landsat imagery DO037 N78-13517 p0047 A78-14820 An application example --- in Klamath River basin of p0003 A78-14809 Remote sensing of ocean color chlorophyll content **OPERATIONAL PROBLEMS** and Operational data processing - The first ten years are the hardest --- in meteorological satellite remote sensing p0048 A78-14855 Monitoring irrigated land acreage using LANDSAT Objective analysis and classification p0066 N78-14501 n of oceanographic p0048 A78-17982 imagery An application example ORGANIC COMPOUNDS p0073 A78-14789 **OPTICAL CORRECTION PROCEDURE** The determination of volatile organic compounds in city air by gas chromatography combined with standard addition Analysis of 1.4 GHz radiometric measurements from p0098 A78-18245 Geometrical models for satellite scanner imagery Skylab p0078 A78-16545 Remote sensing of oceanic parameters during the selective subtraction infrared spectrometry and mass OPTICAL DATA PROCESSING p0015 A78-10041 Skylab/gamefish experiment [NASA-RP-1012] n0051 N78-12644 The complex of optical-photographical transformation ORTHOGONAL FUNCTIONS methods of aerial and space images used for study of natural resources p0077 A78-16501 Clustering of ERTS data using various orthogonal ansforms p0079 A78-17543 OCEANOGRAPHY Oceans 76 Proceedings of the Second Annual Combined resources transforms Effective aerosol optical parameters from polarimeter easurements p0086 N78-12605 Conference Washington D.C. September 13-15 1976 ORTHOPHOTOGRAPHY p0041 A78-12827 Practical experience in the rectification of MSS-images measurements The Seasat surface truth experiments o0077 A78-16520 Experience with the inversion of Nimbus 4 BUV p0042 A78-12834 **OXIDIZERS** measurements to retneve the ozone profile Oceanic morphogenesis --- catastrophe theory approach p0086 N78-12606 Plants as indicators of photochemical oxidants in the for current patterns using Lendsat data USA p0017 A78-14199 Quick-look capability in a European earth resources tellite data network. Volume 2. Appendices 5 to 7 OZONE DO042 A78-12837 satellite data network Volume 2 Appendices 5 to 7
[FU15-4-VOL 2-APP 5 7] N78-13397
Quick-look capability in a European earth resources Estimation of the daytime and nighttime distribution of atmospheric ozone from ground-based millimeter wavelength measurements p0016 A78-13617 Satellite applications to marine technology Conference New Orleans La November 15-17 1977 Collection of DO043 A78-13651 Technical Papers Satellite application to data buoy requirements [AIAA 77-1580] satellite data network, volume 1 -- Earthnet p0109 N78-13519 Ozone sounding correction proced pool 7 A78-14448 [FU15-4-VOL-1] p0044 A78-13664 implications Utilization of remote sensing observations in hydrologic odels p0065 N78 14469 Measurement of atmospheric ozone by satellite p0097 A78-15013 Space instrur nts for oceanography p0046 A78-13679 [AIAA 77-1612] Remote sensing data processing Two years ago today the commercial ocean community Benefit assessment of ozone monitoring satellites p0021 A78-17574 Seasat-A and t DO087 N78-14471 and two years from today p0046 A78-13682 and two years from today

A perspective on the state of the art of photographic
interpretation - - aeral photography po087 N78-14473

Boundary detection in images Optical formulation in
terms of signal detection theory -- photointerpretation of The floor structure of the southwest Pacific Ocean Measurement of atmospheric composition at the p0047 A78-13899 Australian baseline atmospheric monitoring station p0021 A78-18270 Russian book Current and future satellites for oceanic monitorin p0047 A78-14793 Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles --- from remote sounding data p0084 N78-12593

Experience with the inversion of Nimbus 4 BUV Airborne Oceanographic Lidar System [INPE 1118-TPT 087] p0092 N78-14894 p0048 A78-14878 Vector statistics of LANDSAT image Norwegian marine geodetic projects [NASA-TM-78149] p0093 N78-15544 p0048 A78-17648 measurements to retrieve the ozone profile OPTICAL MEASUREMENT p0086 N78-12606 Soviet studies of the Arctic and Southern Oceans in th Application of modified Twomey techniques to invertilidar current stage p0049 A78-19850
A numerical algorithm for remote sensing of ocean density profiles by acoustic pulses [AD-A042372] p0050 N78-10674 p0049 A78-19850 angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12602 A quality assurance program for monitoring ozone and carbon monoxide [PB-271204/0] p0024 N78-13636 The inversion of stratospheric aerosol and ozone vertical OZONOMETRY profiles from spacecraft solar extinction measurements Skylab/EREP application to ecological geological and oceanographic investigations of Delaware Bay p0086 N78-12603 Estimation of the daytime and nighttime distribution of Inversion of solar extinction data from the Apollo-Soyuz Project Stratospheric Aerosol Measurement atmospheric ozone from ground-based millimeter wavelength measurements p0016 A78-13617 Special Sensor H data processing at AFGWC - Preliminary p0050 N78 12492 [E78 10003] 78 10003]
Current and future satellites for oceanic monitoring p0051 N78-14484
Present and future operational NOAA satellite (ASTP/SAM) experiment p0086 N78-12604 results -- IR temperature-humidity ozone sounder Effective aerosol optical parameters from polarimet Present and future operational oceanographic products An introduction measurements p0086 N78-12605
OPTICAL MEASURING INSTRUMENTS p0097 A78-14972 p0052 N78-14512 PROBE - A new technique for measuring the density Airborne oceanographic lidar system rofile of a specific constituent using counterpropag n0053 N78-14572 p0098 A78-13943 laser pulses Use of an inertial navigation system for accurate track Real Time Dust Fall Monitor (RTDFM) --- for application PACIFIC ISLANDS recovery and coastal oceanographic me to space shuttle The floor structure of the southwest Pacific Ocean p0053 N78-14586 p0098 N78 10436 Russian book p0047 A78-13899 TICAL PROPERTIES Description of landform patterns on air photop0020 A78-16529 Analysis of synthetic aperture radar ocean wave data One parameter characterization of the ocean's inherent optical properties for remote sensing p0041 A78-10161
Analysis of some models of atmospheric optical properties PACIFIC OCEAN lected at Marineland and Georges Bank p0050 N78-10678 Stationary waves in the Southern Hemisphere mid-latitude zone revealed from average brightness charts [PB-268675/6] p0020 A78-16539 Laboratory measurements of radiance and reflectance according to space photo surveys p0071 A78-10543 OPTICAL RADAR pectra of dilute secondary-treated sewage sludge p0024 N78 12555 Some aspects of the mixed layer of the upper ocean p0045 A78-13670 [NASA-TP-1089] Atmospheric particulate properties inferred from lidar and solar radiometer observations compared with simultaneous [AIAA 77 1590] Multispectral analysis of ocean dumped materials The floor structure of the southwest Pacific Ocean p0026 N78-14607 in situ aircraft measurements - A case study DO016 A78-13616 n0047 A78-13899 Russian book OFFSHORE ENERGY SOURCES Airborne Oceanographic Lidar System Synoptic observations of the oceanic frontal system e Determination of design and operational criteria for p0048 A78-17326 n0048 A78-14878 of Japan offshore facilities [AIAA 77-1577] Pulsed coherent lidar systems for airborne and satellite ased wind field measurement p0076 A78-15012 Preliminary differences in mean water level between tide p0044 A78-13663 based wind field measurement gauges along the South American Pacific coast Applications of Seasat to the offshore oil gas and mining Quantitative remote measurements of pollutants from stationary sources using Raman lidar p0020 A78-17000 p0048 A78-17650 PARABOLIC ANTENNAS p0045 A78-13666 [AIAA 77-1583] Four metre antenna system for Landsat and NOAA Preliminary results from the Lidar system at the University Future onshore and offshore exploration by remote of L Aquila - - stratospheric aerosols and nitrogen dioxide p0081 A78-20168 orescence observations p0022 A78-18476
Use of lidar to detect oil pollution of the sea surface PARAMETERIZATION sensing from space [AIAA 77-1550] fluorescence observations p0046 A78-13681 f the sea surface p0022 A78-20067 Reducing LANDSAT data to parameters with physical significance and signature extension. A view of LANDSAT OHIO Concept for an airborne multidisciplinary lidar system aerosol measurements p0023 N78-11634 Development of an integrated data base for land use p0090 N78-14575 capabilities p0057 A78 14890 and water quality planning PARKS A survey of SAR image-formation processing for earth sources applications p0087 N78-14472 OIL EXPLORATION Application of remote sensing to state and regional Preliminary study of the present and possible future oil and gas development of areas immediately surrounding the Interior Salt Domes Upper Gulf Coast Salt Dome basins Airborne oceanographic lidar system [E78-10034] p0024 N78-13506 DO053 N78-14572 Development and application of operational techniques OPTICAL REFLECTION of east Texas, north Louisiana and Mississippi for the inventory and monitoring of resources and uses p0036 N78-10545 [ORNL/SUB-75/87988] Use of clear lakes as standard reflectors for atmosph for the Texas coastal zone Volume 2 p0074 A78-14830 OIL POLLUTION p0053 N78-15538 OPTICAL SCANNERS Use of lidar to detect oil pollution of the PARTICLE SIZE DISTRIBUTION A low-cost system for reception and processing of line-scan data from Landsat and other sources p0022 A78-20067 Atmospheric particulate properties inferred from lidar and OIL RECOVERY olar radiometer observations compared with simultaneous p0074 A78 14831 In-situ laser retorting of oil shale [NASA-CASE-LEW-12217-1] in situ aircraft measurements - A case study **OPTICAL THICKNESS** p0037 N78-14452 p0016 A78-13616 A mask correlation remote sensor for measurements of OIL SUCKS SO2 optical depths on long light source PARTICULATE SAMPLING Prototype active scanner for nighttime oil spill mapping and classification p0019 A78-14896 source - Instrument p0016 A78-12938 Quantitative mapping of suspended solids in wastewater sludge plumes in the New York Bight apex p0019 A78-14896 Cloud properties from satellite infrared and visible leasurements p0097 A78-14973 Radar detection of surface oil slicks n0015 A78-10658 p0021 A78-17197 OPTIMIZATION Analysis of photochemical oxidant and particulate Field infrared method to discriminate natural seeps from Forestland type identification and analysis in Western Massachusetts - A linkage of a Landsat forest inventory pollution patterns in New England using remote sensing

[AD-A042861]

non-seeps Santa Barbara California area

p0023 N78-10608

to an optimization study

p0005 A78-14901

[PB-268996/6]

n0023 N78-10623

SUBJECT INDEX

aerial ohotomani

**PHOTOGRAMMETRY** 

A modern tool for land design

PATHOLOGICAL EFFECTS

Pre-visual detection of stress in nine forests

p0004 A78-14847 p0071 A78 10075 the detection of crop p0006 A78-18513 The use of remote sensing in Height measurements from satellite images p0071 A78-10519 The Gestalt Photomapping System p0030 A78-15730 PATTERN RECOGNITION Cotumum ratio of photo-field plots for aersal volume and Blob - An unsupervised clustering approach to spatial reprocessing of MSS imagery p0075 A78 14883 preprocessing of MSS imagery volume growth regression construct ruction --- for spruce p0008 A78-16523 forest cover Pattern recognition of Landsat data based upon temporal compensation procedure block of simply D0007 A78-18248 trend analysis overlapping photograms for the case of flat terrain Procedure B A multisegment to ining selectio n0077 A78-16526 proportion estimation procedure for processing LANDSAT photoimages Modulation transfer analysis of aerial al imagery p0078 A78-16538 cultural data [E78-10039] n0008 N78-14456 Establishment of the hydro-morphi netric characteristics PAYLOADS water bodies using photogrammetric Interactive Test system for earth observation - SPOT Volume -sensing recordings p0058 A78-16540 First mission payload --- land use DO092 N78-14619 Aerial triangulation with Skylab pho [AD-A043418] otography p0078 A78-16541 Test system for earth observation - SPOT Volume 4bis First mission payload and microwave payloa Objective terrain description a ssification for digital p0030 A78-16543 study --- land use n0092 N78-14620 terrain models A system of remote sensing and mapping fo pping for developing p0030 A78-16546 PENINSULAS Geological and hydrogeological investigations in west Analysis of photogrammetric Malaysia p0082 N78-12487 [E78 10027] p0032 N78\*12503 [E78-10032] Analytical aerial triangulation th corrections fo PENNSYLVANIA p0086 N78-13498 Floodplain delineation using multispectral scanner data [AD-A045870] PHOTOGRAPHIC FILM DO081 N78 10528 ctral ratioing of color p0002 A78-13065 PERFORMANCE TESTS Performance tests of signature extension algorithms - -PHOTOGRAPHIC PROCESSING for large area crop inventory experiment Primer for the production of Landsat co p0005 A78-14904 p0072 A78-13496 and digital texture for Test on the mapping application of La Landsat imagery p0077 A78-16527 On the photographic processing and digital textremote sensing of Kujukuri Coast of Chiba in Japan p0052 N78-14506 Unique ambient carbon monoxide monitor based on gas filter correlation Performance and applica Increase in the fidelity of image during the production DO020 A78 16771 Performance tests of signature ex nsion algorithms p0091 N78-14598 [AD-A046226] p0092 N78-14613 **PHOTOINTERPRETATION** satellite imagery Detection of oak wilt with color IR a PERIODIC VARIATIONS p0001 A78-10522 Evaluation of change detection techniques for monitoric coastal zone environments p0090 N78-1456 p0090 N78-14569 Measuring soil moisture with an airb microwave radiometer PERMAFROST The practical application of remote sensing for the Use of Landsat imagery in studies of spring icings and nt and resource p0071 A78-12929 resource assessment seasonally flooded karst in permafrost are pO061 A78-18872 management Tree stress detection through spectral ratio tral ratioing of color p0002 A78-13065 Effect of antecedent on frozen grou [PB-270632/3] pO065 N78-13522 Spectral reflectance deduced from color-infrared photo PETROLOGY p0002 A78-13066 forest damage detection Remote infrared of the earth spectroscopy A comparative study of the amount and types of geologic mineralogical and petrological observation information received from visually interpreted U 2 and Landsat imagery p0035 A78 13492 p0029 A78-14849 Asteroid surface materials Mineralogical International Symposium on Remote Sensing of characterizations from reflectance spectra Environment 11th University of Michigan Ann Arbor Mich April 25-29 1977 Proceedings Volumes 1 & 2 [NASA-CR-154510] p0036 N78-10992 p0106 A78 14776 PHILIPPINES Applications of Landsat data to the integrated econ A perspective on the state of the art of photographic development of Mindoro Philippines p0107 A78-14889 p0073 A78-14786 A study of suspended solids in the F e Requena Dam by Applications of LANDSAT data to the integrated nomic development of Mindoro nilipines p0011 N78-14583 remote sensing Testing the accuracy of remote s sing land use maps p0074 A78-14819 Production of a map of land-use in le interpretation of Landsat imagery Analysis of infrared reflectivity in the presence of p0018 A78-14837 asymmetrical phonon lines -- phonon spectra of mineral Classification of Landsat agricultural data based p0003 A78-14845 PHOTOCHEMICAL OXIDANTS The use of Landsat digital data to detect and monitor Analysis of photochemical oxidant and particulate p0004 A78 14846 etation water deficiencies pollution patterns in New England using remote sensing Textural analysis by statistical parameters and its application to the mapping of flow-structures in wetlands Mudflat area at the German coast of the North Sea/ [PB 268996/6] p0023 N78-10623 PHOTOCHEMICAL REACTIONS p0056 A78 14856 Tropospheric photochemical and photophysical processes Evaluation of spectral channels and wavelength regions --- timable laser application to air pollution monitor for separability of agricultural cover types p0004 A78-14860 Photochemistry in the stratosphere, p0015 A78-11810 Landsat image interpretation aids for Large Area Crop p0004 A78-14864 maldehyde chlorine p0017 A78-14174 Photochemical reactions among form triventory Experiment p0004 A78-1 Evaluation of change detection techniques for anomaly and nitrogen dioxide in air Plants as indicators of photochemical oxida coastal zone environments n0048 A78-14875 Computer-aided classification for remote sensing in Simultaneous measurements of nitrogen dioxide and nitric acid in the lower stratosphere
[ONERA TP NO 1977-154] agriculture and forestry in Northern Italy n0004 A78 14879 p0020 A78 16214 digital technique for manual extraction of data from Formation of photochemical aerosol: [PB-268895/0] aerial photography -- for land use/land cover studi p0023 N78 10621 p0075 A78 14885 PHOTOGEOLÓGY Application of conventional and advanced techniques for Image analysis techniques with special reference to the interpretation of Landsat 2 images for the study of analysis and interpretation of geological features from Analysis and analysis and analysis and surface geophysics integration of remote sensing and surface geophysics pools A78-14887 pools A78-14887 linears in the Fruit earthquake area n0075 A78-14886 Interpretation of multispectral and infrared thermal ys of the Suez Canal Zone Egypt Application of Landsat satellite imagery for iron ore DO076 A78-14905 Image data application obtai space to geological p0035 A78-16502 investigations in the USSR Digital color analysis of color-ratio composite Landsat Engineering geological interpretation of black and white p0075 A78-14898 p0036 A78-16503 and false color air photos Engineering geological interpretation of black and white cartography color and false color air photos p0036 A78-16503
The significance of an arc shaped dark patch on the Nimbus III /HRIR/ imagery of India p0077 A78-16507
ERTS topology of France /First results/ Directional reflectances of objects from B&W-aerial photos p0078 A78-16531

Recent crustal movements rega

Digital preprocessing and classification of multispectral inth observation data p0078 A78-16542

A mathematical model for digital rectification of remote

airphoto interpretation

earth observation data

sensing data

p0036 A78 16511

p0038 A78 16553

Analysis of Landsat-1 data for mapping of surficial

deposits - Test area in Alta commune Finnmark county

ered by the aid of p0030 A78-16534

p0079 A78-16549

PHOTOMAPPING Visual interpretation of Landsat MSS imagery for a naissance soil survey of a part of the Indo-Ga plain India p0006 A78-16555 vegetation from Distinguishing vegetation from soil background information - - by gray mapping of Landsat MSS data p0006 A78-17199 Photo interpretative procedures in assessing river p0080 A78-18271 ecreation potential Integration of remote sensing techniques applied to roundwater investigations p0060 A78-18865 aroundwater investigations Methods of analytic processing of o0081 A78 19241 Models for the identification of topograp hic objects di the deciphering of aerial photographs p0031 A78-19243 aids for cartography and photo p0031 N78-10543 Application of LANDSAT images to wetland study and land use classification in west Tennessee part 1 p0063 N78-12505 The application of LANDSAT-1 imagery for monitoring strip mines in the new river watershed in northeast nessee part 2 p0037 N78 12506 Aerial photointerpretation of a small ice jam D-AO45870] pO084 N78-13513 A perspective on the state of the art of photographic On the photographic processing and digital text remote sensing of Kujukuri Coast of Chiba in Japan d digital texture for p0052 N78-14506 Image analysis techniques with special reference to inalysis and interpretation of geological features from LANDSAT imagery -- India p0038 N78 14544 LANDSAT image interpretation aids p0089 N78 14558 Boundary detection in images Optical formulation in terms of signal detection theory -photointerpretation of [INPE 1118-TPT 087] p0092 N78-14894 Snow mapping from Landsat digital data p0055 A78-12933 Color aerial photography in the plant sciences and related fields Proceedings of the Fifth Biennial Workshop Falls S Dak August 19-21 1975 p0001 A78 p0001 A78-13060 Forest type mapping of the Atchafal satellite and aircraft imagery ava River Basin from p0002 A78-13068 Seasonal color-infrared photographs for mapping inland wetlands on U.S. Geological quadrangles survey 7 5-minute p0035 A78-13069 A comparative study of the amount and types of geologic information received from visually interpreted U Landsat imagery Industrial use of geological remote nO035 A78-13492 sensing from space p0035 A78-14787 Production of a map of land use in lowe through manual p0018 A78-14837 interpretation of Landsat imagery p0018 A78-14837
The application of IR- and MSS-data in the Ruhr district Germany -- aerial photography of heat distributio p0074 A78-14838 Multidate mapping of mosquito habits p0056 A78-14851 at the National p0074 A78-14854 Processing of satellite imagery Environmental Satellite Service Textural analysis by statistical parameters and its application to the mapping of flow-structures in wetla /Mudflat area at the German coast of the North Sea/ DO056 A78 14856 Production of a water quality map of Saginaw Bay by

computer processing of Landsat-2 data

p0057 A78-14857 An application of Landsat digital technology to forest p0004 A78-14863 fire fuel type mapping
Applications of Landsat data to the integrated ecor

development of Mindoro Philippines p0107 A78 14889 Lake water quality mapping from Lai p0057 A78-14893

Prototype active scanner for nightti and classification me od spill mapping p0019 A78-14896

Inventory of ricefields in France using Landsat and aircraft p0005 A78-14900 Large scale 70mm photography for range resources alysis in the western United States p0005 A78-14902

Three approaches to the classification and map n0057 A78 14906 Cold climate mapping using satellite high resolution thermal imagery --- weather forecasting improvement

p0076 A78-14978 The Gestalt Photomapping System p0030 A78 15730

ment planning using p0006 A78 16508 nnish system for forest manager aerial photographs A multiseries digital mapping system for positioning MSS and photographic remotely sensed data n0077 A78 16509

Applications of the ERTS 1 Satellite to traditional intography p0030 A78 16510 Optimum ratio of photo-field plots for aenal volume and aerial volume growth regression construction --- for spruce p0006 A78 16523 Test on the mapping application of Landsat im

p0077 A78-16527

Distinguishing vegetation from soil background information - by gray mapping of Landsat MSS data p0006 A78-17199 PHOTOMAPS SUBJECT INDEX

Environmental mapping of the French coastal zone by Remote optical sensing of the concentration and mass p0031 A78 18102 Application of LANDSAT images to wetland study and flow of particulate and gaseous pollutants in smoke plumes remote sensing land use classification in west Tennessee part 1 [F78-10031] p0063 N78-12505 Annications of remotely sensed data to wetland p0079 A78 18103 discharged through chimneys n0016 A78 12981 [E78-10031] Convective cloud plumes mark Canadian fire sites The application of LANDSAT 1 imagery for monitoring p0005 A78-15308 Application of aircraft multispectral scanners to quantitative analysis and mapping parameters in the James River Virginia of water quality strip mines in the new river watershed in northeast Detection of a plume 400 km from the source Tennessee part 2 [E78-10032] p0019 A78-15370 parameters in the James River Virginia p0080 A78-18104 Computer elaboration and visualization of remote sensing data - from Landsat for cartography p0080 A78-18241 Results and prospects of the study of natural resources by aerospace methods p0107 A78-18522 p0037 N78-12506 Remote sensing of pollutant plume from Landsat **POSITION ERRORS** p0021 A78-18240 Correlated errors in satellite altimetry geoids p0029 A78-13760 Characteristics of polar cap sun aligned arcs POSITION INDICATORS A technique for the determination of Louisiana marsh p0095 A78 13083 Use of an inertial navigation system to a recovery and coastal oceanographic measurements p0096 A78-14892 POLAR ORBITS salinity zone from vegetation mapped by multispectral Processing of satellite imagery Environmental Satellite Service at the National p0074 A78-14854 data A comparison of satellite and aircraft data p0081 N78 10541 POSITIONING [NASA-TM-58203] Cartographic Electron Beam Recorder (EBR) system [AD-A044401] p0100 N78 1251 POLAR SUBSTORMS A multiseries digital mapping system for positioning MSS ND-A044401] po100 N78 12513 Texture tone feature extraction and analysis ID-A045542] p0086 N78-13412 Tennessee-Tombinhee industrial Pulsating aurora - Local and global morpholo and photographic remotely sensed data p0035 A78-13082 p0077 A78-16509 [AD-A045542] Dependence of substorm occurrence probability on the PRECIPITATION (METEOROLOGY) Tennessee-Tombigbee industrial siting project: A study of physical and environmental factors of potential industrial Radar observed land/lake precipitation differen interplanetary magnetic field and on the size of the auroral p0058 A78-17074 p0080 A78-18730 Precipitation (radar) project of the IFYGL lake meteorology - Mississippi Columbus Air Force Base and Lowndes **POLARIMETERS** Clay Monroe Itawamba and Tishomingo Counties program [PB-272152/0] Polarimeter measures sea state characteristics using p0024 N78 13507 p0069 N78-15660 [E78-10035] emitted infrared radiation p0047 A78-14821 [E78-10035] p00024 N/8 1350/ Acquisition of terrain information using Landsat multispectral data Report 2 an interactive procedure for classifying terrain types by spectral characteristics [AD-A045871] p0033 N78-13516 PROBLEM SOLVING POLARIZATION (WAVES) Some aspects of the inversion problem in remote Polarimeter measures sea state characteristics using emitted infrared radiation p0052 N78-14513 p0084 N78 12589 A solution to the problem of SAR range curvature POLLUTION CONTROL The transfer of the contents of satellite pictures onto p0090 N78 14571 Measurement and the law - Monitoring for compliance PRODUCTION PLANNING geographic maps with the Clean Air Amendments of 1970 [RILD-M 24900-(5828 4F)] p0033 N78-14453 Wheat yelld forecasts using LANDSAT data p0022 A78-18456 Lake water quality mapping from LANDSAT p0011 N78-14570 p0026 N78 14587 **POLLUTION MONITORING** PROJECT MANAGEMENT Prototype active scanner for nighttime oil spill mapping diclassification p0026 N78-14590 Remote sensing in operational range management programs in Western Canada p0026 N78-14556 The determination of volatile organic compounds in city air by gas chromatography combined with standard addition selective subtraction infrared spectrometry and mass and classification PHOTOMAPS PROJECT PLANNING p0015 A78-10041 Development of an integrated data base for land use nd water quality planning p0026 N78 14584 Contributions of LANDSAT to natural resource protection spectrometry and future recreational development in the state of West Instrumental sensing of stationary source emissions -and water quality planning Canaan Valley and Dolly Sods area coal burning power p0015 A78-10056 D0024 N78-13501 Prototype active scanner for nighttime oil spill mapping plants d classification p0019 A78-14896
Prototype active scanner for nighttime oil spill mapping d classification p0026 N78-14590 The transfer of the contents of satellite pictures onto and classification Tropospheric photochemical and photophysical processes geographic maps [BLLD-M 24900-(5828 4F)] timable laser application to air pollution monitoring p0033 N78-14453 p0015 A78-11809 and classification PUBLIC LAW PHOTOMETRY Photochemistry in the stratosphere p0015 A78-11810 Comparability of CO2 measurements --- of atmosphere Measurement and the law - Monitoring for compliance Digital image processing p0076 A78 15330 ts --- of atmosphere p0015 A78-12405 Far-infrared photometry with an 0 4-meter liquid helium cooled balloon-borne telescope [NASA-CR-155234] p0099 N78-11449 with the Clean Air Amendments of 1970 between standards and sample p0022 A78-18456 application of remote sensing to to the monitoring of p0016 A78-12955 PULSE DOPPLER RADAR coastal water pollution An advanced computer calculation of ground clutter in an airborne pulse Doppler radar p0097 A78-15662 The growth of aerosol in an urban plume PHOTOMICROGRAPHY Imaging natural materials with a quasi microscope --spectrophotometry of granular materials [NASA-CR-155250] p0099 N78-11813 PULSED LASERS The arrangement of atmospheric pollution detectors by PROBE A new technique for measuring the density p0099 N78-11813 means of a minicomputer and a multicompo profile of a specific constituent using counterpropagating taser pulses p0096 A78-13943 p0016 A78 12975 PHOTOSENSITIVITY Remote optical sensing of the concentration and mass Quality control techniques for high altitude color flow of particulate and gaseous pollutants in smoke plumes photography p0002 A78-13062 p0016 A78-12981 discharged through chimneys Q PHYSICAL FACTORS How to minimize the baseline drift in a COSPEC remote Recent developments in modeling groundwater sensor -- correlation spectrometer for pollution detection systems p0096 A78-13435 QUALITY CONTROL [LBL-5209] p0068 N78-14616 high altitude color p0002 A78-13062 Quality control techniques for Atmospheric particulate properties inferred from lidar and PLANETARY ATMOSPHERES solar radiometer observations compared with simultaneous in situ aircraft measurements. A case study ohotography Generalization of the relaxation method for the inverse A quality assurance program for monitoring ozone and solution of nonlinear and linear transfer equations p0016 A78 13616 carbon monoxida DO084 N78-12590 Evaluation of a hydrogen chloride detector for evironmental monitoring p0017 A78 13843 [PB-271204/0] n0024 N78-13636 Inverse solution of the pseudoscalar transfer equation rough nonlinear matrix inversion p0084 N78-12592 Quality assurance research plan fiscal year 1978 environmental monitoring spheric spectroscopy p0017 A78-14082 through nonlinear matrix inversion Tunable dual-line CO2 laser for atm 1982 Backus-Gilbert theory and its application to retrieval of and pollution monitoring B-272421/9] p0027 N78-14700 ozone and temperature profiles -- from remote sounding data p0084 N78-12593 Remote sensing of air pollutants p0017 A78-1479
Landsat digital data for water pollution and water qualif QUANTITATIVE ANALYSIS DO017 A78-14797 Quantitative analysis of aircraft multispectral-scanner data and mapping of water quality parameters in the James Inversion of infrared limb emission measurements for studies in southern Scandinavia p0018 A78 14841 Detection identification and quantification techniques for spills of hazardous chemicals - in rivers lakes and River in Virginia [NASA-TP-1021] temperature and trace gas concentrations p0065 N78-13628 p0084 N78-12594 n0019 A78-14914 PLANETARY MAGNETIC FIELDS Remote estimation of surface temperature in pollution leasurement experiments p0019 A78-14992 Remote sensing experiment for magnetospheric electric fields parallel to the magnetic field p0080 A78-18440 R measurement experiments Detection of a plume 400 km from the source p0019 A78-15370 PLANETARY MAPPING RADAR Inversion of passive microwave remote sensing data from Simultaneous measurements of nitrogen dioxide and atellites p0085 N78 12599 Digital exploitation of synthetic aperture radar nitric acid in the lower stratosphere [ONERA TP NO 1977 154] DOORS N78-14505 PLANKTON p0020 A78 16214 A multispectral analysis of algal bloom in the Gulf of RADAR ATTENUATION Monitoring of polluted rivers y remote sensing p0020 A78-16530 Simulation of attenuation by rainfall at a wavelength of Mexico methods [AIAA 77 1565] p0044 A78 13657 Unique ambient carbon monoxide monitor based on gas p0058 A78-17019 RADAR DATA PLANTING filter correlation Performance and application Planting data and wheat yield models -- Kansas South Analysis of synthetic aperture radar ocean wave data p0020 A78-16771 collected at Marineland and Georges Bank Dakota and USSR Quantitative remote measurements of pollutants from stationary sources using Raman lidar p0020 A78-17000 [E78-10013] DO007 N78-10538 [PB-268675/6] p0050 N78 10678 Necessity to adapt land use and land cover classification systems to readily accept radar data p0025 N78-14546 Investigations of spectral separability of small grains early Benefit assessment of ozone mon pring satellites p0021 A78-17574 season wheat detection and multicrop inventory planning -- North Dakota and Kansas Design and operation of an rborne air quality p0021 A78-17575 RADAR DETECTION [E78-10015] measurement system p0008 N78-13499 An advanced computer calculation of ground clutter in Aircraft versus spacecraft for remote monitoring of water iality in U S coastal zones p0021 A78-17576 PLANTS (BOTANY) an airborne pulse Doppler radar p0097 A78 15662 quality in U.S. coastal zones Remote sensing and laboratory tech Plants as indicators of photochemical oxidants in the Characteristics of sea clutter measured from E 3A high p0017 A78 14199 USA iques for monitoring p0097 A78 15684 radar platform ocean dumping
Energy resource development
components p0022 A78-18795 Remote sensing of aquatic plants p0056 A78-14836 Observation of the development of individual clear air The monitoring p0022 A78-19616 p0020 A78 17061 Monitoring aquatic plants in Texas p0049 N78-10527 convective cells PLOTTERS Radar detection of surface oil slicks A modular radiative transfer p ogram for gas filter D0021 A78 17197 The Gestalt Photomapping System p0030 A78-15730 correlation radiometry [NASA-CR-2895] PLUMES Monte Carlo simulation of wave sensing with a short p0022 N78-10526 pulse radar [NASA-TM-X 71412] Quantitative mapping of suspended solids in wastewater A quality assurance program for monitoring ozone and studge plumes in the New York Bight apex D0081 N78 10341 carbon monoxide

The growth of aerosol in an urban plume

DO015 A78-10658

p0016 A78-12971

[PB-271204/0]

p0024 N78-13636

Air pollutant monitor network design using mathematical ogramming p0027 N78 15593

RADAR ECHOES

Analysis of GATE radar data for a tropical cloud cluster

p0079 A78 17068

in an easterly wave

SUBJECT INDEX **REGIONAL PLANNING** 

An intercomparison of satellite images and radar rainfall rates - - Miami Florida RADIATIVE TRANSFER Reindeer range inventory in western Alaska from Cloud properties from satellite infrared and visible computer-aided digital classification of LANDSAT data [PB-270299/1] p0063 N78-11647 measurements p0009 N78 14516 RADAR EQUIPMENT A modular radiative transfer program for gas filter RANGELANDS correlation radiometry [NASA-CR-2895] Seasat A Synthetic Aperture Radar - Radar system Surface resource inventory of eastern Montana p0022 N78-10526 implementation p0095 A78-12833 rangelands utilizing high altitude color infrared aeria Hybrid methods are helpful 00084 N78-12587 p0002 A78-13067 Fetimation of soil moisture with radar remote cension photography Review of radiative transfer methods in scattering p0101 N78-14601 Remote sensing in operational range management RADAR IMAGERY programs in Western Canada DO019 A78-14862 Some aspects of the inversion problem in remote insing p0084 N78-12589 Side-looking airborne radar p0071 A78-10325 Large scale 70mm photography for range resources analysis in the western United States p0005 A78-14902 Monitoring open water and sea ice in the Bering Strait radar p0041 A78-10388 Generalization of the relaxation method for the inverse Computer-aided analysis of LANDSAT data for surveying by radar by radar
Computer processing of SAR L-band imagery --Synthetic Aperture Radar for ice mapping
p0055 A78-10524 solution of nonlinear and linear transfer equations exas coastal zone environments --- Pass Cavallo and Port p0084 N78 12590 Statistical principles of inversion theory [E78-10018] p0082 N78-12497 DOOR4 N78-12591 Inverse solution of the pseudoscalar transfer equation rough nonlinear matrix inversion p0084 N78 12592 Backus-Gilbert theory and its application to retrieval of Ocean wave patterns under Hurricane Gloria
Observation with an airborne synthetic-aperture radar Evaluation of Skylab (EREP) data for forest and rangeland through nonlinear matrix inversion [PB-270543/2] n0007 N78-12521 p0047 A78-14126 Investigation of techniques for inventorying forested regions. Volume 1. Reflectance modeling and empirical multispectral analysis of forest canopy components. [E78-10048] p0009 N78-14482 A survey of SAR image formation processing for earth sources applications p0073 A78-14785 ozone and temperature profiles - - from remote sounding nO084 N78-12593 resources applications Inversion of passive microwave remote sensing data from stellites p0085 N78-12599
Application of statistical inversion to ground-based Space radar system specifications hydrology agriculture and geology satellites DO073 A78-14803 Investigation of techniques for inventorying forested Necessity to adapt land use and land cover classification regions Volume 2 Forestry information system requirements and joint use of remotely sensed and ancillary microwave remote sensing of temperature and water vapor systems to readily accept radar data p0018 A78-14852 p0085 N78-12600 A block adjustment for SLAR-imagery Effective aerosol optical parameters from polarimeter easurements p0086 N78-12605 DO079 A78-16548 [E78 10047] Landsat radar synergism - - image enhancement through impositing techniques p0079 A78-16554 RADIO ALTIMETERS Remote sensing in operational range management programs in Western Canada p0026 N78-14556 compositing techniques Design of the Seasat A radar altimeter A78 12830 Measurement of sea surface by means of microwave Analysis of GATE radar data for a tropical cloud cluster an easterly wave p0079 A78 17068 Large scale 20mm photography for range resources analysis in the Western United States - - Casa Grande altimeters - A computer simulation for system evaluation p0095 A78-12836 in an easterly wave A survey of SAR image formation processing for earth sources applications p0087 N78 14472 Arizona Mercury Nevada and Mojave Desert Ocean current surface measurement using dynamic p0012 N78 14596 resources applications Space radar system specifications p0101 N78 14495 elevations obtained by the GEOS 3 radar altimeter RARE EARTH ELEMENTS p0044 A78-13658 Rare earth and trace element geochemistry of metabasalts from the Point Sal ophiolite California Integration of remote sensing and surface geophysics the detection of faults p0038 N78 14561 The computation of ocean wave heights from GEOS-3 in the detection of faults satellite radar altimeter data [AIAA 77-1571] p0036 A78-20097 RADAR MAPS IdAA 77-1571]
Correlated errors in satellite altimetry geoids
p0029 A78-13760 Ocean surface currents mapped by rada Tropospheric photochemical and photophysical processes
- - timable laser application to air pollution monitoring
p0015 A78 11809 p0041 A78 10344 RADAR MEASUREMENT RADIO ANTENNAS Active microwave measurement from sea-surface winds p0041 space An entree for large space antennas p0097 A78-16699 REAL TIME OPERATION p0041 A78 12615 A low-cost system for reception and processing of line-scan data from Landsat and other sources RADIO CONTROL The problems and opportunities ---Use of radio-controlled miniature aircraft for marine tmosphere sampling p0049 A78-20485 p0106 A78-14777 ocean surface atmosphere sampling p0074 A78-14831 Real Time Dust Fall Monitor (RTDFM) - - for application Estimation of soil moisture with radar remote sensing p0005 A78-14907 RADIO OBSERVATION to space shuttle [NASA-CR-150446] A study of the earth by aircraft its obtained by Radar measurement of stratified earth surface covers D0107 A78-18721 radio techniques p0030 A78-15424 RECLAMATION RADIO RECEIVERS Simulation of attenuation by rainfall at a wavelength of cm p0058 A78-17019 The use of LANDSAT digital data and computer GDM/GPS receiver hardware impleme implemented techniques for an erosion hazard-reforestation needs assessment -- Yalobusha Co Calhoun Co and D0030 A78-15589 needs assessment -- \\
Grenada Co Mississippi
[E78-10050] Radar observed land/lake precipitation p0058 A78-17074 Atmospheric particulate properties inferred from lidar and solar radiometer observations compared with simultaneous An evaluation of radar as a soil moisti 50012 N78-15540 p0060 A78-18868 RECREATION in situ aircraft measurements - A case study RADAR NAVIGATION Photo interpretative procedures in assessing river D0016 A78 13616 High-resolution radar scattering characteristics of a disturbed sea surface and floating debris recreation potential p0080 A78-18271
Contributions of LANDSAT to natural resource protection Investigation of thematic mapper spatial radiometric and p0096 A78-14826 p0099 N78-12268 and future recreational development in the state of West
Virginia -- Canaan Valley and Dolly Sods area
[E78-10019] p0024 N78-13501 AD-A0442161 RADAR SCANNING A modular radiative transfer program for gas filter Radar systems for a polar mission volume 1
[NASA-CR-156640] p0049 prrelation radiometry p0049 N78-10344 [NASA-CR-2895] n0022 N78 10526 RECTIFICATION RADAR SCATTERING Microwave radiometric sensing of surface temperature Practical experience in the rectification of MSS-images and wind speed from SEASAT [PB-270323/9] p0077 A78-16520 Experiments on the radar backscatter of sno p0055 A78-10386 n0098 N78-10549 RED TIDE A model for sea backscatter intermittency at extreme azing angles p0043 A78-13312 Techniques for opening regional radiation budgets from tellite radiometer observations p0099 N78-11446 A multispectral analysis of algal bloom in the Gulf of Mexico [AIAA 77 1565] grazing angles satellite radiometer observations High-resolution radar scattering characteristics of a n0044 A78-13657 Inversion of scattered radiance horizon profiles for disturbed see surface and floating debris
[AD-A044216] pc REFLECTANCE
The use of Landsat for monitoring water parameters in gaseous concentrations and aerosol param p0099 N78-12268 p0085 N78-12595 Radar backscattering from a sea having an anisotropic large-scale surface part 2
[NASA-CR-145278] p0054 N78-15663 the coastal zone The digital processing of Scanning Radiometer (SR) data from NOAA weather satellites as carried out in the Meteorological Institute of the Free University of Berlin Part 2 Notes on the digital filtering of satellite pictures [BLLD-M-24895-(5828 4F)] p0102 N78-14747 [AIAA 77 1597] Analysis of infrared reflectivity in the presence of RADIANCE asymmetrical phonon lines --- phonon spectra n0035 A78-13932 Estimating clear radiances - A report and a new decision rule --- IR measurement in lower atmosph Directional reflectances of terrain rain objects from p0078 A78-16531 p0097 A78-14971 Estimation of ground temperature from GFCR radiometric B&W-aerial photos Laboratory measurements of radiance and reflectance spectra of dilute primary-treated sewage sludge [NASA-TP-1038] p0023 N78-12554 Laboratory measurements of radiance and reflectance [NASA CR-145291] pO102 N78-15626 spectra of dilute primary-treated sewage sludge [NASA-TP-1038] p0023 N78-12554 A preliminary study of the applicability of Nimbus 6 ESMR Laboratory measurements of upwelled radiance and reflectance spectra of Calvert Ball Jordan and Feldspar to surface wind speed estimates Laboratory measurements of upwelled radiance and [AD A046629] p0102 N78-15643 reflectance spectra of Calvert Ball Jordan and Feldspar RADIOSONDES [NASA-TP-1039] p0024 N78-12645 Capabilities of operational infrared sounding systems from stellite altitude p0101 N78-14567 [NASA TP 1039] p0024 N78 12645 Investigation of techniques for inventorying forested regions. Volume 1. Reflectance modeling and empirical multispectral analysis of forest canopy components. Capabilities of operational infrared sound stellite altitude pC satellite altitude p0101 N78-14567 RADOMES RADIATION ASSORPTION Design and fabrication of nosecone for WB 57F aircraft fitted with APQ-102A side looking radar p0009 N78 14462 Infrared absorption spectra attributed to ion nucleated water clusters
[AD-A044661] p0064 N78-12518

[E78 10046] Further tests of the suits reflectance mode p0102 N78-15028 [NASA CR-151592] RAIN The effect of soil water deficit on the reflectance of conifer solling canonies p0010 N78 14521 Simulation of attenuation by rainfall at Use of clear lake as standard reflectors for atmospheric p0088 N78 14522

Il at a wavelength of p0058 A78-17019 5 cm An intercomparison of satellite images and radar rainfall

rates - - Miami Florida [PB 270299/1]

## RAMAN SPECTRA

RADIATION DISTRIBUTION

Techniques for opening regional radiation budgets from satellite radiometer observations p0099 N78 11446 RADIATION MEASUREMENT

ADIATION MEASUREMENT STATEMENT AT THE STATEMENT STATEMENT OF THE STATEMENT

Quantitative remote measurements of pollutants from stationary sources using Raman lidar p0020 A78 17000 Significant initial results from the environmental measurements experiment on ATS-6

[NASA-TP-1101]

RADIATION MEASURING INSTRUMENTS

Development of environmental charging effect monitors
p0098 N78 10174

Quantitative remote measurements of pollutants from stationary sources using Raman lidar p0020 A78-17000 RANDOM SAMPLING

Testing the accuracy of remote sensing land use m p0074 A78-14819

Remote sensing in operational range management programs in Western Canada p0019 A78-14862

DO024 N78-13506

REFLECTED WAVES
Spectral structure of the solar radiation field reflected by the ocean-atmosphere system p0049 A78 20055

REGIONAL PLANNING
Contributions of LANDSAT to natural resource protection and future recreational development in the state of West Virginia -- Canaan Valley and Dolly Sods area

[E78-10019] p0024 N78-13501 Application of remote sensing to state and regional

[E78-10034]

n0010 N78 14519

Tennessee Tombigbee industrial siting project. A study of physical and environmental factors of potential industrial ertes - - Mississioni Columbus Air Force Base and Lowndes Clay Monroe Itawamba and Tishomingo Counties p0024 N78 13507 (£78-10035)

REGRESSION ANALYSIS

Mean annual volume growth from sequential volume determination on permanent aerial photographic plots -- of conifer forest p0006 A78 16522 of conifer forest Application of aircraft multispectral scanners quantitative analysis and mapping of water quality parameters in the James River Virginia

p0080 A78-18104
Fundamental analysis of the linear multiple regression technique for quantification of water quality parameters from p0063 N78 12490 remote s nsıng data

RELIEF MAPS

A system of remote sensing and mapping for deve countries p0030 A78 16546 use of satellite photography in the National Topographic Mapping Program of Canada

p0030 A78 16552

DEMOTE SENSORS

Instrumental sensing of stationary source emissions sulphur dioxide remote sensing for coal b oal burning power p0015 A78 10056 A modern tool for land design -erial photomapping p0071 A78-10075

One-parameter characterization of the ocean optical properties for remote sensing p0041 A78 10161 The development of international law relating to remote sensing of the earth from outer space p0105 A78 10358 Yield/reflectance relations in cabbage -- remote sensing p0001 A78 10521

Remote sensing as a tool in assessing the impact of topographical alterations on the microclimat

p0029 A78-11099 Remote sensing using tunable lasers

p0015 A78-11811 Remote sensing A burgeoning science --- Canadian ograms p0105 A78-12214

rograms
The Seasat-A project - An overvie

p0042 A78-12829 Remote sensing of chlorophyll concer entration from high altitude OCS environmental research tech plogy in ice-covered p0043 A78-12845

Results of a remote sensing study of the effects of hail p0001 A78-12878

Earth Resources Management system for analyzing motely sensed data p0071 A78 12928 remotely sensed data The practical application of remote sensing for the of resource assessment management

p0071 A78-12929 Remote sensing for the medium-scale assessment of ground level thermal and hydrologic variations application to the local prediction of storms by use of the Project Tellus system p0055 A78-12930

Agricultural applications of satellite remote sensing - The measurement and prediction of principal harvests

p0001 A78-12931 A mask correlation remote sensor for measurements of SO2 optical depths on long light source - Instrume p0016 A78-12938 Remote sensing from space and models of the management of renewable resources p0105 A78-12943

Earth remote sensing using microwave /radar/ chniques p0072 A78-12944 techniques The application of remote sensing to the monitoring of pastal water pollution p0016 A78-12955

coastal water pollution p0016 A78-12955
Remote optical sensing of the concentration and mass flow of particulate and gaseous pollutants in smoke plumes discharged through chimneys p0016 A78-12981

The remote sensing of atmospheric pollutants by a CO2 p0016 A78-12982 laser apparatus

Color aerial photography in the plant sciences and related fields Proceedings of the Fifth Biennial Workshop Sioux Falls S Dak August 19-21 1975 p0001 A78-13060 Landsat computers and development projects

D0072 A78-13113 nize the baseline drift in a COSPEC remote sensor - - correlation spectrometer for pollution dete

p0096 A78-13435 remote sensing by p0105 A78-13495 The European Space Agency and

1978 - A space focus for ocea ology - ocean remote ensors on Seasat-A and Nimbus-G

[AIAA 77-1564] p0043 A78-13656

Remote sensing of ocean temperature [AIAA 77-1599] p0045 A78-13674

Future onshore and offshore exploration by remote sensing from space [AIAA 77-1550] p0046 A78-13681

PROBE A new technique for measuring the density profile of a specific constituent using counterpropagating laser pulses p0098 A78-13943

International Symposium on Remote Sensing of Environment 11th University of Michigan Ann Arbor Mich April 25-29 1977 Proceedings Volumes 1 & 2 DO106 A78-14776

The problems and opportunities -remote sensing of pQ108 A78-14777 ocean surface

The utility of short wavelength /less than 1 mm/ remote sensing techniques for the monitoring and asset and assessment of p0055 A78-14780 hydrologic parameters

Microwave remote sensing of hydrological logic parameters p0055 A78-14781

Utilization of remote sensing obse vations in hydrologi p0055 A78 14782 models

The impact of remote sensing on United States ography - The past in perspective p pool 7 A78 14783

Remote sensing data processing Two years ago today p0072 A78-14784 and two years from today Industrial use of geological remote sensing from space

p0035 A78-14787 Operational utilization of remotely atah basne p0106 A78-14790

Progress and needs in agricultural research, development and applications programs -- of remote sensing

p0002 A78 14791 Remote sensing and today's forestry issues

p0002 A78 14792

Coastal wetlands - The present and future role of remote p0055 A78 14794 An overview of remote sensing to chnology transfer in p0106 A78 14795

Canada and the United States The transfer of remote sensing technology in the eveloping nations - An observation p0106 A78-14796 Remote sensing of air pollutants DO017 A78-14797

Remote sensing of environmental noact of land use p0018 A78-14798 activities Remote monitoring and Tennessee Valley Authority ograms p0018 A78-14800 program

Corps of Engineers applications for remote sensing of p0018 A78-14801 A study of suspended solids in the Requena Dam by DO073 A78-14807

Testing the accuracy of remote se ising land use maps DO074 A78-14819

Remote sensing exploration for metallic mineral resources central Baja California p0035 A78 14825 ın central Baja Ca Further tests of the Suits reflectance model -- for cros

p0003 A78-14827 remote sensing Use of clear lakes as standard reflectors for atmospheric p0074 A78-14830

Remote sensing-aided systems for snow quantification their application in p0056 A78-14834 evapotranspiration estimation and hydrologic models

Remote sensing of aquatic plants DO056 A78-14836 Indicators of international remote sensing activities p0107 A78-14842

Remote sensing of ocean color and detection of p0048 A78-14855 chlorophyll content Remote sensing utilization of devel poing countries - An p0107 A78-14858 appropriate technology

A survey of users of earth resou p0107 A78-14859 range manager

Remote sensing in operational ri ograms in Western Canada Remote sensing and geographically DO019 A78-14862 based information p0075 A78-14866 systems Integration of remote sensing and surface geophysics p0035 A78-14867 in the detection of faults

Computer-aided classification for . emote sensing in agriculture and forestry in Northern Italy p0004 A78-14879

Estimation of soil moisture with radar remote ser p0005 A78-14907 Passive microwave remote sensing of

of soil moisture p0005 A78-14915 A multiseries digital mapping system for positioning MSS

and photographic remotely sensed date n0077 A78-16509

The use of remote sensing in the detection of crop pmage p0006 A78-16513 damage Approaches for solving forestry p oblems by utilizing p0006 A78 16515 aerospace methods

7 lakes in northern p0058 A78 16528 Remote sensing of water quality in Monitoring of polluted rivers by py remote sensing

methods Establishment of the hydro-morphometric characteristics water bodies photogrammetric and p0058 A78-16540 using

-sensing recordings Earth Resources Technology Satellite /ERTS/ - An p0107 A78-16544 A system of remote sensing and mapping for developing

p0030 A78-16546 A mathematical model for digital rectification of remote p0079 A78-16549 sensing data

Remote sensing of earth resource es using a spaceborne microwave radiometer - - onboard Skylab p0098 A78-17377

Environmental mapping of the French coastal zone by p0031 A78-18102 remote sensino Applications of remotely sensed data to wetland p0079 A78-18103 studies

Remote sensing of pollutant plu p0021 A78-18240 Computer elaboration and visualization

puter elaboration and visualization of remote-sensing - from Landsat for cartography p0080 A78-18241 Optimal spatial sampling techi ques for ground truth data in microwave remote sensing of soil moisture

DO058 A78-18247

Remote sensing experiment for magnetospheric electric fields parallel to the magnetic field p0080 A78-18440 Preliminary results from the Udar system at the University of L Aquila -- stratospheric aerosols and nitrogen dioxide fluorescence observations p0022 A78 18476 p0022 A78 18476

Aerial photography and remote sensing for soil survey - Book p0080 A78-18749 Remote sensing and laboratory tech p0022 A78-18795 ocean dumping

Remote sensing of soil moisture and groundwater Proceedings of the Workshop Toronto Can 8-10 1976 n000 Canada November p0059 A78-18859

The application of remote sensing to water resources anning watershed modelling and real time flood planning watershed modelling and forecasting n0059 A78-18861 Integration of remote sensing techniques applied to oundwater investigations p0060 A78-18865 groundwater investigations

Soil moisture determination by p0060 A78-18870 sensino A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses

n0080 A78-18910 Remote sensing of vegetation and soil using microwave

elimsometry [NASA CASE-GSC-11976-1] p0007 N78 10529

Laboratory requirements for in situ and remote sensing of suspended material [NASA-CR-145263]

Analysis of photochemical oxidant and particulate pollution patterns in New England using remote sensing

p0023 N78-10623 [PB-268996/6]

Thermal remote sensing calibration techniques
[PB-269471/9] p0061 N78 10630
A numerical algorithm for remote sensing of ocean density

profiles by acoustic pulses p0050 N78-10674 [AD-A042372] Investigation of natural environment by space means

Geobotany Geomorphology soil sciences agricultural dscape study [NASA-TM-75041] n0108 N78-11448

IASA-TM-75041;
Geometric processing for digital mapping with multiseries
mote sensing data p0082 N78 12489 remote sensing data undamental analysis of the linear technique for quantification of water quality parameters from

remote sensing data
Basic remote p0063 N78 12490 sensing investigation for

p0083 N78 12515 Remote sensing of oceanic parameters during the

Skylab/gamefish experiment [NASA-RP-1012] p0051 N78-12644 surface Microwave scattering from the sea

p0051 N78-13313 Applications of remote sensing to water resources

p0064 N78 13509 [NASA-CR-150467] p0064 N78 13509 Proceedings of the Eleventh International Symposium on Remote Sensing of Environment volume 1 [NASA-CR-155361] p01 p0109 N78-14464

Sensing the earth's environment from space. User needs and technology opportunities. p0109 N78-14485. The utility of short wavelength (1mm) remote sensing. ues for the monitoring and assessment of hydrolog p0065 N78-14487 parameters

Utilization of remote sensing observations in hydrologic odels p0065 N78-14469
The impact of remote sensing on United States geography The past in perspective p esent realities futur p0109 N78-14470 potentials

Remote sensing data processing Two years ago today p0087 N78-14471 and two years from today Operational utilization of remotely sensed data --- NOAA p0109 N78-14477 Rebirth of remote sensing Do vour own good? --- LANDSAT system Do we know enough for readouts

p0109 N78-14478 US initiatives for remote sensing applications in the p0110 N78-14480 developing world The present status of remote sensing in the United p0110 N78 14481 Nations 8 April 1977

Remote sensing and today's forestry issues p0009 N78-14483 Coastal wetlands The present and future role of remote p0066 N78-14485 sensing

An overview of remote sensing technology transfer in anada and the United States p0110 N78-14486 Canada and the United States Technical assistance and the transfer of remote sensing technology --- for economic developme

p0110 N78-14487 The transfer of remote sensing technology in the developing nations. An observation p0110 N78-14488

Remote sensing of air pollutants p0024 N78-14489 Remote sensing of environmental impact of land use p0025 N78-14490 activities Remote monitoring and Tennessee Valley Authority

p0066 N78 14492 Corps of Engineers applications for remote sensing of p0025 N78-14493

A study of suspended solids in the Requena Dam by p0066 N78-14499 remote sensing and digital texture for

On the photographic proces remote sensing of Kujukuri Coast of Chiba in Japan p0052 N78-14506

Testing the accuracy of remote sensing land use maps p0025 N78-14511

observation data An operational multistate earth p0110 N78-14515 management system Remote sensing exploration for metallic mineral resources in central Baja California p0038 N78-14517

p0061 N78-10541

p0022 N78-10531

p0020 A78-16506

p0024 N78 13670

p0012 N78-15536

p0072 A78-14314

p0062 N78-11447

p0039 N78-14622

p0089 N78-14523

p0046 A78-13679

p0105 A78-10353

p0042 A78 12837

p0071 A78-12928

p0001 A78-12931

p0105 A78 12932

p0035 A78 13082

p0095 A78-13083

remote sensing by p0105 A78 13495

nnology Conference 1977 Collection of p0043 A78 13651

n0043 A78 13656

p0045 A78-13666

DO105 A78-13667

p0045 A78 13669

of the upper ocean p0045 A78-13670

p0045 A/u ice forecasting

p0046 A78 13676

n0046 A78-13681

p0046 A78-13683

ry geoids p0029 A78-13760

p0106 A78-14790

p0074 A78-14830

ensed data

Real time satellite imagery for sea

Correlated errors in satellite altime

Operational utilization of remotely

Sea surface temperature gradient analysis from digital

Future onshore and offshore exploration by remote

Use of clear lakes as standard reflectors for atmospheric

n aids from space

[AIAA 77-1601]

sensing from space [AIAA 77-1550]

Marine decision [AIAA 77-1611]

meteorological satellite data [AIAA 77-1604]

Remote sensing-aided systems for snow qualification RIVER BASINS A technique for the determination of Louisiana marsh evapotranspiration estimation and their application in hydrologic models p0087 N78-14527 salinity zone from vegetation mapped by multispectral scenner data. A comparison of satellite and eircraft data Monitoring irrigated land acreage using Landsat imagery hydrologic models An application example -- in Klamath River basi Oregon p0003 A78-14809
Forestland type identification and analysis in Western [NASA TM-58203] Proceedings of the Eleventh International Symposium on Remote Sensing of Environment volume 2 --- application SALTON SEA (CA) and processing of remotely sensed data [NASA CR-155362] p Massachusetts - A linkage of a Landsat forest inventor Determination of aerosol content in the atmosphere from to an optimization study p0110 N78-14529 p0005 A78-14901 LANDSAT data Application of LANDSAT images to wetland study and [E78-10004] - New York Florida Remote sensing of aquatic plants use classification in west Tennessee part 1 -10031} p0063 N78-12505 Texas Louisiana Mississippi South Carolina SALYUT SPACE STATION [E78-10031] p0052 N78-14530 An investigation of natural resources from orbital station Monitorin g strigated land acreage using LANDSAT napplication example p0066 N78-14501 posing activities posing Activities Salvut-4 Indicators of international remote s imagery An application example SAMPLING Application of remotely sensed land-use information to Global sens Remote sensing utilization of developing countries nprove estimates of streamflow characteristics volume automated instrumentation on 747 airliners [NASA-TM-73810] appropriate technology p0111 N78-14552 --- Maryland Virginia and Delaware A survey of users of earth resources remote sensing [E78-10052] DO069 N78-15541 p0111 N78-14553 Pilot study of the potential contributions of LANDSAT RIVERS data in the construction of area sampling frame Remote sensing in operational range management Monitoring of polluted rivers by remote [E78-10037] p0026 N78-14556 programs in Western Canada p0020 A78-16530 SAN FRANCISCO (CA) Application of aircraft multispectral Remote sensing and geographically based information scanners to p0090 N78-14560 quantitative analysis and mapping of parameters in the James River Virginia water quality The microstructure of California coastal fog and stratus systems Integration of remote sensing and surface geophysics p0038 N78-14561 DOORO A78 18104 SANDS in the detection of faults Photo interpretative procedures in assessing river pools A78-18271 Water utilization evapotranspiration and soil moisture Computer-aided classification for remote sensing in recreation potential monitoring in the south east region of south Australia agriculture and forestry in Northern Italy Some specific problems in the operation of a gauging ation p0062 N78-11468 [E78-10001] p0011 N78-14573 Development of airborne electromagnetic survey instrumentation and application to the search for buried Meteorological support for remote sensing programs p0091 N78-14585 Ultrasonic river gauging p0062 N78 11469
Site calibration of electromagnetic and ultrasonic river sand and gravel a summary report Application of remote sensing to geothermal anomaly gauging stations DO062 N78-11470 [PB 271331/1] Telemetering river level from a large remote tropical p0063 N78-11476 in the Caldas Novas County Goias SATELLITE GROUND SUPPORT p0039 N78-14610 [INPE-1129-TPT/070] A low-cost system for reception and processing of Application of remote sensing to geological and mineral deposits surveys of the northern Minas Gerais state utilizing images from LANDSAT Aerial methods of measuring water discharges p0063 N78-11480 line-scan data from LANDSAT and other si The application of LANDSAT-1 image SATELLITE INSTRUMENTS p0039 N78-14611 [INPE 1096-PE/073] strip mines in the new river watershed in northeast Space instruments for oceanography [AIAA 77-1612] Remote sensing A partial technol [PB-271278/4] ennessee part 2 Pgy p0111 N78-14612 [E78-10032] p0037 N78-12506 SATELLITE OBSERVATION Tennessee-Tombigbee industrial siting project. A study Geological remote sensing from space Pending issues before the Legal Sub-Committee of the p0039 N78-14615 of physical and environmental factors of potential industrial [TID-27689] United Nations Committee on the Peaceful Uses of Outer Mississippi Columbus Air Force Base and Lowndes Frequency band justifications for passive sensors 10.0 Clay Monroe Itawamba and Tishomingo Counties [E78-10035] p0024 N78-The development of international law relating to remote to 385 GHz chapter 1 - for monitoring earth resources and the environment 778-10035] p0024 N78-13507 Aerial photointerpretation of a small ice jam sensing of the earth from outer space p0105 A78 10358 Oceanic morphogenesis — catastrophe theory approach [NASA-CR 155530] p0093 N78-15328 p0064 N78-13513 [AD-A045870] p0064 N78-13513 Quantitative analysis of aircraft multispectral-scanner for current patterns using Landsat data Microwave remote sensing and its application to soil moisture detection volumes 1 and 2 p0068 N78-15529 Hydrographic charting from Landsat satellite - A companson with aircraft imagery p0042 A78 12839 International Electronics Congress 24th Rome Italy March 28-30 1977 Proceedings - for exploration data and mapping of water-quality parameters in the James Determination of scattering functions and their effects River in Virginia [NASA-TP 1021] on remote sensing of turbidity in natural waters
[NASA-CR-145239] pO094 N78 15551 p0065 N78-13628 ROCKET SOUNDING March 28-30 19// Proceedings - ... square utilization and conservation of earth resources p0105 A78-12925 multichannel passive microwave REMOTELY PILOTED VEHICLES wave atmospheric p0101 N78 14568 Use of radio-controlled miniature aircraft for marine temperature sounding system atmosphere sampling p0049 A78-20485 ROCKET-BORNE INSTRUMENTS The use of the Landsat series satellites for the monitoring dimanagement of territory p0105 A78-12926 Research and simulation in support of near real time/real Ion temperature estimation with ion trap data from and management of territory rockets and satellites p0098 A78-17113 time reconnaissance RPV systems
[AD A044598] The Italian ground receiving and processing facility for earth resources survey data p0071 A78-12927 ROCKS p0083 N78-12516 Application of HCMM satellite data to mineral exploration RESEARCH AND DEVELOPMENT Earth Resources Management system for analyzing -- Yerington Nevada [E78-10036] Progress and needs in agricultural re remotely sensed data p0037 N78-13508 p0009 N78 14482 Agricultural applications of satellite remote sensing - The and applications programs Alteration mapping at Goldfield Nevada by cluster and discriminant analysis of LANDSAT digital data RESOLUTION measurement and prediction of principal harvests The influence of multispectral scal p0038 N78-14525 p0004 A78-14880 on forest feature classification User experience with the applications of Landsat data Remote infrared spectroscopy of the earth RESOURCES MANAGEMENT n0038 N78-14543 Oceans 76 Proceedings of the Second Annual Co. Pulsating aurora - Local and global morphology ROCKY MOUNTAINS (NORTH AMERICA) Conference Washington D.C. September 13-15 1976 p0041 A78-12827 Waves and turbulence in the vicinity of a chinook arch Characteristics of polar cap sun-aligned arcs cloud p0076 A78-15455 Earth Resources Management system for analyzing p0071 A78-12928 ROOT-MEAN-SQUARE ERRORS remotely sensed data p0071 A78-12928
The practical application of remote sensing for the The summertime stratus over the offshore waters of p0043 A78-13108 Clustering of ERTS data using various orthogonal California transforms of resource assessment p0079 A78-17543 The European Space Agency and p0071 A78 12929 management experience with the applications of Landsat data Establishment of the hydro-morphometric characteristics Satellite applications to marine techp0105 A78-12932 New Orleans La November 15-17 water bodies using photogrammetric remote-sensing recordings n0058 A78-16540 Data acquisition in the specification of behavior models Technical Papers for ecological environment and earth resources studies 1978 A space focus for oceanology --- ocean remote ensors on Seasat A and Nimbus-G RURAL LAND USE p0072 A78-12942 Two phase sampling for wheat acreage estimati Remote sensing from space and models of the management of renewable resources p0105 A78-12943 Surface resource inventory of eastern Montana p0003 A78-14844 [AIAA 77-1564] Ocean mining requirements - - satellite support
[AIAA 77-1581] p0044 A78 13665 rangelands utilizing high altitude color infrared as Applications of Seasat to the offshore oil gas and mining S p0002 A78 13067 photography ındustries An overview of remote sensing technology transfer in Canada and the United States p0106 A78 14795 [AIAA 77-1583] SAGINAW BAY (MI) Surveying the earth's environment from space - Spectral An operational multistate earth observation data Production of a water quality map of Saginaw Bay by computer processing of Landsat 2 data areal temporal coverage trends management system p0106 A78-14823 DO057 A78-14857 Remote sensing utilization of developing countries On the hysteresis of the sea surface and its applicability p0107 A78-14858 appropriate technology p0107 A78-1485
Applications of Landsat data to the integrated econom to wave height predictions [AIAA 77-1588] Use of remote sensing for land use policy formulation development of Mindoro Philippines p0107 A78-14889
Development of an integrated data base for land use and water quality planning p0057 A78 14890 Some aspects of the mixed layer [AIAA 77-1590] [E78-10020]

Application of LANDSAT to the surveillance of lake

strophication in the Great Lakes basin --- Saginaw Bay Michigan [E78-10023] p0064 N78-13503

Production of a water quality map of computer processing of LANDSAT-2 data ap of Saginaw Bay by

p0067 N78-14551

### **SAHARA DESERT (AFRICA)**

and water quality planning p0057 A78 14890
Analysis of Landsat 1 data for mapping of surficial

Tennessee-Tombigbee industrial siting project. A study of physical and environmental factors of potential industrial

sites -- Mississippi Columbus Air Force Base and Lowndes
Clay Monroe Itawamba and Tishomingo Counties

78-10035]
Remote sensing and today's forestry issues p0009 N78 14483

Inventory of ricefields in France using Landsat and aircraft

nventory of ricefields in France using LANDSAT and ircraft p0012 N78 14594

n0038 A78 18553

p0024 N78-13507

Analysis of Landsat 1 data for ma deposits - Test area in Alta commune

[E78-10035]

Application of Landsat satellite imagery for iron ore prospecting in the western desert of Egypt

p0035 A78-14887

Groundwater studies in and areas in Egypt using Landsat stellite images p0057 A78-14888 satellite images SALINITY

Objective analysis and classification of oceanographic p0048 A78-17982

A-25

SATELLITE ORBITS SUBJECT INDEX

Landsat-D thematic mapper simulation using aircraft Study of the Brazil and Falkland currents using THIR mages of Nimbus V and oceanographic data in 1972 to LANDSAT US standard catalog 1-30 September 1977 LANDSAT imagery for September 1977 multispectral scanner data p0047 A78-14840 [NASA-TM 74957] p0094 N78-15556 some extensions for p0003 A78-14812 1973 iti-seasonal data analysis and Landsat digital data for water pollution and water quality SATELLITE TELEVISION environmental monitoring p0018 A78-14841 studies in southern Scandinavia Pending issues before the Legal Sub-Committee of the Landsat detection of hydroth teration in the Nogal p0029 A78 14815 Canyon Cauldron New Mexico Two phase sampling for wheat acreage estimati United Nations Committee on the Peaceful Uses of Oute ndsat II digital data p0056 A78-14816 n0003 A78-14844 Automated image processing p0105 A78-10353 Classification of Landsat agricultural data bas Image data application obtained from space to geological vestigations in the USSR p0035 A78-16502 watershed runoff prediction ol data based upon p0003 A78-14845 color trends An operational multistate earth observation data investigations in the USSR The use of Landsat digital data to p0106 A78-14823 detect and monitor p0004 A78-14846 nagement system SATELLITE TRACKING vegetation water deficiencies Reindeer range inventory in western Alaska from Intercosmos laser ranging stations p0031 A78 18108 mputer aided digital classification of Landsat data p0003 A78-14824 View angle effect in Landsat National geodetic satellite program, part 2 p0074 A78-14848 p0032 N78-11556 Image analysis techniques with special reference to analysis and interpretation of geological features from A low-cost system for reception and processing of SATELLITE TRANSMISSION line-scan data from Landsat and other sources High Landsat imagery p0029 A78-14850 HRPT ground station n0074 A78-14831 p0081 A78-20171 Transmission from NOAA satellites Multidate mapping of mosquito habitat The use of Landsat imagery to locate uncharted cop0056 A78 14851 Use of earth satellite technology for telemetering p0074 A78-14832 features on the Labrador Coast p0063 N78-11489 eteorological station data Processing of satellite imagery Environmental Satellite Service at the National p0074 A78-14854 Digital processing system for developing ng countries -for Landsat computer compatible tape data Operational data processing. The first ten years are the p0075 A78-14865 for Large Area Crop p0004 A78-14864 hardest --- National Environmental Satellite Landsat image interpretation aids Wheat yield forecasts using Landsat data p0088 N78 14476 Inventory Experiment D0004 A78-14876 SATELLITE-BORNE INSTRUMENTS Satellite land use acquisition and applications to drologic planning models
Application of Landsat satellite p0057 A78-14870 Cold climate mapping using satellite high resolution The Seasat A project - An overview thermal imagery - - weather forecasting improvement p0042 A78-12829 imagery for iron ore DO076 A78-14978 ecting in the western desert of Egyp A78-12830 Design of the Seasat-A radar altimeter p0035 A78-14887 Measurement of atmospheric ozone by satellite Seasat-A Scanning Multichannel Microwaye DO097 A78-15013 Groundwater studies in and areas in Egypt using Landsat stellite images p0057 A78-14888 p0095 A78-12831 NOAA satellite monitoring of Radiometer satellite images The Seasat-A satellite scatteror Applications of Landsat data to the integrated economic hemisphere during the winter of 1977 [IAF PAPER 77-121] p0057 A78-15935 p0095 A78-12832 evelopment of Mindoro Philippines p0
Digital color analysis of color-ratio co p0107 A78-14889 s of determining p0095 A78-13218 Automated earth resources surveys using satellite and Comparison of various methods composite Landsat p0075 A78-14898 aircraft scanner data - A Finnish approach solar-proton spectra p0077 A78-16518 Interactive image processing for meteoro applications at NASA/Goddard Space Flight Center for meteorological Ocean current surface measurement using dynamic Vertical lifting of ionization during geomagnetic storms obtained by the GEOS-3 radar altin p0044 A78-13658 p0076 A78-15004 from satellite measurements of ion co [AIAA 77-1566] p0079 A78-16730 Thunderstorm monitoring from a geosynchronous p0076 A78-15010 Potential applications of digital vis ible and infrared data Temporal and dynamic observations from satellity from geostationary environmental satellites p0031 A78-17195 p0074 A78-14839 Convective cloud plumes mark Canadian fire sites Change detection in coastal zone n0005 A78-15308 environments Image data application obtained from space to geological vestinations in the USSR p0035 A78-16502 Capabilities of operational infrared sou unding systems from p0096\_A78-14873 MSS data analysis p0048 A78 17198 satellite altitude p0096 A78-14873
Special Sensor H data processing at AFGWC - Preliminary Benefit assessment of ozone monitoring satellites investigations in the USSR p0021 A78-17574 The significance of an arc shaped dark patch on the Nimbus III / HRIR/ imagery of India p0077 A78-16507 results --- IR temperature-humidity-ozone sounde Aircraft versus spacecraft for reiote monitoring of water p0097 A78-14972 ries digital mani for positioning MSS quality in U.S. coastal zones n0021 A78-17576 A multise ing system Cloud properties from satellite infrared and visible p0097 A78-14973 and photographic remotely sensed data Remote sensing of pollutant plu s from Landsat p0021 A78-18240 n0077 A78-16509 Ion temperature estimation with ion trap data from Applications of the ERTS 1 Satellite to traditional rtography p0030 A78-16510 Experience with the per-point class fication algorithms rockets and satellites n0098 A78-17113 for the mapping of estuarine areas from Landsat Analysis of 14 GHz radiometric measurements from p0098 A78-18245 cartography p0058 A78-18243 Approaches for solving forestry problems by utiliz Skylab p0006 A78-16515 onitoring air quality from satellites aerospace methods An introduction to orbit dynamics and its application to D0021 A78-18300 Test on the mapping application of Landsat imager satellite-based earth monitoring systems p0077 A78-16527 Techniques for opening regional radiation budgets from stellite radiometer observations p0099 N78-11446 [NASA-RP-1009] p0099 N78-12113 satellite radiometer observations Technology advances in active and passive microwave Digital rectification of multispectral magery - - Landsat p0078 A78-16532 data processing An intercomparison of satellite images and radar rainfall sensing through 1985 --- microwave technology for the rates --- Miami Florida [PB-270299/1] p0087 N78-14466 Establishment of the hydro-morphometric characteristics Seasat-A and Nimbus-G satellites water bodies p0063 N78-11647 Meteorological sensors and related technology for the using photogrammetric remote-sensing recordings p0058 A78-16540 Sensing the earth's environment from space User needs technology opportunities p0109 N78-14465 ighties -- GARP Atlantic Tropical Experiment Digital preprocessing and classification of multispectral p0088 N78-14475 and technology opportunities p0078 A78-16542 SATELLITE-BORNE PHOTOGRAPHY earth observation data Industrial use of geological remote sensing from space Satellite observations of mesosca the eastern tropical Pacific Ocean e eddy dynamics in p0041 A78-10027 Earth Resources Technology Satellite / ERTS/ - An sessment p0107 A78-16544 p0037 N78-14474 assessment Operational utilization of remotely s nsed data -- NOAA Height measurements from satellite Geometrical models for satellite scanner imagery p0109 N78-14477 programs p0071 A78-10519 p0078 A78-16545 anic monitoring p0051 N78-14484 Current and future satellites for occ Snow mapping from Landsat digital data The dry deciduous forests of Bastar Central India on p0055 A78-12933 p0006 A78-16551 Application of the DIBIAS image processing system on andsat pictures of central Morocco and Southern p0035 A78-12934 Coastal wetlands The present and future role of remote The use of satellite photography in the National sensing p0066 N78-14485 andsat pictures of central Topographic Mapping Program of Cana Capabilities of operational infrared sounding systems from Germany p0030 A78-16552 n0101 N78-14567 Forest type mapping of the Atchafalaya River Basin from satellite and aircraft imagery p0002 A78-13068 satellite altitude Analysis of Landsat-1 data for mapping of surficial Test system for earth observation - SPOT Volume 1 deposits - Test area in Alta commune Finnmark cour Primer for the production of Landsat colour-composites Systems analysis and development plan p0036 A78-16553 p0072 A78-13496 platform noting first land use mission p0092 N78 14617 Norway Clustering of ERTS data using various orthogonal ansforms p0079 A78-17543 A low-cost system for reception processing and Test system for earth observation - SPOT Volume 3 distribution of line-scan data from environ
[AIAA 77-1598] p0 nental satellite transforms Multimission platform subsystems DO092 N78-14618 p0045 A78-13673 Applications of remotely sensed data to wetland udies p0079 A78-18103 Test system for earth observation - SPOT Volume 4 International Symposium on Remote Sensing of Environment 11th University of Michigan Ann Arbor Mich April 25-29 1977 Proceedings Volumes 1 & 2 Sensing of First mission payload --- land use p0092 N78-14619 Computer elaboration and visualization of remote-sensing Test system for earth observation - SPOT Volume 4bis data --- from Landsat for cartography p0080 A78 18241 sion payload and microwave payloa p0106 A78-14776 The use of Landsat imagery for terrain analysis DO092 N78-14620 study --- land use The problems and opportunities remote sensing of p0080 A78-18244 Test system for earth observation - SPOT Volume 5 p0106 A78-14777 ocean surface pectral analysis of the interface between the Multipurpose ground facilities and dedicated Sensing the earth's environment fro m space - User needs p0106 A78-14778 Brazil and Falkland currents from Skylab DO092 N78 14621 and technology opportunities p0106 A78-14778
The utility of short wavelength /less than 1 mm/ remote p0049 A78-18246 SATELLITE ORBITS
LANDSAT 1 cumulative US standard catalog Pattern recognition of Landsat data based upon temporal sensing techniques for the monitoring and assessment of p0007 A78 18248 trend analysis 1976/1977 p0055 A78-14780 p0093 N78-15535 Evaluating soil moisture and yield of winter wheat INASA-TM-749931 Remote sensing data processing -Two years ago today p0072 A78-14784 p0007 A78-18249 the Great Plains using Landsat data LANDSAT US standard catalog 1 October - 31 October 1977 -- LANDSAT imagery for Oktober 1977 and two years from today industrial use of geological remote sensing from space p0035 A78-14787 Satellite observations of snowcover p0093 N78-15545 during the great California drought p0059 A78-18250 [NASA-TM-74992] Progress and needs in agricultural research, development Monitoring air quality from satellites LANDSAT non-US standard catalog 1 - 31 October and applications programs - - of remote sensing p0021 A78-18300 n0002 A78-14791 [NASA-TM-74990] p0093 N78-15546 Mass appearance of marine blue algae in the Baltic Sea Remote sensing and today's forestry is p0022 A78-18508 LANDSAT 1 non US cumulative catalog 1976/1977 detected in satellite images n0002 A78-14792 --- LANDSAT imagery for 1976/1977 [NASA-TM-74991] of natural resources p0107 A78-18522 Results and prospects of the study Current and future satellites for ocanic monitoring p0047 A78-14793 p0093 N78-15547 by aerospace methods LANDSAT Non-US standard catalog --- LANDSAT Aerial photography and remote sensing for soil survey mpact of land use p0018 A78-14798 Remote sensing of environmental imagery for August 1977 [NASA-TM-74988] --- Book n0080 A78-18749 activities p0093 N78 15548 Use of Landsat imagery in studies of spring icings and ee Valley Authority p0018 A78-14800 Remote monitoring and Tenr seasonally flooded karst in permafrost areas LANDSAT US standard catalog 1 - 31 August 1977 programs p0094 N78-15554 [GSFC/LU-C/008] p0061 A78-18872 Atmospheric sounding with passive crowaves - Revie LANDSAT Non-US standard catalog 1-30 September 977 --- LANDSAT imagery for September 1977 p0018 A78-14802 and prognosis

LACIE A look to the future --- Larg allite ice information microfilm file 1976 supplement 1 Area Crop Inventory

p0002 A78-14804

[AD-A043046]

DO050 N78-11491

[NASA-TM-74956]

p0094 N78-15555

SUBJECT INDEX **SOIL MOISTURE** 

Quick-look capability in a European earth resources tellite data network Volume 2 Appendices 5 to 7 SEA ROUGHNESS Design and fabrication of nosecone for WB 57F aircraft fitted with APQ-102A side looking radar [NASA-CR-151592] satellite data network Vo Polarimeter measures sea state characteristics using N78-13397 p0102 N78-15028 emitted infrared radiation p0052 N78 14513 Quick-look capability in a European earth resources SIERRA NEVADA MOUNTAINS (CA) Satellite observations of snowcov during the great California drought satellite data network, volume 1 --- Earthnet Measurement of sea surface by means of microwave in the Sierra Nevadas altimeters - A computer simulation for system evaluation p0095 A78-12836 [FU15-4-VOL-1] p0109 N78-13519 p0059 A78-18250 The transfer of the contents of satellite pictures onto SIGNAL DETECTION Analysis of the marine environment in DMSP imagery focusing on island barrier effects
[AIAA 77-1596] eographic maps Boundary detection in images Optical formulation in [BLLD-M-24900-(5828 4F)] p0033 N78-14453 terms of signal detection theory -- photointerpretation of p0045 A78-13671 Classification of LANDSAT agricultural data based upon satellite imagery naracteristics using p0047 A78 14821 Polarimeter measures sea state ch [INPF-1118-TPT 067] p0010 N78-14539 p0092 N78-14894 color trends emitted infrared radiation Processing of satellite imagery Environmental Satellite Service at the National p0089 N78-14548 SIGNAL DISTORTION High-resolution radar scattering characteristics of a disturbed sea surface and floating debris Data handling for the geometric corre Application of LANDSAT satellite imagery for iron ore ımages DO080 A78-18649 [AD-A044216] n0099 N78-12268 A solution to the problem of SAR prospecting in the Western Desert of Egypt range curvature SEA TRUTH nO090 N78-14571 p0039 N78-14581 Active microwave measurement from space of ea-surface winds p0041 A78-12615 SIGNAL ENCODING The digital processing of Scanning Radiometer (SR) data Some aspects of adaptive transform multispectral data p0079 from NOAA weather satellites as carried out in the nsform coding of p0079 A78-18071 The Seasat surface truth experime Meteorological Institute of the Free University of Berlin
Part 2 Notes on the digital filtering of satellite pictures
[BLLD-M-24895-(5828 4F)] p0102 N78-14747 p0042 A78-12834 and detection of p0048 A78-14855 SIGNATURE ANALYSIS Remote sensing of ocean color chlorophyll content Performance tests of signature extension algorithms ---Multispectral analysis of ocean dumped materials p0019 A78 14913 for large area crop inventory experiment Boundary detection in images Optical formulation in p0005 A78-14904 terms of signal detection theory -- photointerpretation of Multispectral analysis of ocean dumped materials SIMULATION satellite imagery [INPE-1118-TPT 067] DO026 N78-14607 nOO92 N78-14894 Monte Carlo simulation of wave sensing with a short SEASAT-A SATELLITE pulse rader [NASA-TM-X 71412] LANDSAT 1 cumulative US standard catalog The Seasat A project 1976/1977 p0081 N78-10341 p0042 A78-12829 LANDSAT-D thematic mapper simulation using aircraft suffishectral scanner data p0088 N78-14498 [NASA TM-74993] p0093 N78-15535 Seasat-A Scanning Multichannel Microwave eter Design of the Seasat-A radar altimeter LANDSAT US standard catalog 1 October - 31 October 177 - LANDSAT imagery for Oktober 1977 LAB PROGRAM Radiometer [NASA TM-74992] p0093 N78-15545 Active microwave measurement from space The Seasat-A satellite scatteromete p0041 A78-12615 a-surface winds LANDSAT non-US standard catalog 1 - 31 October p0095 A78-12832 SLUDGE Seasat-A Synthetic Aperture Radai ar - Radar system p0095 A78 12833 Quantitative mapping of suspended solids in wastewater studge plumes in the New York Bight apex [NASA TM-74990] p0093 N78-15546 implementation LANDSAT 1 non US cumulative catalog 1976/1977
-- LANDSAT imagery for 1976/1977
[NASA-TM-74991] p0093 N78-15547 The Seasat surface truth experiments p0015 A78-10658 p0042 A78-12834 SMOG 1978 A space focus for oceanology -- ocean remote LANDSAT Non-US standard catalog --- LANDSAT imagery for August 1977
[NASA TM-74988] p0093 N78-15548 Formation of photochemical aerosols sensors on Seasat-A and Nimbus G [AIAA 77-1564] p0023 N78-10621 [PB-268895/0] p0043 A78-13856 Applications of Seasat to the offshore oil gas and mining Cold climate mapping using satellite high resolution thermal imagery - - weather forecasting improvement p0076 A78-14978 31 August 1977 p0094 N78-15554 industries [AIAA 77-1583] LANDSAT US standard catalog 1 n0045 A78 13666 [GSFC/LU-C/008] Seasat-A and the commercial ocean com
[AIAA 77-1591] p004 LANDSAT Non-US standard catalog 1 30 September 1977 --- LANDSAT imagery for September 1977 n community p0046 A78-13682 SMS 2 Potential applications of digital visible and infrared data Application of satellite-borne synthetic aperture radar to INASA-TM-749561 p0094 N78-15555 from geostationary environmental satellites Application 5
marine operations
[AIAA 77-1610]
A survey of SAR image-formation processing for earth
poor applications
poor A78-14785 [NASA-IM-495b] p0094 N78-15555 LANDSAT US standard catalog 1-30 September 1977 - LANDSAT imagery for September 1977 [NASA-TM 74957] p0094 N78-15556 SATELLITE-BORNE RADAR p0074 A78-14839 SNOW Application of LANDSAT imagery for snow mapping in Technology advances in active and passive microwave sensing through 1985 - microwave technology for the Seasat-A and Nimbus-G satellites p0087 N78-14466 Seasat-A Synthetic Aperture Radar - Radar system plementation p0095 A78-12833 [E78-10029] p0064 N78-13505 implementation Application of LANDSAT imagery for snow mapping in Seasart-A and Nimbus-G satellites p0087 N78-14466
The SEASAT-A project Where it stands today National
Aeronautics and Space Administration National Oceanic nicrowave /radar/ p0072 A78-12944 Earth remote sensing using microwave p0065 N78-14458 techniques [E78-10041] Observations of the ultraviolet spectral reflectance of The computation of ocean wave heights from GEOS-3 and Atmospheric Administration satellite radar altimeter data [AIAA 77 1571] p0053 N78-14772 [PB 272004/3] p0044 A78-13662 [AD-A046349] DO069 N78-15630 SEDIMENTS. Application of satellite-borne synthetic aperture radar to SHOW COVER Laboratory requirements for in-situ and remote sensing marine operations [AIAA 77 1610] Experiments on the radar backscatter of sn of suspended material [NASA-CR-145263] p0055 A78-10386 p0046 A78-13687 p0098 N78-10539 Landsat-radar synergism - - image enhancement through impositing techniques p0079 A78-16554 Snow mapping from Landsat digital data Application of electronic distance measuring devices to p0055 A78-12933 compositing techniques measurement of discharge and sediment dep Space radar system specifications p0101 N78-14495 Microwave multispectral investigations of snov p0062 N78-11467 Automated earth resources surveys using satellite and Laboratory measurements of upwelled radiance and Remote sensing-aided systems for snow quantification ircraft scanner data - A Finnish approach reflectance spectra of Calvert Ball Jordan and Feldspai apotranspiration estimation and their application in p0056 A78 14834 p0077 A78-16518 el sediments ogic models [NASA-TP-1039] p0024 N78 12645 NOAA satellite monitoring of snow cover in the northern SCATTER PROPAGATION A model for microwave intensity propagation in an homogeneous medium p0096 A78-13971 hemisphere during the winter of 1977 [IAF PAPER 77-121] On multidisciplinary research on the application of remote nhomogeneous medium p0057 A78-15935 ater resources problems [E78-10028] p0064 N78-13504 Satellite observations of snowcover in the Sierra Nevadas p0059 A78-18250 The Seasat-A satellite scatterometer during the great California drought Onsite control of sedimentation utilizing the modified p0095 A78-12832 Utilization of remote sensing obser rations in hydrologic p0065 N78-14469 block-cut method of surface mining Scatterometer results from shorefast and floating sea p0047 A78-14822 [PB-272244/5] p0040 N78-15552 Microwave multispectral investigat ons of snov SEEDS p0066 N78-14509 SCENE ANALYSIS The effect of soil water deficit on the reflectance of conifer SOIL EROSION Image analysis techniques with special reference to seedling canopies p0003 A78-14829 analysis and interpretation of geological features from LANDSAT imagery --- India p0038 N78-14544 Investigations of spectral separability of small grains learly season wheat detection and multicrop inventory planning SEISMOLOGY Advances in surface geogroundwater and soil moisture surface geophysical technique SCINTILIATION - North Dakota and Kansas p0059 A78-18862 Ionospheric irregularities Optical support of HAES p0008 N78-13499 SOIL MAPPING cintillation experiments A PbSe diode laser spectrometer to be used in air pollution Automated image processing of Landsat II digital data for watershed runoff prediction p0056 A78-14816 [AD-A043666] p0082 N78-11561 monitoring and mineral prospecting [CTH-IEM TR-7636] SEA GRASSES p0056 A78-14816 p0101 N78-14699 digital analysis of p0076 A78 14908 Quantification of soil mapping SEWAGE TREATMENT Landsat data Visual interpretation of Landsat MSS imagery for a reconnaissance soil survey of a part of the Indo-Gangetic Laboratory measurements of radiance and reflectance sectra of dilute primary-treated sewage sludge SEA ICE ge sludge p0023 N78 12554 [NASA-TP-1038] Monitoring open water and sea ice in the Bering Strait radar p0041 A78-10388 plain India n0006 A78-16555 Aerial photography and remote sensing for soil survey - Book p0080 A78-18749 by radar SHALE OIL OCS environmental research techno In-situ laser retorting of oil shale [NASA CASE-LEW 12217 1] plogy in ice covered p0043 A78-12845 Textural analysis by statistical parameters and its water p0037 N78-14452

Real time satellite imagery for sea [AIAA 77 1601]

[NASA-CR-156640]

[REPT S-90]

[AD-A043046]

Scatterometer results from shorefa

Microwave emission from sea ice

crofilm file 1976 supplement 1

Radar systems for a polar mission volum

Aerial ice reconnaissance and satellite ice information

Scatterometer results from shorefast and floating sea e p0052 N78-14514

p0046 A78-13675

ist and floating sea p0047 A78-14822

p0049 N78-10344

0050 N78-11292

p0050 N78-11491

SHALLOW WATER

SIDE-LOOKING RADAR

shallow-water

Accuracy of moored current

A block adjustment for SLAR-imagery

Radar detection of surface oil slicks

Computer processing of SAR L-band imagery Synthetic Aperture Radar for ice mapping
p0055 A78-10524

Side-looking airbome radar

Microwave remote sensing of hydrologic parameters p0055 A78-14781 --- for surveys of p0073 A78 14803

Measuring soil moisture with an airborne imaging passive microwave radiometer p0001 A78-10523

application to the mapping of flow-structures in v

SOIL MOISTURE

DO042 A78-12840

p0071 A78-10325

p0079 A78-16548

p0021 A78-17197

Space radar system speciments processed proces p0005 A78 14907

p0067 N78-14550

SOIL SCIENCE SUBJECT INDEX

SPACECRAFT COMMUNICATION Passive microwave remote sensing of soil moistu Spectral structure of the solar radiation field reflected p0005 A78-14915 p0049 A78-20055 The 20 and 30 GHz attenuation the ATS-6 satellite by the ocean-atmosphere system Optimal spatial sampling techniques for ground truth data Inversion of solar aureole measure p0093 N78-15340 ents for determining p0085 N78-12596 SPACECRAFT TRACKING in microwave remote sensing of soil moisture erosol characteristics Evaluating soil moisture and yield of winter wheat in e Great Plains using Landsat data p0007 A78-18249 Remote sensing of a moisture with the poor and poor area. National geodetic satellite program SOLAR SPECTRA p0032 N78-11550 Comparison of various methods s of determining p0095 A78-13218 **SPACELAB** solar-proton spectra Remote sensing of soil moisture and groundwater
Proceedings of the Workshop Toronto Canada November
8-10 1976 p0059 A78-18859 Spacelab - A new tool for cooperative research SOUDS p0108 A78 19595 A study of suspended solids in the Requena Dam by mote sensing p0073 A78-14807 SPACELAB PAYLOADS remote sensing Advances in surface geophysical techniques for Uses of the Space Shuttle in the NASA Applications A study of suspended solids in the Requena Dam by p0059 A78 18862 p0107 A78-18189 groundwater and soil moisture oundwater and soil moisture
Electromagnetic detection of soil water content - Progress
port II p0059 A78 18863 remote sensing p0066 N78-14499 Remote sensing experiment for magnetospheric electric p0080 A78 18440 SONAR fields parallel to the magnetic field marine resource p0041 A78-12828 SPATIAL DEPENDENCIES image processing in Electrical properties of water in rocks and soils p0060 A78-18864
Airborne thermal infra-red sensing of soil moisture and oundwater exploration Blob - An unsupervised clustering eprocessing of MSS imagery p0075 A78 14883 SOUNDING SPATIAL DISTRIBUTION groundwater Hybrid methods are helpful p0084 N78-12587 Methods of assessment of ground truth Test of spectral/spatial classifier [E78-10044] Atmospheric sounding with passive microwaves Review p0060 A78 18867 p0087 N78 14460 p0088 N78-14494 An evaluation of radar as a soil mois SPATIAL FILTERING SOUTH AMERICA p0060 A78-18868 Remote sensing utilization of developing countries An incorporate technology p0107 A78-14858 The influence of multispectral scanner spatial resolution on forest feature classification p0011 N78-1457
BLOB An unsupervised clustering approach to spatial preprocessing of MSS imagery p0090 N78 1457
SPECTRAL BANDS Microwave radiometry for soil moistu p0011 N78-14574 appropriate technology p0107 A78-14858
Preliminary differences in mean water level between tide p0060 A78-18869 DO090 N78 14577 Soil moisture determination by thermal infrared remote gauges along the South American Pacific coast p0060 A78-18870 p0048 A78 17650 Influence of temperature on the emissivity of moist soil Evaluation of spectral channels and wavelength regions SOUTH CAROLINA for separability of agricultural cover type DO081 A78-19114 in the microwave range Remote sensing of aquatic plants - New York Florida Texas Louisiana Mississippi South Carolina Electromagnetic detection of soil moisture - Progress eport I p0061 A78-20174 D0004 A78-14860 SPECTRAL CORRELATION p0052 N78-14530 Water utilization evapotranspiration and soil moisture A mask correlation remote sensor for measurements of SO2 optical depths on long light source - instrument SOUTH DAKOTA monitoring in the south east region of south Australia [E78-10001] Multidate mapping of mosquito habitat p0016 A78 12938 p0062 N78-11447 p0056 A78-14851 Investigations of spectral separability of small grains early SPECTRAL ENERGY DISTRIBUTION Planting data and wheat yield models -Kansas South season wheat detection and multicrop inventory planning --- North Dakota and Kanses Comparison of various methods solar-proton spectra Dakota and USSR p0095 A78 13218 [E78-10013] p0007 N78-10538 [E78-10015] p0008 N78-13499 SPECTRAL RECONNAISSANCE Resampling study Estimation of soil moisture with radar remote sensing p0101 N78-14601
Passive microwave remote sensing of soil moisture Visual interpretation of Landsat MSS imagery for a [£78-10014] p0082 N78-12495 The use of LANDSAT digital data to detect and monitor reconnaissance soil survey of a part of the Indo-Gangetic p0006 A78 16555 vegetation water deficiencies - South Dakota p0068 N78-14609 Method of obtaining and analyzing the spectral p0010 N78-14540 Microwave remote sensing and its application to soil moisture detection volumes 1 and 2 p0068 N78-15529 characteristics of natural formations --- spectral reflectance Multidate mapping of mosquito habitat - - Nebraska Sensing of earth surface p0031 A78 18992
Acquisition of terrain information using Landsat multispectral data Report 2 an interactive procedure for p0067 N78-14545 SOIL SCIENCE Application of remote sensing technology in South Dakota Estimation of old field ecosystem biomass using to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify p0003 A78-14828 altitude imagery classifying terrain types by spectral characteristics [AD-A045871] p0033 N78 Electromagnetic detection of soil moisture moisture Progress p0061 A78-20174 p0033 N78 13516 cell selection criteria for spatial data SPECTRAL REFLECTANCE Report I p0013 N78-15542 Tennessee-Tombigbee industrial siting project. A study SOUTHERN HEMISPHERE Yield/reflectance relations in cabbage - remote sensing of physical and environmental factors of potential industrial p0001 A78-10521 of crops Stationary waves in the Southern Hemisphere mid-latitude zone revealed from average brightness charts sites --- Mississippi Columbus Air Force Base and Lowndes Anisotropic reflection properties of vegetated surfaces Clay Monroe Itawamba and Tishomingo Counties [E78-10035] p0024 N78-13507 p0001 A78-12904 p0071 A78-10543 Spectral reflectance deduced from color-infrared photos SOILS r forest damage detection p0002 A Further tests of the Suits reflectance model p0002 A78-13066 The auxiliary use of LANDSAT data in estimating crop vegetation from Distinguishing soil acreages Results of the 1975 Illinois crop-acreage Therefore to the state of the s information - by gray mapping of Landsat MSS data experiment p0006 A78-17199 [F78, 10049] p0012 N78-15539 Remote sensing of vegetation and soil using microwave measurements SOYUZ SPACECRAFT ellipsometry [NASA-CASE-GSC-11976 1] Spectral reflection measurements of water with particle Investigation of earth from space
USSR and GDR scientists on the Soluz-22 spacecraft
p0109 N78-13511 p0007 N78-10529 suspensions for an analysis of the water quality on the basis of multispectral recordings p0058 A78-16514 Analysis of Landsat-1 data for mapping of surficial HCMM energy budget data as a model input for assessing regions of high potential groundwater pollution SPACE ERECTABLE STRUCTURES p0061 N78-10535 [E78-10010] deposits - Test area in Alta commune Finnmark county An entree for large space antennas p0097 A78-16699 p0036 A78-16553 Investigation of LANDSAT imagery on correlations between ore deposits and major shield structures in SPACE LAW Method of obtaining and analyzing the spectral characteristics of natural formations --- spectral reflectance sensing of earth surface p0031 A78-18992 Pending issues before the Legal Sub-Committee of the United Nations Committee on the Peaceful Uses of Outer [E78-10012] p0036 N78-10537 p0105 A78-10353 Spectral structure of the solar radiation field reflected Investigations using data from LANDSAT-2 [E78-10026] p0083 The development of international law relating to remote by the ocean-atmosphere system p0049 A78-20055 p0083 N78-12502 sensing of the earth from outer space p0105 A78-10358 SPACE PROCESSING Differentiation of selected annual field crops throughout Laboratory measurements of upwelled radiance and pectral reflectance p0007 A78-20172 the growing season by their Uses of the Space Shuttle in the NASA Applicati reflectance spectra of Calvert Ball Jordan and Feldspar p0107 A78-18189 SPACE SHUTTLES Asteroid surface materials Mineralogical [NASA-TP-1039] p0024 N78-12645 characterizations from reflectance spectra [NASA-CR-154510] p06 Uses of the Space Shuttle in the NASA Applications ogram p0107 A78-18189 Comparing soil boundaries delineated by digital analysis p0036 N78-10992 Program resolution systems - Tippencanoe County Indiana [E78-10017] of multispectral scanner data from high and low spatial SPECTRAL RESOLUTION SPACEBORNE PHOTOGRAPHY Investigation of thematic mapper spatial radiometric and Space radar system specifications hydrology agriculture and geology p0008 N78-13500 spectral resolution p0096 A78-14826 p0073 A78-14803 The influence of multispectral scanner spatis On multidisciplinary research on the application of remote The complex of optical-photographical transformation methods of aerial and space images used for study of natural p0011 N78-14574 sensing to water resources problems -- Wisconsin on forest feature classification [E78-10028] p0064 N78-13504 SPECTRAL SENSITIVITY DO077 A78-16501 Agricultural scene understanding [E78-10043] An investigation of natural resources from orbital station p0020 A78-16506 Estimation of soil moisture with radar remote sens p0008 N78-14459 p0005 A78-14907 Salvut-4 Aerial triangulation with Skylab photography p0078 A78-16541 Forestland type identification and analysis in Western Massachussetts A linkage of a LANDSAT forest inventory SPECTRAL SIGNATURES Landsat data from agricultural sites Crop signature Land-use change detection from Landsat and Skylab tellites p0020 A78-16550 p0012 N78-14595 to an optimization study p0005 A78-14899 Quantification of soil mapping by digital analysis of Performance tests of signature extension algorithms --ANDSAT data -- Clinton County Remote sensing of earth resources using a spaceborne microwave radiometer - onboard Skylab for large area crop inventory experiment diana p0091 N78-14602 [REPT-6690] p0005 A78-14904 p0098 A78-17377 SOLAR ACTIVITY An evaluation of the signature extension approach to various aerocosmic p0081 A78-19241 Methods of analytic processing of Comparison of various methods solar-proton spectra of determining large area crop inventories utilizing space image data ----Kansas and North Dakota p0095 A78-13218 photoimages Investigation of natural environment by space means p0007 N78-12496 SOLAR ENERGY CONVERSION [E78-10016] Geobotany Geomorphology soil sciences agricultural Characterization of terrestrial service environments - The Evaluation of signature extension algorithms --- Kansas lands landscape study simultaneous occurrence of comb ed conditions of solar [NASA-TM-75041] p0108 N78 11448 p0015 A78-11283 p0083 N78-12498 insolation and climatic variables [E78-10021] Investigation of earth from space Joint experiment of SOLAR POSITION Laboratory measurements of upwelled radiance and USSR and GDR scientists on the Soluz-22 spacecraft p0109 N78 13511 Characteristics of polar cap sun-aligned arcs reflectance spectra of Calvert Ball Jordan and Feldspar p0095 A78-13083 Sensing the earth's environment from User needs [NASA-TP-1039] p0024 N78-12645 SOLAR PROTONS and technology opportunities p0109 N78 14465 Comparison of various methods Signature extension preprocessing for LANDSAT MSS Remote sensing A partial technology p0095 A78-13218 solar-proton spectra [PB-271278/4] p0111 N78 14612 SPACECRAFT CHARGING [E78 10040] p0087 N78-14457 **SOLAR RADIATION** Atmospheric transformation of solar radiation reflected from the ocean p0047 A78-13803 Development of environmental cha for operational satellites rging effect monitors Test of spectral/spatial classifier [E78-10044] p0087 N78-14460

Reducing LANDSAT data to parameters with physical gnificance and signature extension. A view of LANDSAT capabilities n0090 N78-14575 LANDSAT data from agricultural sites Crop signature enalysis - - Kansas p0012 N78-14593 Performance tests of signature extension algorithms p0091 N78-14598

**SPECTROMETERS** 

How to minimize the baseline drift in a COSPEC remote sensor -- correlation spectrometer for pollution detection p0096 A78 13435

A PbSe diode laser spectrometer to be used in air pollution monitoring and mineral prospecting [CTH IEM-TR-7636] p0101 N78 14699

SPECTROPHOTOGRAPHY

Method of obtaining and analyzing the spectral characteristics of natural formations - - spectral reflectance sensing of earth surface p0031 A78 18992 SPECTROPHOTOMETRY

A mask correlation remote sensor for measurements of SO2 optical depths on long light source - Instrument p0016 A78 12938

Imaging natural materials with a quasi-microscope - spectrophotometry of granular materials [NASA-CR-155250] DO099 N78 11813

**SPECTRORADIOMETERS** 

Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA-CR-155290]

p0100 N78-12514

SPECTRUM ANALYSIS

Analysis of infrared reflectivity in the presence of asymmetrical phonon lines -- phonon p0035 A78-13932 Landsat digital data for water pollution and water qualit

studies in southern Scandinavia p0018 A78 14841 SPILLING

Detection identification and quantification techniques for spills of hazardous chemicals --- in rivers lakes and oceans p0019 A78 14914

Detection identification and quantification techniques for spills of hazardous chemicals p0026 N78 14608 SPRINGS (WATER)

Use of Landsat imagery in studies of spring icings and seasonally flooded karst in permafrost areas

p0061 A78-18872

STATISTICAL AMALYSIS

Clustering of ERTS data using various orthogonal p0079 A78-17543 transforms Statistical principles of inversion theory

p0084 N78-12591 Application of statistical inversion to ground-based ture and water vapor p0085 N78 12600 microwave remote sensing of temperature profiles nsing land use maps p0025 N78-14511 Testing the accuracy of remote sens

Alteration mapping at Goldfield Nevada by cluster and discriminant analysis of LANDSAT digital data

p0038 N78-14525 Vector statistics of LANDSAT image

[NASA-TM-78149] p0093 N78-15544

STATISTICAL DECISION THEORY

Estimating clear radiances - A report and a new decision rule --- IR measurement in lower atmosphere DO097 A78-14971

STATISTICAL TESTS

Testing the accuracy of remote sensing land use map p0074 A78-14819

**STERFOPHOTOGRAPHY** 

REOPHOTOGRAPHY
Height measurements from satellite images
p0071 A78 10519 A comparative study of the amount and types of geologic information received from visually interpreted U Landsat (magery n0035 A78-13492 Aerial albedos of natural vegetation in south-eastern poor 5 A78-14882

Increase in the fidelity of image during the production of diapositives [AD A046226] p0092 N78-14613 STRAITS

Monitoring open water and sea ice in the Bering Strait p0041 A78-10388 STRATA

Radar measurement of stratified earth surface covers - ussian book p0030 A78-15424 Russian book

Photochemistry in the stratosphere p0015 A78-11810

The vertical distribution of HCI in the stratosphere p0019 A78-15890

Simultaneous measurements of nitrocen dioxide and nitric acid in the lower stratosphere [ONERA TP NO 1977 154] p0020 A78-16214

Benefit assessment of ozone monitoring satellites p0021 A78-17574 Preliminary results from the Lidar system at the University

Preliminary results from the Ludar system at the University of L Aquila - stratospheric aerosols and nitrogen dixide fluorescence observations p0022 A78-18476 Global sensing of gaseous and aerosol trace species using automated instrumentation on 747 airliners p0024 N78-13670 p0024 N78-13670

STRATOSPHERE RADIATION

Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol para p0085 N78-12595

STRATUS CLOUDS

The summertime stratus over the offshore waters of California p0043 A78-13108 The microstructure of California coastal fog and stratus p0072 A78-14314

STREAMS

Hydrometry under Arctic conditions

Application of remotely sensed land-use information to improve estimates of streamflow characteristics, volume 8 --- Maryland Virginia and Delaware [E78-10052] n0069 N78-15541

p0062 N78-11475

STRESS (PHYSIOLOGY)

Pre-visual detection of stress in pine forests p0004 A78-14847 Pre-visual detection of stress in pine

p0010 N78-14541

STRESS ANALYSIS

problems

Compression wave studies in Solenhofen limestone [SAND-76-0279] p0037 N78-13688 p0037 N78-13688 STRIP MINING The application of LANDSAT-1 imagery for monitoring

strip mines in the new river watershed in northea Tennessee part 2 [E78-10032] n0037 N78-12506 Application of remote sensing to state and regional

[E78-10034] p0024 N78-13506

STRUCTURAL BASINS

Landsat-1 identification of groundwater re p0061 A78-18871 Great Lake basin ERTS B imagery to monitor large scale clearing and development programmes in the Daly Basin northern

p0081 N78-10530 [E78-10002] Application of LANDSAT imagery for snow mapping in

[E78-10041] p0065 N78-14458

STRUCTURAL ENGINEERING

Design and fabrication of nosecone for WB-57F aircraft fitted with APQ-102A side looking radar [NASA CR-151592] p0102 N78-15028

STRUCTURAL PROPERTIES (GEOLOGY) ERTS topology of France / First results

p0036 A78-16511 Investigation of LANDSAT imagery on correlations between ore deposits and major shield structures in Finland

Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Friuli earthquake area p0091 N78-14580

SULFUR DIOXIDES

mask correlation remote sensor for measurem SO2 optical depths on long light source Instrument p0016 A78-12938 Influence of ground level SO2 on the diffuse to direct

irradiance ratio in the middle ultraviolet p0018 A78-14810

Detection of a plume 400 km from the source

p0019 A78-15370 Influence of ground level SO2 on the diffuse to direct irradiance ratio in the middle ultraviolet

p0025 N78-14502

The summertime stratus over the offshore waters of California p0043 A78-13108

SUPERCONDUCTING MAGNETS Techniques for ocean bottom measurements of magnetic fields with a superconducting magnetomete

SUPERHIGH FREQUENCIES

The 20 and 30 GHz attenuation the ATS-6 satellite p0093 N78-15340

SURFACE LAYERS

Radar measurement of stratified earth surface covers p0030 A78-15424 Russian book Asteroid surface Mineralogical characterizations from reflectance spectra

[NASA CR-154510] p0036 N78-10992 SURFACE NAVIGATION

Norwegian marine geodetic projects p0048 A78 17648

SURFACE PROPERTIES

Textural analysis by statistical parameters and its application to the mapping of flow structures in wetlands p0067 N78-14550

SURFACE TEMPERATURE Sea surface temperature gradient analysis from digital meteorological satellite data [AIAA 77-1504] p0046 A78-13676

Surface temperatures and temperature gradient features of the U.S. Gulf coast waters p0048 A78-14912 Remote estimation of surface tem perature in pollution p0019 A78-14992 measurement experiments Soil moisture determination by thermal infrared remote

sensing D0060 A78 18870 Thermal remote sensing calibration techniques [PB-269471/9] p0061 N7: p0061 N78-10630

Applications of HCMM satellite data [E78-10033] p0064 N78-12507

Surface temperatures and temperature gradient features of the US Gulf Coast waters p0053 N78-14606

Application of remote sensing to geothermal anomaly mapping in the Caldas Novas County Goias [INPE-1129-TPT/070] GOIAS p0039 N78-14610

Estimation of ground temperature from GFCR radiometric

signai [NASA-CR-145291] o0102 N78-15626

SURFACE WATER

Application of aerial photography to water-related programs in Michigan p0056 A78 14835 Use of remote sensing for land use policy formulation Michigan [E78-10020] p0008 N78-13502

SURFACE WAVES

Accuracy of moored current shallow-water p0042 A78-12840 Monte Carlo simulation of wave sensing with a short oulse radar [NASA-TM-X-71412] p0081 N78 10341

SUSPENDING (MIXING)

A study of suspended solids in the Requena Dam by remote sensing p0073 A78-14807 A study of suspended solids in the Requena Dam p0066 N78-14499 remote sensing **SWEDEN** 

Landsat digital data for water pollution and water quality studies in southern Scandinavia p0018 A78-14841 LANDSAT digital data for water pollution and water quality studies in Southern Scandinavia

p0025 N78 14534

SWITZERLAND Results of a remote sensing study of the effects of hail

SYNCHRONOUS SATELLITES

Satellite application to data buoy requirements
[AIAA 77-1580] p0044 A78 13664 Thunderstorm monitoring from p0076 A78 15010

SYNOPTIC MEASUREMENT

- - catastrophe theory approach Oceanic morphogenesis for current patterns using Landsat data

p0042 A78-12837 Synoptic observations of the oceanic frontal system east p0048 A78-17326 of Japan

SYNOPTIC METEOROLOGY Waves and turbulence in the vicinity of a chinook arch p0076 A78 15455

SYNTHETIC ARRAYS

Computer processing of SAR L-band imagery ---Synthetic Aperture Radar for ice mapping DO055 A78 10524

A survey of SAR image formation processing for earth sources applications p0073 A78-14785 resources applications Analysis of synthetic aperture radar ocean wave data collected at Marineland and Georges Bank

p0050 N78-10678 [PB-268675/6]

YSTEMS ANALYSIS

Multispectral system analysis through modeling and p0075 A78-14884 An analysis of LANDSAT systems for cartographic and terrain information [AD-A044431] DO031 N78 10544

Multispectral system analysis through modeling and mulation p0090 N78-14578

Т

TARGET ACQUISITION

Research and simulation in support of near real time/real time reconnaissance RPV systems DO083 N78 12516

AD-A044598] TASMANIA

p0041 A78-10389

The floor structure of the southwest Pacific Ocean p0047 A78 13899

TECHNOLOGICAL FORECASTING Sensing the earth's environment from s and technology opportunities p0106 A78 14778 The impact of remote sensing on United States geography The past in perspective present realities future

potentials p0017 A78-14783 Remote sensing data processing Two years ago today p0087 N78-14471

and two years from today
TECHNOLOGY ASSESSMENT

Remote sensing A burgeoning science -- Canadian p0105 A78-12214 Remote sensing data processing wo years ago today p0072 A78-14784 and two years from today A perspective on the state of the art of photographic tempretation p0073 A78-14786 interpretation

Earth Resources Technology Satellite /ERTS/ - An policy A78 16544 Sensing the earth's environment from space. User needs p0109 N78-14465 and technology opportunities Technology advances in active and passive microwave sensing through 1985 - microwave technology for the Seasat A and Nimbus G satellites p0087 N78-14486

Remote sensing data processing. To and two years from today. wo years ago today p0087 N78-14471 A perspective on the state of the art of photographic interpretation - aerial photography p0087 N78-14473 Rebirth of remote sensing Do we know enough for

our own good? --- LANDSAT system readouts

Remote sensing A partial technology p0111 N78 14612 [PB-271278/4]

SUBJECT INDEX

**TECHNOLOGY TRANSFER** TECHNOLOGY TRANSFER An overview of remote sensing technology transfer in Canada and the United States p0106 A78-14795 The transfer of remote sensing technology in the veloping nations - An observation p0106 A78-14796 developing nations - An observation signal [NASA-CR 145291] Corps of Engineers applications for re r remote sensing of p0018 A78-14801 the environment Processing techniques development p0087 N78-14461 [E78-10045] Gathering and using information on a global scale p0109 N78-14479 US initiatives for remote sensing applications in the and prognosis developing world nO110 N78-14480 An overview of remote sensing technology transfer in anada and the United States p0110 N78-14486 Technical assistance and the transfer of remote sensing Canada and the United States technology -- for economic development p0110 N78-14487 The transfer of remote sensing technology in the eveloping nations. An observation p0110 N78-14488 Inversion of infrared limb emission measurements for developing nations An obse TECHNOLOGY UTILIZATION The European Space Agency and remote sensing h p0105 A78-13495 Applications of Seasat to the offshore oil gas and mining industries [AIAA 77-1583] TEMMERREE DO045 A78-13666 Predictions on future use of active icrowave systems programs for all weather sensing of the earth [AIAA 77-1584] n0072 A78-13686 Operational utilization of remotely sensed data p0106 A78-14790 Indicators of international remote : ensing activities p0107 A78-14842 Remote sensing utilization of developing countries. An appropriate technology p0107 A78-14858 studies A survey of users of earth resources remote sensing p0107 A78-14859 [E78 10031] Uses of the Space Shuttle in the NASA Applications
Program p0107 A78-18189
The impact of remote sensing on United States geography. The past in perspective present realities future [E78-10032] p0109 N78-14470 Industrial use of geological remote sensing from space p0037 N78-14474 [E78-10034] Operational utilization of remotely sensed data --- NOAA nO109 N78-14477 Rebirth of remote sensing Do we know our own good? --- LANDSAT system readouts Do we know enough for p0109 N78-14478
Technical assistance and the transfer of remote sensing [E78 10035] technology --- for economic development

p0110 N78-14487 Proceedings of the Eleventh International Symposium on

Remote Sensing of Environment volume 2 --- application and processing of remotely sensed data [NASA CR-155362] p0110 N78-14529

ASA CR-155362] Indicators of international remote sensing activities p0111 N78-14535

TECTONICS The floor structure of the southwest Pacific Ocean p0047 A78-13899 Russian book

Image data application obtained from space to geological vestigations in the USSR p0035 A78-16502 investigations in the USSR Relationship of tectonic structure to aquifer mechanics in the western Grand Canyon District Arizona [PB-272308/8] n0068 N78-14624

Recent vertical crustal movements from geodetic measurements. Alaska and the eastern United States p0033 N78-15622

TEMPERATURE

Microwave radiometric sensing of surface temperature and wind speed from SEASAT [PB-270323/9] p0098 N78-10549

TEMPERATURE DISTRIBUTION

Remote sensing of ocean temperature

p0045 A78-13674 [AIAA 77-1599] The application of IR- and MSS-data in the Ruhr district Germany --- aerial photography of heat distribution p0074 A78-14838

TEMPERATURE EFFECTS

Influence of temperature on the emis issivity of moist soil in the microwave range

TEMPERATURE GRADIENTS Sea surface temperature gradient analysis from digital meteorological satellite data

[AIAA 77-1604] n0046 A78-13676 Surface temperatures and temperature gradient features p0048 A78-14912 of the U.S. Gulf coast waters

Capabilities of operational infrared sounding systems from p0101 N78-14567 satellite altıtude Surface temperatures and temperature gradient features of the US Gulf Coast waters p0053 N78-14606

TEMPERATURE INVERSIONS

Temperature sensing The direct road to information p0086 N78-12607

TEMPERATURE MEASUREMENT

Airborne monitoring of crop canopy temperatures for irrigation scheduling and yield prediction

p0004 A78-14897 Special Sensor H data processing at AFGWC - Preliminary

Special Sensor H data processing a.m. \_ results - - IR temperature-humidity-ozone sounder p0097 A78-14972 Evaluation of an infrared line scanner for the study of coastal water circulation
[NIWARS-PUBL 41] n0099 N78-11496

Airborne monitoring of crop canopy temperatures for irrigation scheduling and yield prediction

n0011 N78 14591 Estimation of ground temperature from GFCR radiometric

nO102 N78 15626 TEMPERATURE MEASURING INSTRUMENTS

Capabilities of operational infrared sounding systems from tellite altitude p0096 A78 14873

TEMPERATURE PROFILES

Atmospheric sounding with passive microwaves p0018 A78 14802 Objective analysis and classification of oceanographic p0048 A78-17982

Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles -- from remote sounding p0084 N78 12593

temperature and trace gas concentratio p0084 N78-12594

TEMPERATURE SENSORS

Temperature measurement array for internal wave observations --- in upper ocean p0042 A78-12842

Remote monitoring and Tennessee p0018 A78-14800 Application of Landsat data to wetland study and land

classification in West Tennessee p0056 A78-14818 Three approaches to the classification and mapping of p0057 A78-14906

Applications of remotely sensed data to wetland p0079 A78-18103

Application of LANDSAT images to wetland study and land use classification in west Tennessee part 1 p0063 N78-12505

The application of LANDSAT-1 imagery for monitoring strip mines in the new river watershed in northeast Tennessee part 2

p0037 N78-12506 Application of remote sensing to state and regional

p0024 N78-13506

Tennessee-Tombiquee industrial siting project. A study of physical and environmental factors of potential industrial sites - Mississippi Columbus Air Force Base and Lowndes (Tay Monroe Itawamba and Tishomingo Counties [E78 10035] p0024 N78-13507

Remote monitoring and Tennessee Valley Authority programs

Application of LANDSAT data to wetland study and land use classification in west Tennessee p0066 N78-14510

Three approaches to the classification of inland wetlands -- Dismal Swamp Tennessee and Florida p0068 N78-14600

TENNESSEE VALLEY (AL-KY-TN)

Remote monitoring and Tennessee Valley Authority programs p0018 A78-14800

Tennessee Tombigbee industrial siting project. A study of physical and environmental factors of potential industrial sites - - Mississippi. Columbus Air Force Base and Lowndes sites -Clay Monroe Itawamba and Tishomingo Counties

[E78-10035] p0024 N78 13507 Remote monitoring and Tennessee Valley Authority p0066 N78-14492

TERRADYNAMICS

Temporal and dynamic observations from D0031 A78 17195

TERRAIN

The vector classifier Procedures for gathering ground truth information for a supervised approach to a computer-implemented land cover classification of LANDSAT acquired multispectral scanner data

p0027 N78 15549

TERRAIN ANALYSIS

Composite sampling for digital terrain models p0072 A78 13493

A compensation procedure in a block of simply overlapping photograms for the case of flat terrain p0077 A78-16526

Description of landform patterns on air photos p0020 A78-16529

Directional reflectances of terra rain objects from p0078 A78-16531 B&W-aerial photos ssification for digital p0030 A78-16543 Objective terrain description and cla terrain models

The use of Landsat imagery for terrain analysis

p0080 A78-18244 An analysis of LANDSAT systems for cartographic and terrain information

[AD-A044431] p0031 N78 10544 Application of LANDSAT images to wetland study and use classification in west Tennessee part

[E78 10031] p0063 N78-12505 The application of LANDSAT-1 imagery for moni strip mines in the new river watershed in northeast

Tennessee part 2 [E78 10032] p0037 N78-12506 Tennessee-Tombigbee industrial siting project A study of physical and environmental factors of potential industrial sites - Mississippi Columbus Air Force Base and Lowndes

Clay Monroe Itawamba and Tishomingo Counties [E78-10035] p0024 N78 13507

Acquisition of terrain information using Landsat multispectral data. Report 2 an interactive procedure for classifying terrain types by spectral characteristics

p0033 N78-13516 TEXAS

The influence of multispectral scanner spatial resolution forest feature classification p0004 A78-14880 on forest feature classification Change detection in coastal zone environments --- by

Landsat MSS data analysis p0048 A78-17198 Monitoring aquatic plants in Texas p0049 N78-10527
Preliminary study of the present and possible future oil and gas development of areas immediately surrounding the Interior Salt Domes Upper Gulf Coast Salt Dome be

of east Texas north Louisiana and Mississippi [ORNL/SUB-75/87988] p0036 PRNL/SUB-75/87988] p0036 N78-10545 Computer-aided analysis of LANDSAT data for surveying Texas coastal zone environments --- Pass Cavallo and Port

nO082 N78-12497 Aerial gamma-ray and magnetic survey of the Red River area Block C Texas and Oklahoma volume 2
[GJBX-17(77)-VOL-2] p0037 N78-13517

p0037 N78-13517 Remote sensing of aquatic plants --- New Texas Louisiana Mississippi South Carolina New York Florida

p0052 N78-14530 Evaluation of change detection techniques for monitoring p0090 N78-14569 

Development and application of operational techniques for the inventory and monitoring of resources and uses for the Texas coastal zone Volume 1 Tavt

p0053 N78-15537 [E78-10042] Development and application of operational techniques for the inventory and monitoring of resources and uses for the Texas coastal zone Volume 2 Appendices

[E78-10048] p0053 N78-15538 TEXTURES

Texture tone feature extraction and analysis

[AD-A045542] p0086 N78-13412

On the photographic processing and digital texture for remote sensing of Kujukuri Coast of Chib p0052 N78-14506

THEMATIC MAPPING

Quantitative mapping of suspended solids in wastewater sludge plumes in the New York Bight apex

p0015 A78-10658 Coastal wetlands The present and future role of remote p0055 A78-14794 sensing poole A78.1 Remote monitoring and Tennessee Valley Authority p0018 A78.1 4804

Landsat-D thematic mapper simulation using aircraft ultispectral scanner data p0073 A78-14806 multispectral scanner data Investigation of thematic mapper spatial radiometric and spectral resolution p0096 A78-14826

Alteration mapping at Goldfield Nevada by cluster and scriminant analysis of Landsat digital data - mapping of hydrothermally altered volcanic rocks p0029 A78-14833

Application of aerial photography to water-related programs in Michigan p0056 A78-14835 Production of a water quality map of Saginaw Bay by

computer processing of Landsat 2 data p0057 A78-14857 Evaluation of algorithms for geological thermal inertia apping p0029 A78-14868

Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt p0076 A78-14905

An investigation of natural resources from orbital station p0020 A78-16506 A system of remote sensing and mapping for developing countries

Land-use change detection from Landsat and Skylab tellites p0020 A78-16550 satellites or Central India on p0006 A78-16551 The dry deciduous forests of Bastar

Landsat-1 The use of satellite photography in the National Topographic Mapping Program of Canada p0030 A78-16552

Analysis of Landsat-1 data for mapping of surficial deposits - Test area in Alta commune Finnmark county

p0036 A78-16553 Distinguishing vegetation from soil background information --- by gray mapping of Landsat MSS data

p0006 A78-17199

Remote sensing and today's forestry issues

ulation using aircraft p0088 N78-14498 LANDSAT-D thematic mapper sim multispectral scanner data Investigation of thematic mapper spatial radiometric and pO088 N78-14518

THERMAL MAPPING

Evaluation of algorithms for geological thermal inertia apping p0029 A78-14868 mapping

Cold climate mapping using satellite high resolution thermal imagery - - weather forecasting improvement p0076 A78-14978

Airborne thermal infra-red sensing of soil moisture and p0060 A78-18866 groundwater Evaluation of algorithms for geological thermal inertia

nOO39 N78-14562

manning THERMAL POLLUTION

Monitoring of polluted rivers methods y remote sensing p0020 A78-16530 SUBJECT INDEX **URBAN DEVELOPMENT** 

THERMAL RADIATION

Remote sensing of earth resources using a spaceborne microwave radiometer --- onboard Skylab

p0098 A78 17377

THICKNESS

Nucleonic detector with independent hydropneumatic suspension [NASA-CR-150465] p0036 N78-11454

**THUNDERSTORMS** 

Remote sensing for the medium-scale assessment of ground level thermal and hydrologic variations - An application to the local prediction of storms by use of the p0055 A78-12930 Project Tellus system a geosynchronous p0076 A78-15010 Thunderstorm monitoring from

satellite

TIDAL FLATS

Environmental mapping of the French coastal zone by remote sensing p0031 A78-18102

Preliminary differences in mean water level between tide gauges along the South American Pacific coa p0048 A78-17650

Application of digital filtering to satellite geodesy p0082 N78-12486

TIMBER IDENTIFICATION

Forest type mapping of the Atchafalaya River Basin from satellite and aircraft imagery p0002 A78-13068 The influence of multispectral

ner spatial resolution p0004 A78-14880 on forest feature classification Forestland type identification and analysis in Western Massachusetts - A linkage of a Landsat forest inventory to an optimization study p0005 A78-14901

Remote sensing and today's forestry issues

p0002 A78-14792 Use of multispectral data in design of forest san surveys p0002 A78-14808
Forestland type identification and analysis in Western

Massachusetts - A linkage of a Landsat forest inventory p0005 A78-14901 to an optimization study Approaches for solving forestry problems by utilizing prospace methods p0006 A78-16515 Mean annual volume growth from sequential volume

determination on permanent serial photographic plots p0006 A78-16522

Optimum ratio of photo-field plots for aerial volume and aerial volume growth regression construction p0006 A78-16523 forest cover

The dry deciduous forests of Bastar Central India on andsat 1 p0006 A78-16551
Forest land management by satellite LANDSAT-derived information as input to a forest inventory system -- North

[E78 10038] p0008 N78-14455

Agricultural scene understanding [E78 10043]

p0008 N78 14459 Investigation of techniques for inventorying forested gions. Volume 1. Reflectance modeling and empirical ultispectral analysis of forest canopy components

[E78-10046] p0009 N78-14462 Investigation of techniques for inventorying forested regions Volume 2 Forestry information system requirements and joint use of remotely sensed and ancillary

[E78 10047] p0009 N78-14463 Forestland type identification and analysis in Western Massachussetts. A linkage of a LANDSAT forest inventory

to an optimization study TIMBER VIGOR

BER VIGOR
Detection of oak wilt with color IR aerial photography p0001 A78-10522 Tree stress detection through spectral rationing of color m records p0002 A78-13065 film records

p0012 N78 14595

Spectral reflectance deduced from color infrared photos reforest damage detection p0002 A78-13066 for forest damage detection Assessment of forest plantations from low altitude aeria p0005 A78-14903 otography

TIME DEPENDENCE

Temporal and dynamic observations from satellite p0031 A78-17195

TOPOGRAPHY

Remote sensing as a tool in assessing the impact of topographical alterations on the microclimate

p0029 A78-11099

Ocean current surface measurement using dynamic elevations obtained by the GEOS 3 radar altimeter [AIAA 77-1566] p0044 A78-13658

Method of obtaining and analyzing the spectral characteristics of natural formations - spectral reflectance sensing of earth surface p0031 A78-18992 Models for the identification of topographic objects during

the deciphering of aerial photographs p0031 A78-19243
Application of LANDSAT images to wetland study and land use classification in west Tennessee part 1

p0063 N78-12505 [E78-10031] Investigation of techniques for inventorying forested Volume 2 Forestry information system requirements and joint use of remotely sensed and ancillary data [E78-10047] p0009 N78-14463

TOPOLOGY

ERTS topology of France /First results/

p0036 A78-16511

TRACE ELEMENTS

Photochemistry in the stratosphere p0015 A78 11810

Rare earth and trace element geochemistry of metabasalts from the Point Sal ophiolite Californ p0036 A78-20097

TRACKING (POSITION)

Use of an inertial navigation system for accurate track recovery and coastal oceanographic measurements p0096 A78-14892

Use of an inertial navigation system for accurate track recovery and coastal oceanographic measuren p0053 N78-14586

TRACKING METWORKS

p0031 A78 18108 Intercosmos laser ranging stations National geodetic satellite program part 1 00032 N78 11550

TRANSFER OF TRAINING

An overview of remote sensing technology transfer in Canada and the United States p0106 A78 14795 TRANSFORMATIONS (MATHEMATICS)

Clustering of ERTS data using various p0079 A78 17543 transforms Some aspects of adaptive transform coding of multispectral data p0079 A78-18071 A mathematical theory of equivalent transformations

p0031 A78-19236

TREES (PLANTS)

during the equalizing of geodesic networks

Tree stress detection through spectral rationing of color m records p0002 A78-13065
Application of remote sensing technology in South Dakota film records to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data p0013 N78 15542 [F78-10053]

TRIANGULATION

Analytical aerial triangulation - Its obtention through simple algorithm p0078 A78 16533 Aerial triangulation with Skylab photography

p0078 A78-16541 The use of balloons for geodetic research

DO031 A78 18183 Analytical aerial triangulation with corrections for systematic errors p0086 N78-13498

TROPICAL METEOROLOGY

Atmospheric transformation of solar radiation reflected p0047 A78-13803 from the ocean Analysis of GATE radar data for a tropical cloud cluster in an easterly wave p0079 A78-17068

Tropospheric photochemical and photophysical processes - - timable laser application to air pollution

lution monitoring p0015 A78-11809 Remote sensing of air pollutants n0017 A78-14797 Global sensing of gaseous and aerosol trace species using automated instrumentation on 747 airliners p0024 N78-13670

[NASA-TM 73810] TURBIDITY Determination of aerosol content in the atmosphere from

ANDSAT data [F78-10004] n0022 N78-10531 LANDSAT/coastal processes [E78 10011] p0061 N78-10536

Airborne spectroradiometer data compared with ground water turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA CR 155290] p0100 N78-12514

Determination of scattering functions and their effects on remote sensing of turbidity in natural waters [NASA-CR 145239] p0094 N TWO-WAVELENGTH LABERS p0094 N78 15551

Tunable dual-line CO2 laser for atmospheric spectroscopy of pollution monitoring p0017 A78-14082 and pollution monitoring

USSR

Image data application obtained from space to geological vestigations in the USSR p0035 A78-16502 investigations in the USSR An investigation of natural resources from orbital station p0020 A78 16506 Approaches for solving forestry problems by utilizing p0006 A78 16515 rospace methods p0 Planting data and wheat yield models Kansas South Dakota and USSR

Investigation of natural environment by space means Geobotany Geomorphology soil sciences agricultural lands landscape study [NASA-TM-75041] p0108 N78 11448

Aerial methods of measuring water discharges

p0063 N78 11480 Translations on USSR resources no 768

p0111 N78 15557 [JPRS 70524]

ULTRASONIC WAVE TRANSDUCERS

Ultrasonic river gauging p0062 N78 11469 Site calibration of electromagnetic and ultrasonic river gauging stations n0062 N78-11470

ULTRAVIOLET PHOTOMETRY

Experience with the inversion of Nimbus 4 BUV measurements to retrieve the ozone profile p0086 N78-12606

ULTRAVIOLET RADIATION

Influence of ground level SO2 on the diffuse to direct irradiance ratio in the middle ultraviolet

DO018 A78 14810

**ULTRAVIOLET REFLECTION** 

Observations of the ultraviolet spectral reflectance of

[AD A046349] n0069 N78 15630

ULTRAVIOLET SPECTRA

influence of ground level SO2 on the diffuse to direct irradiance ratio in the middle ultraviolet p0025 N78 14502

Observations of the ultraviolet spectral reflectance of snow [AD A048349] nOO69 N78-15630

UNDERWATER PHOTOGRAPHY

Computer image processing marine resource p0041 A78 12828

UNITED KINGDOM Ultrasonic river gauging

n0062 N78-11469 UNITED NATIONS

Pending issues before the Legal Sub-Committee of the United Nations Committee on the Peaceful Uses of Ou p0105 A78-10353 Space The present status of remote sensing in the United ations 8 April 1977 p0110 N78-14481 Nations & April 1977

UNITED STATES OF AMERICA

Seasonal color-infrared photographs for mapping inland wetlands on US Geological survey 7.5-minute quadrangles p0035 A78-13069 quadrangles Plants as indicators of photochemical oxidants in the

p0017 A78-14199 The impact of remote sensing on United States geography The past in perspective present realities

p0017 A78-14783 potentials An overview of remote sensing technology transfer in p0106 A78-14795 Canada and the United States

Large scale 70mm photography for range resources analysis in the western United States p0005 A78-14902 Aircraft versus spacecraft for remote monitoring of water latity in U.S. coastal zones p0021 A78 17576 quality in U.S. coastal zones

Monitoring air quality from satellites

p0021 A78-18300 The monitoring p0022 A78-19616 Energy resource development components

Analysis of photochemical oxidant and particulate pollution patterns in New England using remote sensing

p0023 N78-10623 [PB-268996/6]

Skylab/EREP application to ecological geological and oceanographic investigations of Delaware Bay [E78 10003] p0050 N78 12492

Resampling study

p0082 N78 12495 [E78-10014] The impact of remote sensing on United States eography The past in perspective present realities future policy N78 14470 potentials

US initiatives for remote sensing applications in the DO110 N78-14480 developing world

An overview of remote sensing technology transfer in anada and the United States p0110 N78-14486 Canada and the United States Canada and the United States pUTIO N78-14-460 Satellite land use acquisition and applications to hydrologic planning models p0068 N78-14554 Large scale 20mm photography for range resources analysis in the Western United States -- Casa Grande

Arizona Mercury Nevada and Mojave Desert p0012 N78-14596

Surface temperatures and temperature gradient features the US Gulf Coast waters p0053 N78-14606 of the US Gulf Coast waters p0053 N78-14606
LANDSAT 1 cumulative US standard catalog 1976/1977 [NASA TM-74993] p0093 N78-15535

LANDSAT US standard catalog 1 October 31 October 1977 --- LANDSAT imagery for Oktober 1977 [NASA TM-74992] p0093 N78-15545 Interim hierarchical regional classification scheme for oastal ecosystems of the United States and its territories

[GSFC/LU-C/008] P0027 N78-15553 LANDSAT US standard catalog 1 31 August 1977 p0094 N78 15554

LANDSAT US standard catalog 1-30 September 1977
- LANDSAT imagery for September 1977 p0094 N78 15556 [NASA TM-74957] Recent vertical crustal movements from geodetic measurements. Alaska and the eastern United States

UPPER ATMOSPHERE

LWIR (7-24-micrometer) measurements from the launch of a rocket borne spectrometer into a quiet atmosphere (1974)

[AD A045466] DO100 N78 13684 UPWELLING WATER

Satellite observations of mesoscale eddy dynamics in the eastern tropical Pacific Ocean p0041 A78-10027 An overview of oceanic features and air-sea interaction processes as viewed from the NOAA operational atellites

[AIAA 77 1569] Laboratory measurements of upwelled radiance and reflectance spectra of Calvert Ball Jordan and Feldspar

soil sediments [NASA TP-1039] RBAN DEVELOPMENT

Urban area delineation and detection of change along the urban-rural boundary as derived from LANDSAT digital

INASA-TM X-714131 p0023 N78 10540

n0024 N78 12645

**URBAN RESEARCH** SUBJECT INDEX

#### URBAN RESEARCH

The determination of volatile organic compounds in city air by gas chromatography combined with standard addition selective subtraction infrared spectrometry and mass p0015 A78 10041

The growth of aerosol in an urban plume p0016 A78 12971
The application of IR- and MSS data in the Ruhr district

Germany --- aerial photography of heat distribution

p0074 A78 14838 The use of canonical correlation analysis for measuring urban environmental health quality
USER REQUIREMENTS p0027 N78 15592

Sensing the earth's environment from space - User ne and technology opportunities p0106 A78 14 p0106 A78 14778

and technology opportunities

Progress and needs in agricultural/research development and applications programs - of remote sensing p0002 A78 14791 A survey of users of earth resource ces remote sensing data

Aircraft sensor analysis package [NASA-TM-78038] system description p0081 N78 11451 Sensing the earth's environment from space. User needs p0109 N78-14465 technology opportunities

UTAH Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data

[NASA-CR-155290] p0100 N78-12514

#### VEGETATION

Results of a remote sensing study of the effects of hail Anisotropic reflection properties of vegetated surfaces p0001 A78-12904 p0001 A78-12878

Necessity to adapt land use and land cover classif systems to readily accept radar data p0018 A78-14852 Aerial albedos of natural vegetation in south-eastern on in south-eastern p0075 A78-14882 Australia

On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation p0058 A78-16505

Distinguishing vegetation from soil background information - by gray mapping of Landsat MSS da p0006 A78-17199

Investigation of LANDSAT imagery on correlations between ore deposits and major shield structures in

[E78-10012] p0036 N78-10537 Computer-aided analysis of LANDSAT data for surveying

Texas coastal zone environments - Pass Cavallo and Port O Conne

[E78 10018] DO082 N78-12497

Investigation of techniques for inventorying forested regions Volume 1 Reflectance modeling and empirical multispectral analysis of forest canopy components [E78-10046] p0009 N78-14462

The use of LANDSAT digital data to detect and monitor vegetation water deficiencies --- South Dakota

p0010 N78-14540

Aerial albedos of natural vegetation in South-eastern p0011 N78-14576 Australia

Large scale 20mm photography for range resources analysis in the Western United States --- Casa Grande Arizona Mercury Nevada and Mojave Desert

p0012 N78-14596 Three approaches to the classification of inland wetlands

Dismal Swamp Tennessee and Florida p0068 N78-14600

Estimation of soil moisture with radar remote sensing p0101 N78-14601

### VEGETATION GROWTH

Remote sensing of vegetation and soil using microwave

[NASA-CASE GSC-11976-1] p0007 N78-10529

A technique for the determination of Louisiana marsh salinity zone from vegetation mapped by multispectral scanner data A comparison of satellite and aircraft data [NASA-TM-58203] p0061 N78-10541

Application of LANDSAT images to wetland study and land use classification in west Tennessee part 1 [E78 10031] p0063 N78-12505

Contributions of LANDSAT to natural resource protection and future recreational development in the state of West Canaan Valley and Dolly Sods area

p0024 N78-13501 [E78 10019] biomass using low p0088 N78-14520 Estimation of old field ecosystem

altitude imagery The effect of soil water deficit on the reflectance of conifer p0010 N78-14521 seedling canopies

### VELOCITY MEASUREMENT

Accuracy of moored current shallow-water measurements p0042 A78-12840

#### VERTICAL DISTRIBUTION

The vertical distribution of HCI in the stratosphere

p0019 A78-15890

#### **VERTICAL MOTION**

Recent vertical crustal movements from geodetic measurements. Alaska and the eastern United States p0033 N78 15622 VIEW EFFECTS

View angle effect in Landsat imagery

p0074 A78-14848 View angle effect in LANDSAT imagery p0089 N78-14542

VIRGINIA

Application of aircraft multispectral scanners to quantitative analysis and mapping of water quality parameters in the James River Virginia

p0080 A78-18104

Resampling study [E78-10014]

DO082 N78-12495 Quantitative analysis of aircraft multispectral scanner

data and mapping of water-quality parameters in the James River in Virginia [NASA TP 1021]

Utilization of remote sensing observations in hydrologic odels p0065 N78-14469 models

Three approaches to the classification of inland wetlands --- Dismal Swamp Tennessee and Florida p0068 N78-14600

Analication of remotely sensed land-use information to improve estimates of streamflow characteristics volume

8 -- Maryland Virginia and Delaware [F78-10052] DO069 N78-15541

VOLCANOLOGY

Landsat detection of hydrothermal alteration in the Noga Canyon Cauldron New Mexico p0029 A78 14815 VORTICES

Satellite observations of mesoscale ple eddy dynamics in the eastern tropical Pacific Ocean Synoptic observations of the oceanic frontal system east
Japan p0048 A78-17326 of Japan

#### W

#### WARNING SYSTEMS

Characteristics of sea clutter measured from E 3A high radar platform p0097 A78 15664 WASTE DISPOSAL

Quantitative mapping of suspended solids in wastewater studge plumes in the New York Bight apex

n0015 A78 10658 Multispectral analysis of ocean dumped materials p0019 A78-14913

p0022 A78-18795 Remote sensing and laboratory tech ocean dumping

Laboratory measurements of radiance and reflectance sectra of dilute secondary-treated sewage sludge p0024 N78-12555 [NASA-TP-1089]

Multispectral analysis of ocean dumped materials p0026 N78-14607 WARTE WATER

Quantitative mapping of suspended solids in wastewater sludge plumes in the New York Bight apex p0015 A78-10658

The use of Landsat for monitoring water parameters in the coastal zo [AIAA 77-1597] p0045 A78-13672

Estimation of old field ecosystem piomass using low p0003 A78 14828 altitude imagery WATER

Thermal remote sensing calibration p0061 N78 10630 [PB 269471/9]

Infrared absorption spectra attributed to ion-nucleated water clusters [AD-A044661] n0064 N78-12518

WATER CIRCULATION Evaluation of an infrared line scanner for the study of

coastal water circulation [NIWARS-PUBL-41] WATER COLOR Remote sensing of chlorophyll concentration from high

altıtude

p0042 A78-12838 WATER CURRENTS

OCS environmental research technology in ice covered

p0043 A78-12845 WATER DEPRIVATION The effect of soil water deficit on the reflectance of conifer

seedling canopies
WATER FLOW p0010 N78-14521

Aenal methods of measuring water p0063 N78 11480

#### WATER MANAGEMENT

Snow mapping from Landsat digital data p0055 A78 12933

The utility of short wavelength /less than 1 mm/ remote sensing techniques for the monitoring an d assessment hydrologic parameters p0055 A78 14780

Utilization of remote sensing observations in hydrologic odels p0055 A78-14782 Development of an integrated data base for land use

Development or an integrate p0057 A78-14890 On the possibilities of using serial photographs in the planning of the recreational use of waterways and water p0058 A78-16505 The application of remote sensing to water resource:

planning watershed modelling and real-time forecasting p0059 A78-18861 Modern developments in hydrometry volume 2

conference proceedings [WMO-427] p0062 N78-11455

Data retransmission by satellite for operational purpose: Canadian water management p0063 N78-11490 Application of LANDSAT imagery for snow mapping in

[E78-10029] p0064 N78-13505 The utility of short wavelength (1mm) remote sensing changes for the monitoring and assessment of hydrologic techniques for the monitoring and assessme

ssment of hydrologic p0065 N78-14467 Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data
[E78-10053] p0013 N78-15542

#### WATER POLITION

The application of remote sensing to the monitoring of coastal water pollution p0016 A78-12955 The use of Landsat for monitoring water parameters in

the coastal zone [AIAA 77-1597]

p0045 A78-13672 A study of suspended solids in the Requena Dam by p0073 A78-14807 Lake water quality mapping from Landset

p0057 A78-14893

Prototype active scanner for nighttime oil spill mapping and classification n0019 A78 14896 Multispectral analysis of ocean dumped materials p0019 A78-14913

Detection identification and quantification techniques for spills of hazardous chemicals -- in rivers lakes and n0019 A78-14914

Spectral reflection measurements of water with particle suspensions for an analysis of the water quality on the basis of multispectral recordings p0058 A78-16514 Monitoring of polluted rivers by remote sensing

methods p0020 A78-16530 Mass appearance of marine blue algae in the Baltic Sea detected in satellite images

Remote sensing and laboratory techniques for monitoring p0022 A78-18795 ocean dumping

puuzz A78-18795
Use of lidar to detect oil pollution of the sea surface
p0022 A78-20067
HCMM energy budget data as a model input for assessing
regions of high potential groundwater pollution
[E78-10010]

LANDSAT digital data for water pollution and water quality studies in Southern Scandinavia

n0025 N7R-14534 Detection identification and quar ntification techniques p0026 N78-14608 for spills of hazardous chemicals

WATER QUALITY Landsat digital data for water pollution and water quality

p0018 A78-14841 studies in southern Scandinavia p0018 A78-14841
Production of a water quality map of Seginaw Bay by

computer processing of Landsat-2 data p0057 A78-14857 Use of thermal infrared imagery n ground-water p0057 A78-14869 investigations in Montana

Development of an integrated data base for land use

Italy

Aircraft versus spacecraft for remote monitoring of water plustry in U.S. coastal zones p0021 A78-17576 quality in U.S. coastal zones Application of aircraft multispectral scanners to

quantitative analysis and mapping of water quality parameters in the James River Virginia p0080 A78-18104

Energy resource development - The monitoring p0022 A78 19616 components LANDSAT/coastal processes

[E78-10011] p0061 N78-10536 Fundamental analysis of the linear multiple regression technique for quantification of water quality param

ality parameters from p0063 N78-12490 remote sensing data Application of LANDSAT to the surveillance of lake eutrophication in the Great Lakes basin - - Saginaw Bay

[E78-10023] p0064 N78-13503 On multidisciplinary research on the application of remote

sensing to water resources problems --- Wiscons p0084 N78 13504 Quantitative analysis of aircraft multispectral-scanner

data and mapping of water-quality parameters in the James River in Virginia [NASA-TP-1021] p0065 N78 13628

A study of suspended solids in the Requena Dam by mote sensing p0066 N78-14499 remote sensing

LANDSAT digital data for water pollution and water quality studies in Southern Scandinavia

p0025 N78 14534 Production of a water quality map of Saginaw Bay by

computer processing of LANDSAT-2 data p0067 N78 14551 Development of an integrated data base for land use

water quality planning p0026 N78-14584 Lake water quality mapping from LANDSAT

p0026 N78-14587 Determination of scattering functions and their effects on remote sensing of turbidity in natural waters [NASA-CR-145239] p0094 N78 15551

#### WATER RESOURCES

The utility of short wavelength /less than 1 mm/ remote sensing techniques for the monitoring and assessment of hydrologic parameters p0055 A78 14780 SUBJECT INDEX YUGOSLAVIA

Microwave remote sensing of hydrolog WEATHER FORECASTING WIND EFFECTS Remote sensing for the medium scale assessment of ground-level thermal and hydrologic variations - An application to the local prediction of storms by use of the Project Tellus system p0055 A78-12930 p0055 A78-14781 On the hysteresis of the sea surface and its applicability to wave height predictions Monitoring irrigated land acreage using Landsat imagery p0045 A78-13669 An application example --- in Klamath River basin of p0003 A78-14809 Convective cloud plumes mark Canadian fire sites Cold climate mapping using satellite high resolution p0005 A78-15308 Application of aerial photography to water-related ograms in Michigan p0056 A78-14835 thermal imagery - weather forecasting improvement WIND MEASUREMENT programs in Michigan DO076 A78 14978 Pulsed coherent lidar systems for airborne and satellite based wind field measurement p0076 A78-15012 p0056 A78-14836 Remote sensing of aquatic plants p0076 A78-15012 Establishment of the hydro-morphometric characteristics water bodies using photogrammetric and Contributions of LANDSAT to natural resource protection WIND RIVER RANGE (WY) and future recreational development in the state of West Virginia - - Canaan Valley and Dolly Sods area Reducing Landsat data to parameters with physical remote-sensing recordings n0058 A78-16540 significance and signature extension A view of Landsat p0075 A78 14881 The application of remote sensing to water resources p0024 N78 13501 [F78-10019] capabilities planning watershed modelling and forecasting nd real-time flood p0059 A78-18861 VETLANDS WIND VELOCITY Microwave radiometric sensing of surface temperature and wind speed from SEASAT [P8 270323/9] p0098 N78-10549 Seasonal color-infrared photographs for mapping inland on U.S. Geological survey 7.5-minute p0035 A78-13069 AOIPS water resources data management system [NASA-TM-X 71396] p0061 N78-10542 quadrangles Coastal wetlands The present and future role of remote poops A78 14794 The operational processing of wind estimates from cloud p0091 N78-14604 On multidisciplinary research on the application of remote motions Past present and future sensing to water resources problems sensing [E78-10028] p0064 N78-13504 lication of Landsat data to wetland study and land A preliminary study of the applicability of Numbus 6 ESMR se classification in West Tennessee p0056 A78 14818 Multidate mapping of mosquito habitat to surface wind speed estimates [AD-A046629] Application of LANDSAT imagery for snow mapping in n0102 N78 15643 Norway p0056 A78 14851 ND VELOCITY MEASUREMENT p0064 N78 13505 [E78-10029] Textural analysis by statistical parameters and its from space of p0041 A78 12615 Active microwave measurement Applications of remote sensing to water resources application to the mapping of flow-structures in wetlands /Mudflat area at the German coast of the North Sea/ p0056 A78-14856 sea surface winds p0064 N78 13509 [NASA-CR 150467] The Seasat-A satellite scatterometer The utility of short wavelength (1mm) remote sensing p0095 A78-12832 techniques for the monitoring and assessment of hydrologic Three approaches to the classification and mapping of land wetlands p0057 A78-14906 n0065 N78 14467 inland wetlands Winter intrusions of the Loop Current -- water circulation Gulf of Mexico Microwave remote sensing of hydrologic parameters Radar observed land/lake precipitation difference p0043 A78-13116 p0065 N78 14468 p0058 A78-17074 WISCONSIN On multidisciplinary research on the application of remote sensing to water resources problems -- Wisconsin [E78-10028] p0064 N78-13504 Remote sensing-aided systems for snow qualification data to wetland p0079 A78-18103 Applications of remotely sensed evapotranspiration estimation and their application in hydrologic models p0067 N78 14527 Computer-aided analysis of LANDSAT data for surveying OMING Application of aerial photography to water-related rograms in Michigan p0067 N78 14528 Texas coastal zone environments - - Pass Cavallo and Port rams in Michigan Reducing Landsat data to parameters with physical significance and signature extension - A view of Landsat capabilities p0075 A78-14881 [E78 10018] WATER RUNOFF p0082 N78-12497 Automated image processing of LANDSAT 2 digital data Geological and hydrogeological investigations in west Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data. for watershed runoff prediction p0066 N78-14508 [E78 10027] WATER TABLES p0032 N78 12503 HCMM energy budget data as a model input for assessing Application of LANDSAT images to wetland study and regions of high potential groundwater pollution
[E78-10010] p0061 N78-10535 land use classification in west Tennessee part 1 p0013 N78-15542 [E78 10031] p0063 N78 12505 WATER TEMPERATURE Contributions of LANDSAT to natural resource protection Y Temperature measurement array for internal wave observations - in upper ocean p0042 A78-12842 and future recreational development in the state of West Virginia - - Canaan Valley and Dolly Sods area p0042 A78-12842 p0024 N78 13501 Winter intrusions of the Loop Current - water circulation [E78-10019] p0043 A78-13116 in Gulf of Mexico Coastal wetlands The present and future role of remote Preparation of a geologic photo map and hydrologic study p0066 N78-14485 Remote sensing of ocean temperature sensing of the Yemen Arab Republic [E78-10008] [AIAA 77 1599] n0045 A78-13674 Application of LANDSAT data to wetland study and land use classification in west Tennessee p0066 N78-14510 Surface temperatures and temperature gradient features YIELD DO048 A78-14912 of the US Gulf coast waters Multidate mapping of mosquito habitat -- Nebraska buth Dakota p0067 N78 14545 Planting data and wheat yield models --- Kansas South Dakota and U.S.S.R. Synoptic observations of the oceanic frontal system east South Dakota p0048 A78-17326 Textural analysis by statistical parameters and its [E78-10013] p0007 N78-10538 YUGOSLAVIA WATER VAPOR application to the mapping of flow structures in wetlands Atmospheric sounding with passive microwaves Revie p0067 N78 14550 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Friuli earthquake area p0091 N78-14580 p0018 A78 14802 Three approaches to the classification of inland wetlands nd prognosis WATER WAVER - Dismal Swamp Tennessee and Florida The computation of ocean wave heights from GEOS-3 p0068 N78 14600 satellite radar altimeter data WHEAT n0044 A78 13662 [AIAA 77 1571] Two phase sampling for wheat acreage estimation p0003 A78-14844 Ocean wave patterns under Hurricane Gloria Observation with an airborne synthetic aperture radar Wheat yield forecasts using Landsat data p0047 A78 14126 p0004 A78-14876 Analysis of synthetic aperture radar ocean wave data collected at Marineland and Georges Bank [PB 268675/6] p00 Landsat data from agricultural sites Crop signature p0050 N78 10678 p0005 A78-14899 WATERSHEDS Using Landsat data to estimate evapotranspiration of Automated image processing of Landsat II digital data for watershed runoff prediction p0056 A78 14816 p0006 A78-15392 Evaluating soil moisture and yield of winter wheat in The application of remote sensing to water resources anning watershed modelling and real time floor the Great Plains using Landsat data p0007 A78-18249 Wheat productivity estimates using LANDSAT data 78-10009] p0007 N78-10534 forecasting F AOIPS water resources data manage p0059 A78-18861 [E78-10009] pement system p0061 N78-10542 Planting data and wheat yield models Kansas South [NASA-TM X 71396] nd USSR The application of LANDSAT 1 imagery for monitoring p0007 N78-10538 strip mines in the new river watershed in northeast Tennessee part 2 [E78-10032] p0037 N78-12506 Investigations of spectral separability of small grains early season wheat detection and multicrop inventory planning North Dakota and Kansas Application of LANDSAT to the surveillance of lake eutrophication in the Great Lakes basin - Saginaw Bay p0008 N78 13499 p0009 N78-14496 LACIE A look to the future Michigan [E78-10023] p0064 N78-13503 Two phase sampling for wheat acreage estimation large area crop inventory experiment p0010 N78-14538 On multidisciplinary research on the application of remote Wheat yelld forecasts using LANDSAT data p0011 N78 14570 sensing to water resources problems - Wisconsin p0064 N78-13504 Application of LANDSAT imagery for snow mapping in WILDLIFE Reindeer range inventory in western Alaska from computer aided digital classification of LANDSAT data p0009 N78 14516 [E78-10029] p0064 N78-13505 Effect of anter [PB-270632/3] cedent on frozen ground floods p0065 N78-13522 Thermal imagery for census of ungulates Utilization of remote sensing observations in hydro p0010 N78 14555 p0065 N78-14469 Development and application of operational techniques Automated image processing of LANDSAT 2 digital data for the inventory and monitoring of resources and uses for the Texas coastal zone Volume 2 Appendices for watershed runoff prediction p0066 N78-14508 WAVELENGTHS p0053 N78-15538 Evaluation of spectral channels and wavelength regions for separability of agricultural cover types Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes 00004 A78-14860 cell selection criteria for spatial data [E78-10053]

improve agricultural censusing map Aspen and quantify

Waves and turbulence in the vicinity of a chinook arch

WIND (METEOROLOGY)

n0013 N78-15542

p0076 A78-15455

The utility of short wavelength (1mm) remote sensing

Evaluation of spectral channels and wavelength regions for separability of agricultural cover types p0010 N78 14554

p0065 N78 14467

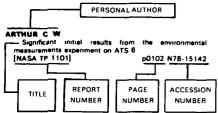
techniques for the monitoring and assessment of hydrologic

# PERSONAL AUTHOR INDEX

Earth Resources/A Continuing Bibliography (Issue 17)

**APRIL 1978** 

### **Typical Personal Author** Index Listing



Listings in this index are arranged alphabetically by personal author. The title of the document provides the user with a brief description of the AH subject matter. The report number helps to indicate the type of document listed (e.g. NASA report translation NASA contractor report) The page and accession numbers are located beneath and to the right of the title e.g. p 0102 N78-15142 Under any one authors name the accession numbers are arranged in sequence with the AIAA accession numbers appearing first

### Α

#### ABDEL HADY, M. A.

Application of Landsat satellite imagery for iron ore prospecting in the western desert of Egypt p0035 A78 14887

Groundwater studies in and areas in Egypt using Landsat p0057 A78 14888

Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt p0076 A78 14905

### ABDEL HAFEZ, M. A.

Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt D0076 A78-14905

ABDELHADY M A
Application of LANDSAT satellite imagery for iron ore Application of LANDSA1 satellite magazi, prospecting in the Western Desert of Egypt p0039 N78-14581

eas in Egypt using p0068 N78-14582 Groundwater studies in and areas LANDSAT satellite images

#### ABEL P G

Remote sensir [AIAA 77 1599] ng of ocean temperature p0045 A78-13674

### ABIODUN, A. A.

The transfer of remote sensing technology in the developing nations - An observation p0106 A78-14796 The transfer of remote sensing technology in the developing nations. An observation p0110 N78 14488 ABOTTEEN, R

Performance tests of signature extens p0005 A78 14904

#### ABOTTEEN R A

p0004 A78 14864 image interpretation aids LANDSAT image interpretation aids

p0089 N78 14558 Performance tests of signature exte ension algorithms p0091 N78 14598

### ABRAMOV, O

Use of lidar to detect oil pollution of the sea surface p0022 A78-20067 ADAMS J

Development of an integrated data base for land use not water quality planning p0057 A78 14890 and water quality planning Development of an integrated data base for land u and water quality planning p0026 N78 14584

Application of LANDSAT to the surveillance of lake trophication in the Great Lakes basin [E78-10023] p0064 N78 13503

#### ADLER, R F

Thunderstorm monitoring from geosynchron p0076 A78-15010

#### ADRIEN. P. M

Landsat computers and develop DO072 A78-13113

#### AFRAMEEVA 1 A

sence of temperature on the e p0081 A78-19114 in the microwave range

#### AGARWAL G C

rces Technology Satellite Earth Re /FRTS/ pO107 A78-16544

ctors for atmospheric p0074 A78-14830 measurements Use of clear lake as standard refle

#### AHMAD J B

Geological and hydrogeological investigations in west Malaysia

#### [E78 10027] MED, N

Some aspects of adaptive transform coding of p0079 A78-18071 AILES, S B

Prototype active scanner for nighttime oil spill mappin and classification p0019 A78 1489 p0019 A78 14896 Prototype active scanner for nighttime oil spill mappin D0026 N78 14590

#### AKASOFU S-I

Dependence of substorm occurrence probability on the interplanetary magnetic field and on the size of the auroral p0080 A78-18730

#### AKERSTEN I

Landsat digital data for water pollution and water quality idies in southern Scandinavia p0018 A78-14841 LANDSAT digital data for water pollution and water quality studies in Southern Scandinavia

n0025 N78-14534

n0032 N78-12503

#### ALAASSY, I E E

Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt p0076 A78 14905

#### ALAASSY, I E E

Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt p0101 N78 14599

#### ALBEROTANZA L

Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the venetian lagoon p0067 N78 14536

#### Venetian lagoon ALBOTA M

Establishment of the hydro-morphometric characteristics using water bodies p0058 A78-16540

# remote-sensing recordings

Earth Resources Management system for analyzing motely sensed data p0071 A78-12928 remotely sensed data

#### ALDRICH, R. C.

Evaluation of Skylab (EREP) data for forest and rangeland

### [PB-270543/2]

p0007 N78 12521

### ALEKSEEV, N V

A vector aeromagnetometer instrument system o0095 A78 13239

#### ALFOLDI, T T

Snow mapping from Landsat digital data

p0055 A78 12933 ALGAZI V R

#### Satellite land use acquisition and applications

p0057 A78 14870 hydrologic planning models Satellite land use acquisition and applications hydrologic planning models p0068 N78 14564

#### ALI M E O Aerial triangulation with Skylab photogram

p0078 A78 16541

#### ALKEZWEENY A J

p0016 A78 12971

ALLEN, C P
SEAHT A computer program for the use of intersecting arcs of altimeter data for sea surface he [NASA CR-141432] p0083 N78 12511

### The auxiliary use of LANDSAT data in estimating crop

Results of the 1975 filmois crop-acreage acreages [E78-10049]

#### ANDERLE R J

Correlated errors in satellite altimetry

p0029 A78 13760

n0012 N78 15539

ANDERSON, J E
The use of LANDSAT digital data and computer implemented techniques for an erosion hazard-reforestation needs assessment [E78-10050]

#### ANDERSON, J M

A multiseries digital mapping system for positioning MSS and photographic remotely sensed data

#### ANDERSON R R

Production of a map of land-use in lowa through manual p0018 A78-14837 interpretation of Landsat imagery ANNAN A P

Electromagnetic detection of soil water p0059 A78-18863 report II moisture - Progress p0061 A78-20174 Electromagnetic detection of soil

### Report I

ANUTA P E Evaluation of change detection tech niques for monitoring p0048\_A78-14875 coastal zone environments

Digital preprocessing and classification of multispectral arth observation data p0078 A78-16542 earth observation data Change detection in coastal zone

n0048 A78 17198

# Processing techniques development [E78 10045]

p0087 N78-14461 Evaluation of change detection tech niques for monitoring p0090 N78 14569 coastal zone environments

#### APRILESI, G

Proposal for an extension of the CAMAC standard suitable to low power data acquisition systems for oceanographic stations on marine platforms and buoys n0043 A78-12941

ARMAND N A
A study of the earth by aircraft - Results obtained by a0107 A78 18721 p0107 A78 18721

#### ARMSTRONG A

Remote sensing of pollutant plumes for p0021 A78-18240

### ARMSTRONG A C

Experience with the per-point classification algorithms for the mapping of estuarine areas from Landsat p0058 A78-18243

Observation of the development of individual clear air p0020 A78-17061

### ARTHUR C W

Significant initial results the environmental measurements experiment on ATS-6 [NASA-TP 1101] p0102 N78-15142

ARVIDSON R Imaging natural materials with a quasi-microscope [NASA-CR-155250] p0099 N78-1

D0099 N78-11813 ATWATER S G Radar detection of surface oil slicks

Remote sensing of vegetation and soil using microwave p0007 N78 10529

o0021 A78-17197

### [NASA-CASE-GSC-11976-1]

Objective terrain description and classification for digital terrain models p0030 A78 16543

AZUARA P R
A study of suspended solids in the Requena Dam t p0066 N78 14499 remote sensing

#### В

#### RAGLEY J O

Using Landsat data to estimate evapotranspiration p0006 A78 15392 winter wheat Evaluating soil moisture and yield of winter wheat in the Great Plains using Landsat data p0007 A78 18249

#### BAHN G S

Quantitative analysis of aircraft multispectral-scanner data and mapping of water-quality parameters in the James River in Virginia [NASA-TP-1021]

#### BAHR H P

Geometrical models for satellite scanner nner imagery p0078 A78-16545

Winter intrusions of the Loop Current p0043 A78-13116

Sea surface temperature gradient analysis from digital meteorological satellite data [AIAA 77-1604] p0046 A78-13676

p0065 N78 13628

BAILEY P L

Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78 12594

RAKER D J

Rocketborne measurement of an infrared enhancement associated with a bright auroral breakup [AD-A046474] p0 p0102 N78 15632

BAKER K

Thermal imagery for census of ungulates p0010 N78-14555

BAKER K D

Rocketborne measurement of an infrared enhancement associated with a bright auroral breakup p0102 N78 15632

BAKER, R N

Remote sensing exploration for metallic mineral resources ın central Baja California p0035 A78-14825 Remote sensing exploration for metallic mineral resources n central Baja California p0038 N78-14517

A system of remote sensing and mapping for developing p0030 A78-16546

BALDRIDGE, J N

Reindeer range inventory in western Alaska from computer aided digital classification of Landsat data p0003 A78-14824

Reindeer range inventory in western Alaska from computer aided digital classification of LANDSAT data p0009 N78-14516

Proposal for an extension of the CAMAC standard suitable to low power data acquistion systems for oceanographic stations on marine platforms and buoys n0043 A78-12941

BALLANCE, J W

The 20 and 30 GHz attenuation measurements usin the ATS-6 satellite p0093 N78 1534 DO093 N78 15340

BALLARD R J

An operational multistate earth observation data p0106 A78-14823 management system An operational multistate earth observation data p0110 N78-14515 management system

BALLEW, G

Alteration mapping at Goldfield Nevada by cluster and discriminant analysis of Landsat digital data p0029 A78-14833

Alteration mapping at Goldfield Nevada by cluster and discriminant analysis of LANDSAT digital data p0038 N78-14525

BALON R J

An evaluation of the signature extension approach to large area crop inventories utilizing space image data [E78-10016] p0007 N78-12496

BARATH F T

Seasat A Scanning Multichannel p0095 A78-12831 Radiometer Technology advances in active and passive microwa p0087 N78-14466 sensing through 1985

BARKER J L

Hydrographic charting from Landsat satellite p0042 A78-12839 comparison with aircraft imagery BARNES, J C

Analysis of photochemical oxidant and particulate pollution patterns in New England using remote sensing [PB-268996/6] p0023 N78-10623

BARRICK D E

Ocean surface currents mapped by radar

p0041 A78-10344

BARROW H G Interactive aids for cartography and photo interpretation [AD-A043418] p0031 N78-10543

BARTHOLIC, J F

Remote sensing as a tool in assessing the impact of topographical alterations on the microclimate p0029 A78-11099

Cold climate mapping using satellite high resolution termal imagery p0076 A78-14978 thermal imagery

**BARTLETT D S**Skylab/EREP application to ecological geological and

oceanographic investigations of Delaware Bay [E78-10003] p0050 p0050 N78-12492 BASHARINOV A E

A study of the earth by aircraft - Results obtained radio techniques nO107 A78-18721

RATIUVALA, P. P. Estimation of soil moisture with radar remote sensir

p0005 A78-14907 Estimation of soil moisture with radar remote sensing p0101 N78-14601

BATSON F T

resource inventory of eastern Montana rangelands utilizing high altitude co color infrared aerial photography

BAUER, M E

Agricultural scene understanding [E78-10043] p0008 N78-14459

BAUMGARDNER M F

Landsat computers and development projects p0072 A78-13113

Comparing soil boundaries delineated by digital analysis of multispectral scanner data from high and low spatial esolution systems [E78-10017] p0008 N78-13500

Agricultural scene understanding [E78-10043]

p0008 N78-14459 BAYMA R W

A survey of SAR image-formation processing for earth sources applications p0073 A78-14785 resources applications A survey of SAR image-formation processing for earth p0087 N78-14472 resources applications

BEHRINGER, D. W.

Winter intrusions of the Loop Current

p0043 A78-13116 BELL R R

The 20 and 30 GHz attenuation measurem the ATS-6 satellite DO093 N78-15340 BENEDINI, M

The application of remote sensing to the monitoring of coastal water pollution p0016 A78-12955

p0016 A78-12955 BENESSALAH D Mean annual volume growth from sequential volume determination on permanent aerial photographic plots p0006 A78-16522

BENETAZZO, L. Data acquisition in the specification of behavioi

p0072 A78-12942 BENNEKAMPER, K G

Present and future operational NOAA satellite oceanographic products. An introduction p0047 A78-14820 Present and future operational I oceanographic products An introduction NOAA satellite

p0052 N78-14512

BENTON A R.JR

Monitoring aquatic plants in Texas p0049 N78-10527 BERAN, D W

Pulsed coherent lidar systems for airborne and sate based wind field measurement p0076 A78-15012

National geodetic satellite program p0032 N78 11550

BERGIN, J M

Some aspects of the mixed layer of the upper ocean [AIAA 77-1590] p0045 A78-13670 p0045 A78-13670

BERKOPEC, F D Development of environmental charging effect monitors properational satellites p0098 N78-10174

operational satellites BILLING, H The digital processing of Scanning Radiometer (SR) data from NOAA weather satellites as carried out in the

Meteorological Institute of the Free University of Berlin Part 1 Linearising the SR data [BLL-M-24896-(5828 4F)] o0102 N78-14750

BILLINGSLEY, F C

Land classification of south-central lowa from computer enhanced images E78-100051 p0082 N78-12493 BILLINGSLEY, J B

Interactive image processing for meteoro applications at NASA/Goddard Space Flight Center meteorological n0076 A78-15004

BISCHOF, W

Comparability of CO2 measurements p0015 A78-12405

BJERKESTRAND A.

Tunable dual-line CO2 laser for atmospheric spectroscopy and pollution monitoring BJORNSEN, G L. p0017 A78-14082

GDM/GPS receiver hardware implementation p0030 A78-15589

BLACKER, 8 M nent and the law Monitoring for compliance

with the Clean Air Amendments of 1970 p0022 A78-18456 BLAKE, J B

Significant initial results from measurements experiment on ATS-8 [NASA TP-1101] the environmental p0102 N78-15142 BLANCHARD, D

Rare earth and trace geochemistry of metabasalts from the Point Sal ophiolite California p0036 A78-20097

BLANKENBURGH J C

Norwegian marine geodetic projects p0048 A78-17648

BLOOMFIELD, H & In-situ laser retorting of oil shale [NASA-CASE-LEW-12217-1] DO037 N78-14452

BÓBBA, A. G. Landsat-1 identification of ground er regimes Great Lake basin p0061 A78-18871 BOCHEV A Z.

Ion temperature estimation with ion trap data from rockets and satellites p0098 A78-17113

BOETTCHER A. J
Use of thermal-infrared imagery y in ground-water p0057 A78-14869 investigations in Montana
Use of thermal-infrared imagery m ground-water p0067 N78-14563 investigations in Montana

A digital technique for manual extraction of data from p0075 A78-14885

aerial photography p0075 A78-14885
A digital technique for manual extraction of data from p0091 N78-14579 aerial photography

BONRUD L. O

Digital image correlation techniques applied to LANDSAT pectral imagery

p0083 N78-12499 BOWKER D E

The use of Landsat for monitoring water parameters in he coastal zone p0045 A78-13672 JAIAA 77-1597]

BOWKER, N W A low cost system for reception processing and distribution of line-scan data from environi [AIAA 77-1598] pOC pivironmental satellites p0045 A78-13673

BOWLEY C J

Analysis of photochemical oxidant and particulate pollution patterns in New England using remote sensing

data [PB-268996/6] DO023 N78-10623 BOYLAN M

Use of remote sensing for land use policy formulation [E78-10020] p0008 N78-13502 BRACALENTE E M

The Seasat-A satellite scatterometer

p0095 A78-12832

BRACH E J Differentiation of selected annual field crops throughout the growing season by their spectral reflectance properties p0007 A78 20172

BRAGG, S Imaging natural materials with a quasi-microscope [NASA-CR-155250] p0099 N78 1 p0099 N78 11813

Preliminary differences in mean water level between tide gauges along the South American Pacific

RRESMAHAN P A

Wheat productivity estimates using LANDSAT data [E78-10009] p0007 N78 10534

p0048 A78 17650

BRESSANIN, G The Italian ground receiving and processing facility for arth resources survey data p0071 A78-12927 earth resources survey data

RRESSEI C

Airborne Oceanographic Lidar System p0048 A78 14878

Airborne oceanographic fidar system p0053 N78-14572

BRIGHT, J B

LANDSAT/coastal processes

[E78-10011] p0061 N78-10536 BRIMBLECOMBE, P

Remote sensing of pollutant plumes from Landsat

p0021 A78-18240 Experience with the per-point classification algorithms for the mapping of estuarine areas from Landsat

DO058 A78-18243

BRISTOR C Operational data processing - The first ten years are th p0073 A78-14789 Operational data processing. The first ten years are the

p0088 N78-14476 BROCK, R H Tree stress detection through spectral ratioing of colo

film records n0002 A78 13065 BROOKS, D. R.

An introduction to orbit dynamics and its application to satellite-based earth monitoring systems [NASA-RP-1009] p0099 N78-12113 BROOKS P D

Three approaches to the classification and mapping of

inland wetlands p0057 A78-14906 Three approaches to the classification of inland etlands p0068 N78-14600 wetlands

BROWER, R L Present and future operational NOAA satellite oceanographic products. An introduction p0047 A78-14820

Present and future operational oceanographic products An introduction NOAA satellite p0052 N78 14512

BROWN, L. D.

Recent vertical crustal movements from geodetic measurements Alaska and the eastern United States p0033 N78-15622

BROWN S R

Present and future operational NOAA satellite oceanographic products - An introduction

p0047 A78-14820 Present and future operational NOAA satellite oceanographic products An introduction nO052 N78-14512

BROWND, J

National geodetic satellite program part 1 p0032 N78 11550

BRUCKS J T
LANDSAT menhaden and thread herring resources

p0050 N78 12500 RUMFIELD, M L Quantitative remote measurements of pollutants from

stationary sources using Raman lidar p0020 A78-17000 BRUNSVELDVANHULTEN H W Evaluation of an infrared line scanner for the study of

coastal water circulation [NIWARS-PUBL-41] DO099 N78 11496

PERSONAL AUTHOR INDEX CONNER, W D BRUTON, J E CARROLL W F CHENG. N TON, J ≿ Landsat 1 identification of groundwater regimes in a reat Lake ba≶in p0061 A78-18871 Characterization of terrestrial service environments - The An intercomparison of satellite images and radar rainfall Great Lake basın simultaneous occurrence of combined conditions of sola rates p0015 A78-11283 pQQ63 N78-11647 solation and climatic variables [PB-270299/1] BRYAN, M L CARTER, B D Computer processing of SAR L-band imagery p0055 A78-10524 CHENG, R Y K Application of remote sensing to state and regional Laboratory requirements for in-situ and remote sensing BRYANT, N A.

Landsat-D thematic mapper simulation us of suspended material p0024 N78-13506 [E78-10034] [NASA-CR-145263] n0098 N78-10539 lation using aircraft p0073 A78-14806 CARTER, V multispectral scanner data CHEREDWICHEK A D Seasonal color infrared photographs for mapping inland A vector aeromagnetometer instrument system p0095 A78-13239 LANDSAT-D thematic mapper simulation using aircraft wetlands on U.S. Geological survey 7.5-minute p0088 N78-14498 multispectral scanner data p0035 A78-13069 quadrangles CHILDERS, J M BUGBOV E A Coastal wetlands The present and future role of remote A vector aeromagnetometer instrument syst Hydrometry under Arctic conditions p0055 A78 14794 Three approaches to the classification and mapping of p0057 A78 14906 p0062 N78 11475 p0095 A78-13239 CHIPMAN, R BUKATA R P inland wetlands Landsat 1 identification of groundwater regimes in Applications of remotely ser data to wetland p0079 A78 18103 technology p0110 N78-14487 Great Lake basin p0061 A78-18871 studies Coastal wetlands The present and future role of remote p0066 N78 14485 CHOWDHURY, M I BULTYNCK, H Land utilization and ecological as Sylhet-Mymensingh Haor region of Banglads The arrangement of atmospheric pollution detectors by means of a minicomputer and a multicomponent che Three approaches to the classification p0019 A78-14871 p0068 N78 14600 p0016 A78-12975 of Landsat data vetlands BUNTING, J T CASAS, J C Land utilization A modular radiative transfer program for gas filter Cloud properties from satellite infrared and visible p0097 A78-14973 correlation radiometry [NASA-CR-2895] p0022 N78-10526 BURNETT, J. W. CHRISTENSON, J W Image modeling with application to measuremen Urban area delineation and detection of change along Inventory of neefields in France using Landsat and aircraft p0082 N78 12491 ata p0005 A78-14900
Inventory of ncefields in France using LANDSAT and screaft p0012 N78-14594 Estimation of old field ecosystem biomass using low p0023 N78-10540 [NASA-TM X-71413] altitude imagery
Estimation of old field ecosystem p0003 A78 14828 CHU W P CASTRUCCIO, P biomass using low p0088 N78-14520 The inversion of stratosphene aerosol and ozone vertical altitude imagery The use of the Landsat series satellites for the monitoring profiles from spacecraft solar extinction measure p0105 A78-12926 and management of territory p0086 N78-12603 Space radar system specifications p0073 A78 14803 CATES M CHUNG, Y 8 Techniques for ocean bottom measurements of magnetic Space radar system specifications BUTERA, M K p0101 N78-14495 Detection of a plume 400 km from th fields with a superconducting magnetometer p0019 A78-15370 p0041 A78-10389 A technique for the determination of Louisiana marsh CICONE R C salinity zone from vegetation mapped by multispectral High-resolution radar scattering characteristics of a A comparison of satellite and aircraft data canner data p0061 N78 10541 [NASA-TM-58203] disturbed sea surface and floating debris [AD-A044216] p0099 N78-12268 Multispectral system analysis through modeling and BUTLER, J.A.

LANDSAT menhaden and thread herring resources simulation CAVALLIN, A investigation [E78-10024] Application of conventional and advanced techniques for An evaluation of the signature extension approach to p0050 N78 12500 the interpretation of Landsat 2 images for the sti linears in the Fruili earthquake area p0075 A78-14886 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of BYRNE, D. M Atmospheric particulate properties inferred from lidar and Investigation of techniques for inventorying forested agions. Volume 2. Forestry information system. solar radiometer observations compared with simultaneous in situ aircraft measurements - A case stud the Friuli earthquake area p0091 N78-14580 p0016 A78 13616 CAZABAT. C Applications of the ERTS 1 Satellite to traditional p0009 N78-14463 p0030 A78-16510 C Remote sensing and geographically based informati ERTS topology of France /First results/ systems p0036 A78-16511 Multispectral system analysis through modeling and mulation p0090 N78-14578 CHAHINE M T CALLAGHAN P C
Contributions of LANDSAT to natural resource protection simulation Generalization of the relaxation method for the inverse CIHLAR J solution of nonlinear and linear transfer equ and future recreational development in the state of West Scatterometer results from shorefast and floating sea DO084 N78-12590 Virginia [E78-10019] p0047 A78-14822 CHAMBERLAIN, T K tce n0024 N78-13501 p0042 A78-12837 Soil moisture determination by thermal infrared remote Oceanic morphogenesis CHANCE, J E CAMPBELL P I p0060 A78 18870 sensina Application of electronic distance measuring devices to Further tests of the Suits reflectance in ast and floating sea p0052 N78-14514 Scatterometer results from short surement of discharge and sediment dep p0003 A78-14827 p0062 N78-11467 Further tests of the suits reflectant CLAASSEN J P CAMPBELL R p0010 N78-14519 Geophysics Applied to Detection and Delineation of Radar systems for a polar mission [NASA-CR-156640] p0049 N78-10344 Non-energy Non-renewable Resources Workshop on CHANDLER, B J The use of Landsat imagery for terrain hysics aın analysıs p0080 A78-18244 CLAPP, J L [PB-271952/4] n0037 N78-13622 On multidisciplinary research on the application of remote CAMPBELL, S A
A modular radiative transfer program for gas filter sensing to water resources problems [E78-10028] Vertical lifting of ionization during geomagnetic storms n0064 N78 13504 from satellite measurements of ion composition correlation radiometry CLARK G E A modern tool for land design p0079 A78-16730 [NASA CR-2895] p0022 N78-10526 n0071 A78 10075 e ambient carbon monoxide monitor based on gas Landsat-D thematic mapper simulation using aircraft jultispectral scanner data p0073 A78-14806 Localization of an experimental ecological unit in the filter correlation Performance and application Maradi region of Nigeria [NASA-TM-75085] p0020 A78 16771 p0032 N78-12553 CHAPELLE A M multispectral scan CAPONIGRO, P ner data Localization of an experimental ecological unit in the Maradi region of Nigeria [NASA TM-75085] p0032 N78 12553 Remote sensing for the medium-scale assessment of Real Time Dust Fall Monitor (RTDFM)
[NASA CR-150446] pC ground-level thermal and hydrologic variations. An application to the local prediction of storms by use of the Project Tellus system. p0055 A78-12930 p0098 N78-10436 CHAPPELL A. C COGGER L L Preliminary eastern Indian Ocean geoid from GEOS-3 CAPOZZA F

CANON L

Remote sensing from space and

management of renewable resources p0105 A78-12943 CAPPELLINI V An application of numerical filtering and data compression

to the elaboration of earth resources imagery p0071 A78-12935

CARDAMONE, P

Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of linears in the Friuli earthquake area DO075 A78-14886 Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of p0091 N78-14580 nears in the Friuli earthquake area CARLON, H R

Infrared absorption spectra attributed to ion-nucleated water clusters [AD A044661]

p0064 N78-12518

CARMICHAEL D C
Characterization of terrestrial service environments - The

simultaneous occurrence of combined conditions of sola ation and climatic variables p0015 A78-11283 CARROL S

Homomorphic processing of Landsat data p0081 A78 20173

[AD A043788]

CHECCHI M

CHEN, P-W

CHEN, Y M

CHENEY R E

of Japan

radar platform

profiles by acoustic pulses [AD-A042372]

p0050 N78-10675

p0080 A78-18910

p0050 N78-10674

Agricultural applications of satellite remote sensing - The

measurement and prediction of principal harvests
p0001 A78-12931

Pending issues before the Legal Sub-Committee of the United Nations Committee on the Peaceful Uses of Outer Space p0105 A78 10353

Characteristics of sea clutter measured from E-3A high ladar platform p0097 A78-15684

A numerical algorithm for remote sensing of density

A numerical algorithm for remote sensing of ocean density

Synoptic observations of the oceanic frontal system east Japan p0048 A78-17326

profiles of a simple ocean model by acoustic

Technical assistance and the transfer of remote sensing

and ecological aspects in the Sylhet Mymensingh Haor Region of Bangladesh An analysis of LANDSAT data p0026 N78-14565

the urban-rural boundary as derived from LANDSAT digital

Remote sensing and geographically based information p0075 A78-14866

p0075 A78-14884

large area crop inventories utilizing space image data [E78-10016] p0007 N78-12496

regions Volume 2 Forestry information system requirements and joint use of remotely sensed and ancillary

p0090 N78-14560

LANDSAT-D thematic mapper simulation using aircraft DOORS N78-14498

Characteristics of polar cap sun-aligned arcs

p0095 A78-13083

COLEMAN, P. J. JR

the environmental

Significant initial results from measurements experiment on ATS-6 p0102 N78-15142 [NASA-TP-1101]

COLLETT, L S

Advances in surface geophysical techniques for p0059 A78-18862 oundwater and soil moisture

COLWELL J

Wheat productivity estimates using LANDSAT data 78 10009) p0007 N78 10534 [E78 10009]

COLWELL J E Wheat yield forecasts using Landsat data

p0004 A78-14876

Wheat yelld forecasts using LANDSAT data p0011 N78 14570

CONITZ. M W

Remote sensing utilization of developing countries An propriate technology p0107 A78 14858 appropriate technology
Remote sensing utilization of developropriate technology eloping countries An p0111 N78 14552

CONNER W D sing of stationary ource emissions p0015 A78-10056 CONRATH, B J PERSONAL AUTHOR INDEX

COMMATH B .

Backus-Gilbert theory and its application to retrieval of ozone and temperature profiles n0084 N78-12593

The auxiliary use of LANDSAT data in estimating crop acreages Results of the 1975 Illinois crop acreage

n0012 N78-15539 [F78.10049]

CORBETT, J D Geophysics Applied to Detection and Delineation of

Non-energy Non-renewable Resources Workshop on Mining Geophysics [PB-271952/4] n0037 N78 13622

CORRIGAN, J F Significant initial results from the environmental

measurements experiment on ATS-6
[NASA-TP-1101] p0102 N78 15142 COSKUM B

Analytical aerial triangulation with corrections systematic errors p0086 N78 13498

Meteorological support for remote sensing programs p0091 N78-14585

The auxiliary use of LANDSAT data in estimating crop acreages Results of the 1975 Illinois crop acreage [F78-10049] n0012 N78-15539

CRENSHAW E G

A remote display system utilizing compressed data CRIST E P

Investigation of techniques for inventorying forested agions. Volume 2. Forestry information system. regions requirements and joint use of remotely sensed and ancillary

data [E78 10047] p0009 N78 14463 CRMKOVICH & &

An operational multistate earth observation data management system
An operational multistate earth p0106 A78 14823 p0110 N78 14515 management system

CROSSY D S Estimating clear radiances - A report and a ne p0097 A78-14971 rule

CROWE, M Processing of satellite imagery at the National Environmental Satellite Service p0074 A78-14854

Processing of satellite imagery Environmental Satellite Service at the National p0089 N78-14548

Role of cumulonimbus in the evolution of cyclonic disturbances in Mediterranean regions

p0077 A78 16364

CRUICKSHANK, M J Computer image processing exploration p0041 A78 12828

CUMMINGS W D Significant initial results from measurements experiment on ATS 6 the environmental

[NASA-TP-1101] p0102 N78-15142

D

DACOSTAPRADO L O

Boundary detection in images Optical formulation in terms of signal detection theory finpe-1118-TPT-067] p0092 N78-14894

DACUNHA R P

Application of remote sensing to geological and mineral deposits surveys of the northern Minas Gerais state utilizing images from LANDSAT

[INPE-1096-PE/073] n0039 N78-14611 DALSTED, K J

Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data [E78-10053] p0013 N78-15542

DALTORIO A

Preliminary results from the Lidar system at the University of L Aquila D0022 A78-18476 DARNELL, W L

Aircraft versus spacecraft for remote monitoring of water uality in U.S. coastal zones p0021 A78-17576 quality in U.S. coastal zones

DAVID D J Computer elaboration and visualization of remote p0080 A78-18241 data

Preparation of a geologic photo map and hydrologic study

of the Yemen Arab Republic [E78-10008] p0037 N78-12494

DAVIES T Remote sensing of pollutant plumes from Landsat p0021 A78-18240

DAVIS, B J

Test of spectral/spatial classifier [E78-10044]

p0087 N78-14460 Processing techniques development [E78-10045] p0087 N78-14461

DAVIS C. F. remote sensing investigation for beach reconnaissance p0083 N78-12515 [AD-A044836]

DAVIS. J. L.

Electromagnetic detection of soil water content Progress report II n0059 A78-18863 Electromagnetic detection of soil moisture - Progress D0061 A78-20174 Report 1

DAVIS. J. R. Techniques for ocean bottom measurements of magnetic

fields with a superconducting magnetometer n0041 A78-10389

DAVIS T M

18 T N
Pulsating aurora - Local and global morphology
p0035 A78-13082 DAVISSON L D

Monte Carlo simulation of wave sensing with a short pulse radar [NASA-TM-X-71412] n0081 N78-10341

DE PENA, R G

Atmospheric particulate properties inferred from lidar and solar radiometer observations compared with simultaneous in situ aircraft measurements - A case study p0016 A78-13616

DECKER M T

Application of statistical inversion to ground based microwave remote sensing of temperature a p0085 N78-12600

DEEPAK A

Inversion Methods in Atmospheric Remote Soun-INASA-CP 0041 p0084 N78-12586 Inversion of solar aureole measurements for determining p0085 N78 12596 aerosol characteristics

DEFOREST, S E Significant initial results fro

the environmental measurements experiment on ATS-6 [NASA TP 1101] p0102 N78-15142

DEJACE, J

Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy . p0004 A78 14879

Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy 00011 N7R 14573

Experiments on the radar backscatter of snow p0055 A78 10386

DEMATTOS, J. T.

Application of remote sensing to geological and mineral deposits surveys of the northern Minas Gerais state utilizing images from LANDSAT [INPE-1096-PE/073] p0039 N78-14611

DEMOTT, R L

Ocean mining requirements [AIAA 77-1581] p0044 A78-13665

DENHARTOG, S L

Aerial photointerpretation of a small ( [AD-A045870] p0064 N78 13513 DEPRIEST D J

Estimating clear radiances A report a p0097 A78-14971 DESCHAMPS P Y

Remote sensing of ocean color and detection of p0048 A78-14855 chlorophyll content Remote sensing of ocean color chlorophyll content and detection of p0052 N78-14549

DESTEIGUER. J E

Forest type mapping of the Atchafalaya River Basin from p0002 A78-13068 satellite and aircraft imagery DEVICHEVA, E A
Comparison of various methods

of determining solar proton spectra p0095 A78-13218

Techniques for ocean bottom measurements of magnetic fields with a superconducting magnetometer

p0041 A78-10389 DISMACHEK D C

Potential applications of digital visible and infrared data

from geostationary environmental satellites p0074 A78-14839

Potential applications of digital visible and infrared data from geostationary environmental satellit p0101 N78-14532

DONKER N H W

Analysis of MSS digital imagery with th component transform p0 p0078 A78-16547

Application of remote sensing to geothermal anomaly mapping in the Caldas Novas County [INPE 1129-TPT/070] p0039 N78-14610

A block adjustment for SLAR-imagery p0079 A78-16548 DOWIDEIT, G

DRAEGER W C

Monitoring irrigated land acreage using Landsat imagery An application example p0003 A78 14809
Monitoring irrigated land acreage using LANDSAT imagery An application example p0066 N78-14501

lecessity to adapt land use and land cov

systems to readily accept radar data p0018 A78-14852
Necessity to adapt land use and land over classification systems to readily accept radar data p0025 N78-14546 DROZDOV N D

mathematical theory of equivalent transformations during the equalizing of geodesic networks

p0031 A78-19236

DUCKETT, E.J.

The use of canonical correlation analysis for measuring than anytronmental health quality p0027 N78 15592 urban environmental health quality

Quantitative mapping of suspended solids in wastewater sludge plumes in the New York Bight ape p0015 A78-10658

DUMME J A The Seasat A project - An overview

D0042 A78-12829

DURSTENFELD, R on aids from space

Marine decision [AIAA 77-1611] n0046 A78 13683

E

EASTWOOD, D

Field infrared method to discriminate natural seeps from non-seeps Santa Barbara California area p0023 N78-10608 [40.4047861]

EASTWOOD, L. F., JR

An operational multistate earth observation data p0106 A78-14823 management system An operational multistate earth observation data p0110 N78-14515 management system

EATON, W T

Application of satellite-borne synthetic aperture radar to

D0046 A78-13687

EBBERT T F

A survey of users of earth resources remote sensing p0107 A78-14859 data A survey of users of earth resources remote sensing

ERNER H

A mathematical model for digital rectification of remote p0079 A78 16549 sensing data

p0111 N78-14553

ECKERT, J A

DO017 A78 14797 Remote sensing of air pollutants p0024 N78 14489 Remote sensing of air pollutants

EFIMOVA, Z. G

The complex of optical-photographical transformation methods of aerial and space images used for study of natura n0077 A78-16501 resources

EGAN, W G

Polarimeter measures sea state characteristics using emitted infrared radiation p0047 A78-14821 Polarimeter measures sea state characteristics using mitted infrared radiation p0052 N78-14513 emitted infrared radiation

EIDENSHINK, J C

Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data [E78-10053] p0013 N78-15542

EL GHAWABY M A
Application of Landsat satellite imagery for iron ore Application of Landsat satellite image, prospecting in the western desert of Egypt p0035 A78 14887

EL RAKAIBY, M. M.

Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt p0076 A78-14905

EL SHAZLY, E M
Application of Landsat satellite imagery for iron ore Application of Landsat satellite more prospecting in the western desert of Egypt p0035 A78-14887

Groundwater studies in arid areas in Egypt using Landsat stellite images p0057 A78-14888 satellite images Interpretation of multispectral and infrared thermal

surveys of the Suez Canal Zone Egypt DO076 A78-14905

EI RHAZIV M M Groundwater studies in and areas in Egypt using Landsat stellite images p0057 A78-14888

satellite images ELACHI, C

wave patterns under Hurricane Gloria -Ocean wave patterns under numbers solution Observation with an airborne synthetic-aperture radar p0047 A78 14126

ELAHI K M

Land utilization and ecological aspects in the Sylhet-Mymensingh Haor region of Bangladesh - An analysis of Landsat data p0019 A78-14871 of Landsat data

Land utilization and ecological aspects in the Sylhet-Mymensingh Haor Region of Bangladesh An analysis of LANDSAT data p0026 N78-14565

ELGHAWABY M A
Application of LANDSAT satellite imagery for iron ore Application of LANDSA1 sateritie integer, prospecting in the Western Desert of Egypt p0039 N78-14581

Land-use change detection from Landsat and Skylab p0020 A78-16550 ELLIOTT, J C

Surface resource inventory of eastern Montana rangelands utilizing high altitude color infrared aerial photography p0002 A78-13067 ELRAKAIBY M M Interpretation of multispectral and infrared thermal

surveys of the Suez Canal Zone Egypt p0101 N78-14599 PERSONAL AUTHOR INDEX ELSHAZLY E M Application of LANDSA1 Security prospecting in the Western Desert of Egypt p0039 N78-14581 Groundwater studies in and areas in Egypt using LANDSAT satellite images p0068 N78-14582 Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt nO101 N78-14599 ELSHAZLY, M M Groundwater studies in arid areas in Egypt using LANDSAT satellite images p0068 N78-14582 ENG, S T A PbSe diode laser spectrometer to be used in air pollution monitoring and mineral prospecting [CTH-IEM-TR-7636] p0101 N78-14699 ENGVALL, J L View angle effect in Landsat imagen n0074 A78-14848 Pattern recognition of Landsat data based upon tempora p0007 A78-18248 View angle effect in LANDSAT imag p0089 N78-14542 Application of serial photography to water-related programs in Michigan p0056 A78-14835 Application of aerial photography to water-related p0067 N78 14528 ams in Michigan Use of lidar to detect oil pollution of the sea surface n0022 A78-20067 EREMIN, V K Image data application obtained from space to geological investigations in the USSR p0035 A78-16502 ERICKSON, J D Remote sensing data processing -Two years ago today p0072 A78-14784 and two years from today Investigation of thematic mapper sp atial radiometric and p0096 A78-14826 spectral resolution wo years ago today p0087 N78 14471 Remote sensing data processing T and two years from today Investigation of thematic mapper sp spectral resolution tial radiometric ERICKSON, K N Significant initial results from measurements experiment on ATS-6 [NASA-TP-1101]

p0088 N78 14518 environmental p0102 N78-15142

ERICKSON, R L Radar systems for a polar mission [NASA-CR-156640] p0049 N78-10344

ERMST J A
1978 A space focus for oceanology
[AIAA 77-1564] p p0043 A78 13656 ESTES J E

Measuring soil moisture with an airborn me imaging passive p0001 A78-10523 microwave radiometer The impact of remote sensing on United States geography The past in perspective present realities future potentials p0017 A78-14783 A perspective on the state of the art of photographic p0073 A78-14786 interpretation Automated image processing of La r watershed runoff prediction indsat II digital data p0056 A78-14816 Radar detection of surface oil slicks p0021 A78-17197

The impact of remote sensing on United States geography The past in perspective present realities future potentials n0109 N78, 14470 A perspective on the state of the art of photographic p0087 N78-14473 A perspective processing of LANDSAT 2 digital data poofs needletion poofs N78-14508

A mask correlation remote sensor for measurements of SO2 optical depths on long light source Instrument p0016 A78-12938 EVANS M W

Ocean surface currents mapped by rad DO041 A78-10344

EVANS R B p0017 A78-14797 Remote sensing of air pollutants

Remote sensing of air pollutants p0024 N78-14489

Development of airborne electromagnetic survey instrumentation and application to the search for buried sand and gravel a summary report [PB-271331/1] p0039 N78-14622

F

FALLER, K. H.

Detection and measurement of interfaces in remotely ecquired data using a digital computer [AIAA 77-1616] p0096 A78-13688 LANDSAT menhaden and thread herring resources

investigation p0050 N78-12500

Remote sensing of oceanic parameters during the Skylab/gamefish experiment [NASA-RP-1012] p0051 N78-12644

FARMAKOVSKII, S. V

vector aeromagnetometer instrument system n0095 A78-13239 FARMER, C B

The vertical distribution of HCI in the stratosphere DO019 A78-15890 FARR. T. G.

Computer processing of SAR L-band is

FAURE, P K

The determination of volatile organic compounds in city air by gas chromatography combin withhe backness day be selective subtraction infrared spectrometry and p0015 A78-10041 spectrometry

o imagery p0055 A78-10524

FELSENTREGER T

National geodetic satellite program part 1 p0032 N78 11550 FENN, D D

Thunderstorm monitoring from a geosynchronous p0076 A78-15010 FERNANDEZ. J C

Applications of Landsat data to the integrated economic development of Mindoro Philippines p0107 A78-14889 Applications of LANDSAT data to the integrated economic development of Mindoro Phi p0011 N78-14583

FERMEYHOUGH D G

Resampling study [E78-10014] p0082 N78 12495

FETT R W

Analysis of the marine environment in DMSP imagery focusing on island barrier effects [AIAA 77-1596] nOO45 A78-13671

FEYERHERM, A M Planting data and wheat yield models [E78-10013] p p0007 N78-10538

FINKELSHTEIN, M. I. Radar measurement of stratified earth surface con

p0030 A78-15424 FINLAYSON-PITTS B J Tropospheric photochemical p0015 A78-11809

Development and application of operational techniques for the inventory and monitoring of a for the Texas coastal zone. Volume 1 resources and uses

[E78-10042] p0053 N78-15537 Development and application of operational techniques for the inventory and monitoring of resources and uses the Texas coastal zone Volume 2 Appendices p0053 N78-15538

[E78-10048] FISHER, A. D

A model for microwave intensity propagation

inhomogeneous medium p0096 A78-13971 Remote sensing of earth resources using a spaceb

microwave radiometer p0098 A78-17377

The use of Landsat imagery to locate uncharted coastal p0074 A78-14832 features on the Labrador Coast The use of satellite photography in the National Topographic Mapping Program of Canada

p0030 A78-16552 The use of LANDSAT imagery to locate uncharted coastal features on the Labrador coast

n0089 N78-14524 FLEMING H E

Comparison of linear inversion methods by examination of the duality between iterative and inverse n0085 N78 12598 methods

FLOCK, W L Monitoring open water and sea ice in p0041 A78-10388 by radar

FOLLESTAD, B A
Analysis of Landsat-1 data for mapping of surficial Test area in Alta commune Finnmark county p0036 A78-16553 deposits

An application of numerical filtering and data compression to the elaboration of earth resources in

magery p0071 A78-12935 FONG, R K T

Radar systems for a polar mission p0049 N78 10344 [NASA-CR 156640] FONTANELLA, J -C

Simultaneous measurements of nitrogen dioxide and nitric acid in the lower stratosphere [ONERA TP NO 1977-154] p0020 A78-16214

FORMAN, M. L. Aircraft sensor [NASA-TM-78038] anatysis package n0081 N78-11451

FOSSUM, B A

Norwegian marine geodetic projects

p0048 A78-17648

A quality assurance program for monitoring ozone and irbon monoxide [PB-271204/0] p0024 N78-13636

The effect of soil water deficit on the reflectance of conifer p0010 N78-14521

FOX. L. III The effect of soil water deficit on the reflectance of conifer seedling canopies p0003 A78-14829

FRAGGIOTTI, J Research and simulation in support of near real time/real e reconnaissance RPV systems o0083 N78-12516 [AD-A044598]

FRENCH D W

Detection of oak wilt with color IR aerial photography p0001 A78-10522

FRIEDRICHS D R Comprehensive Information Retrieval and Model Input Sequence (CIRMIS)

[BNWL 2235] p0087 N78-13951 RITZ, T A

Significant initial results from the environmental measurements experiment on ATS-6 [NASA-TP-1101] p0102 N78-15142

FUBARA, D. M. Improved ground truth geoid for the GEOS 3 calibration

[NASA CR-141431] p0032 N78-12510

YMAT, A. L.

Inversion methods in temperature and aerosol remote sounding Their commonality and differences and some unexplored approaches p0085 N78-12601

G

GAFFEY, M J surface Asteroid materials Mineralogical characterizations from reflectance spectra

[NASA-CR-154510] p0036 N78-10992

The present status of remote sensing Nations 8 April 1977 p01 sing in the United p0110 N78-14481 GAMMON P T

Three approaches to the classification and mapping of land wetlands p0057 A78-14906 inland wetlands Three approaches to the classification of inland etlands p0068 N78 14600

GANNON J F Application of LANDSAT to the surveillance of lake

eutrophication in the Great Lakes basin p0064 N78-13503 [E78-10023]

GARDNER, J V A comparative study of the amount and types of geologic information received from visually interpreted U-2 and

Landsat imagery n0035 A78-13492 GATELLI, E

Remote sensing of water quality in 7 lakes in northern aly p0058 A78-16528 Italy GAY B W JR

Photochemical reactions among formaldehyde chlorine and nitrogen dioxide in air GEDYMIN, W p0017 A78-14174

Updated system for calculations of coordinates for locating points on computer GEO 2 [AD-A045434]

p0033 N78 13514 GEMMA J L

The fate of nitrogen oxides in the atmosphere

p0023 N78 10619 [PB-267784/7]

On the photographic processing and digital texture for remote sensing of Kujukuri coast of Chib hiba in Japan p0073 A78 14814

On the photographic processing and digital texture for remote sensing of Kujukuri Coast of Chiba in Japan p0052 N78 14506

GEORGE T H

Reindeer range inventory in western Alaska from

computer-aided digital classification of Landsat data p0003 A78 14824 Reindeer range inventory in western Alaska from computer-aided digital classification of LANDSAT data p0009 N78-14516

GERRERMANN A H

Yield/reflectance relations in cabbage

DOOO1 A78-10521 GERVAIS F

Analysis of infrared reflectivity in the presence of symmetrical phonon lines p0035 A78 13932 asymmetrical phonon lines GHOVANLOU, A H

Determination of scattering functions and their effects on remote sensing of turbidity in natural [NASA-CR-145239] p0

p0094 N78-15551 GIRSON, R The European Space Agency and remote sensing by polios A78-13495

satellite GILLE, J C Inversion of infrared limb emission measurements for

temperature and trace gas concentrations p0084 N78 12594

GILLESPIE, G H

Measurement of ambient magnetic field gradients using super conducting magnetic gradiometer p0100 N78-12618 [AD A044997]

The magnetic field and magnetic field gradients of the NUC oceanographic research tower

AD A045161] p0051 N78-13289 GIOVANELLI G

A mask correlation remote sensor for measurements of SO2 optical depths on long light source - Instrument n0016 A78-12938

Simultaneous measurements of nitrogen dioxide and

nitric acid in the lower stratosphere [ONERA TP NO 1977-154] p0020 A78 16214 GIRARD, C.-M

The use of remote sensing in the detection of crop p0006 A78 16513 GIRAUDET, R PERSONAL AUTHOR INDEX

GIRAUDET, R GRANT, D. F. HALLIDAY R A Field infrared method to discriminate natural seeps from Simultaneous measurements of nitrogen dioxide and Data retransmission by satellite for operational p0063 N78-11490 non-seeps Santa Barbara California are nitric acid in the lower stratosphere [ONERA TP NO 1977-154] p0020 A78 16214 p0023 N78-10608 HALPERN D GRANTHAM W L GLASGOW, R M Accuracy of moored current Quantitative mapping of suspended solids in wastewater p0042 A78 12840 shallow water The Seasat-A satellite scatterometer p0095 A78-12832 sludge plumes in the New York Bight apex HAMAL K p0015 A78-10658 cosmos laser ranging stations p0031 A78 18108 GRAY, L HAMILTON D R GLEASON, C Scatterometer results from shorefast and floating sea The auxiliary use of LANDSAT data in estimating crop Objective analysis and classification of oceanographic ICR acreages Results of the 1975 Illinois crop-acreage p0048 A78 17982 Scatterometer results from shorefast and floating sea experiment HAMPSHIRE D W H p0052 N78-14514 p0012 N78-15539 Measurement of sea surface by means of microwave [F78-10049] GREEN A E S GLEASON, J M altimeters - A computer simulation for system evaluation fluence of ground level SO2 on the diffuse to direct n0095 A78 12836 Multispectral system analysis through modeling and mulation p0075 A78-14884 irradiance ratio in the middle ultraviolet p0018 A78-14810 Investigations of spectral separability of small grains early Nucleonic coat detector with independent wheat detection and multicrop inventory planning 015] p0008 N78-13499 Influence of ground level SO2 on the diffuse to direct hydropneumatic suspension [NASA-CR-150465] [E78-10015] irradiance ratio in the middle ultraviolet p0036 N78-11454 n0025 N78-14502 Multispectral system analysis through modeling and mulation p0090 N78-14578 HANSEN, J.P.
High-resolution radar scattering characteristics of a disturbed sea surface and floating debris GUATTI. E. L. Site calibration of electromagnetic and ultrasonic river p0099 N78-12268 Modulation transfer analysis of serial gauging stations p0062 N78-11470 AD-A044216] D0078 A78 16538 HANSON, B C. GREEN R N GLOERSEN, P Experiments on the radar backscatter of snow Potential applications of digital visible and infrared data p0055 A78 10386 The Seasat-A Scanning Multichannel Microwave from geostationary environmental satellites p0074 A78-14839 Radiometer p0095 A78-12831 HAMST. P. L. Photochemical reactions among formaldehyde Potential applications of digital visible and infrared data Application of digital filtering to satellite geodesy p0017 A78 14174 and nitrogen dioxide in air from geostationary environmental satellites p0082 N78-12486 HANUSCHAK G
Pilot study of the potential contributions of LANDSAT p0101 N78-14532 GOEBEL J E GREGORY, G L Quaternary geologic map of Minnesota data in the construction of area sampling frames Evaluation of a hydrogen chloride environmental monitoring p001 detector for p0038 N78 14526 p0012 N78-15536 p0017 A78-13843 HANUSCHAK G A GOEL M K GRIGGS, M

Comment on Relative atmospheric aerosol content from The auxiliary use of LANDSAT data in estimating crop acreages Results of the 1975 Illinois crop-acreage Vertical lifting of ionization during geomagnetic storms from satellite measurements of ion composition ERTS observations by Yu Mekler H Quenzel G Ohring and I Marcus p0017 A78-13837 p0079 A78-16730 p0012 N78-15539 GOETTELMAN R C Determination of aerosol content in the atmosphere from Airborne monitoring of crop canopy temperatures for irrigation scheduling and yield prediction HARALICK R M Use of thermal-infrared imagery LANDSAT data n ground-water p0057 A78-14869 [E78-10004] p0022 N78 10531 p0004 A78-14897 investigations in Montana Use of thermal-infrared imagery Airborne monitoring of crop canopy temperatures for irrigation scheduling and yield prediction GRINBERG, L. A. y in ground-water p0067 N78-14563 investigations in Montana investigation of natural environment by space means Geobotany Geomorphology soil sciences agricultural lands landscape study
[NASA-TM-75041] p0108 N78-11448 n0011 N78-14591 HARRIS, D GOHAGAN, J K National geodetic satellite program DO032 N78-11550 An operational multistate earth observation data anagement system p0108 A78-14823 An operational multistate earth observation data management system HARRIS, G , JR GROLIER, M. J. Preparation of a geologic photo map and hydrologic study of the Yemen Arab Republic [E78-10008] p0037 N78 12494 Landsat-radar synergism p0079 A78-16554 management system p0110 N78-14515 HARWOOD P Development and application of operational techniques for the inventory and monitoring of resources and uses GOLDSTEIN, J A Techniques for ocean bottom measurements of magnetic GROSSO P I fields with a superconducting magnetor for the Texas coastal zone Volume 1 Text Cartographic Electron Beam Recorder (EBR) system p0053 N78-15537 p0041 A78-10389 [E78 10042] [AD-A044401] p0100 N78-12513 GOLFIN N G Development and application of operational techniques GUILBAULT G G The 20 and 30 GHz attenuation the ATS-6 satellite for the inventory and monitoring of resources and uses for the Texas coastal zone Volume 2 Appendices [E78-10048] p0053 N78-15538 A study of gas solid reactions and air pollution p0093 N78-15340 detectors GONIN. G B [AD-A046646] p0027 N78-15601 Analysis of some models of atmospheric optical properties HAVER G F GUPIA. S K Forest land management by satellite LANDSAT derived according to space photo surveys
GOODENOUGH D p0020 A78-16539 Estimation of ground temperature from GFCR radiometric information as input to a forest inventory system
[E78-10038] p0008 N78-14455 Remote sensing data processing Two years ago today p0072 A78-14784 [NASA-CR-145291] p0102 N78-15626 HAVIG. T F and two years from today emote sensing data processing Two years ago today p0087 N78-14471 GUPTA. J N Characteristics of sea clutter measured from E 3A high Determination of scattering functions and their effects and two years from today radar platform p0097 A78 15664 COODENOUGH D G on remote sensing of turbidity in natural waters HAY, C M p0094 N78-15551 Remote sensing - A burgeoning science [NASA-CR-145239] Two phase sampling for wheat acreage estimation DO105 A78-12214 GUPTA. S K p0003 A78 14844 Use of clear lakes as standard reflectors tors for atmospheric p0074 A78-14830 Remote estimation of surface temperature in Two phase sampling for wheat ac age estimation p0010 N78-14538 measurements measurement experiments p0019 A78-14992 Use of clear lake as standard refle tors for atmospheric p0088 N78-14522 GURGANUS, E A HAYS, T. R. Laboratory measurements of radiance and reflectance An operational multistate earth observation data spectra of dilute primary-treated sawage sludge [NASA-TP-1038] p0023 N78-12554 GOODMAN J p0106 A78-14823 management system [NASA-TP-1038] p0023 N78-12554
Laboratory measurements of radiance and reflectance The microstructure of California coastal fog and stratus p0072 A78-14314 An operational multistate earth observation data p0110 N78 14515 ectra of dilute secondary-treated sewage sludge ASA-TP 1089] p0024 N78-12555 management system GOPALAPILLAI S Improved ground truth geoid for the GEOS 3 calibration HEACOCK E L Meteorological sensors and related technology for the ghties p0088 N78 14475 Laboratory measurements of upwelled radiance and [NASA CR-141431] p0032 N78-12510 reflectance spectra of Calvert Ball Jordan and Feldspar GORDON, H. R. HEILMAN J One-parameter characterization of the ocean's inherent optical properties for remote sensing p0041 A78-10161 [NASA TP 1039] p0024 N78-12645 HCMM energy budget data as a model input for assessing regions of high potential groundwater pollution [E78-10010] p0061 N78-10535 GOWER, J F R Н The computation of ocean wave heights from GEOS-3 HEILMAN, J. L. Using Landsat data to estimate evapotranspiration of satellite radar altimeter data [AIAA 77-1571] p0006 A78-15392 p0044 A78-13662 HAAN C T winter wheat Evaluating soil moisture and yield of winter wheat in the Great Plains using Landset data p0007 A78-18249 Use of an inertial navigation system for accurate track Onsite control of sedimentation utilizing the modified recovery and coastal oceanographic measurements block-cut method of surface mining p0096 A78-14892 [PB-272244/5] o0040 N78-15552 HEITKEMPER, L. J. A preliminary study of the applicability of Nimbus 6 ESMR to surface wind speed estimates
[AD-A046629] p0102 N78-15643 HAAS, G Use of an inertial navigation system for accurate track recovery and coastal oceanographic measurements p0053 N78-14586 Satellite application to data buoy requirements [AIAA 77-1580] p0044 A78-13664 HELLDEN, U Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt Acquisition of terrain information using Landsat multispectral data. Report 2 an interactive procedure for Landsat digital data for water pollution and water quality studies in southern Scandinavia p0101 N78 14599 classifying terrain types by spectral characteristics LANDSAT digital data for water pollution and water HAFEZ, M A. A. p0033 N78-13516 [AD-A045871] quality studies in Southern Scandinavia Interpretation of multispectral and infrared thermal p0025 N78 14534 GRADY, D. E. surveys of the Suez Canal Zone Egypt Compression wave studies in Solenhofen limestone [SAND-76-0279] Solenhofen limestone p0037 N78-13688 HENDERSON F B III DO101 N78 14599 Future onshore and offshore exploration by remote HAGMAN, B. B.

On the use of microwave radiation for Great Lakes ice urveillance

p0051 N78-12632

p0002 A78-14804

[PB-271254/5]

HALL F G LACIE - A look to the future

LACIE A look to the future

ensing from space

Industrial use of geological remote sensing from spa

Industrial use of geological remote

[AIAA 77-1550]

p0046 A78-13681

p0035 A78 14787

sensing from space p0037 N78-14474

GRAHAM L C

Side-looking airborne rader

Benefit assessment of ozone monitoring satellites

Landsat-radar synergism

DO071 A78-10325

p0079 A78-16554

p0021 A78-17574

PERSONAL AUTHOR INDEX JARMAN, J W Geological remote sensing from space [TID-27689] HOFFER, R M IDSO 8 B p0039 N78-14615 Agricultural scene understanding [E78-10043] Airborne monitoring of crop canopy temperatures for p0008 N78 14459 rrigation scheduling and yield prediction HENDERSON, R G p0004 A78-14897 Determination of scattering functions and their effects on remote sensing of turbidity in natural waters [NASA-CR-145239] p0094 N78-15551 HOGE, F Airborne Oceanographic Lidar System Airborne monitoring of crop canopy temperatures for p0048 A78-14878 irrigation scheduling and yield prediction Airborne oceanographic lidar system p0011 N78-14591 HENGEVELD, H G p0053 N78-14572 Systems approach to ice reconnaissance - A study INOSTROZA, H M V HOHMANN G W Study of the Brazil and Falkland currents using their images of Nimbus 5 and oceanographic data in 1972 p0049 A78-20169 Geophysics Applied to Detection and Delineation of HENNINGER, D L Non-energy Non-renewable Resources Workshop on p0052 N78-14533 Floodplain delineation using multispectral scanner data Mining Geophysics p0081 N78-10528 INOSTROZA, V. H M Study of the Brazil and Falkland currents using THIR [PB-271952/4] p0037 N78 13622 HERBST R L HÖLLEY, H J Rebirth of remote sensing Do images of Nimbus V and oceanographic data in 1972 to LANDSAT menhaden and thread herring resources p0109 N78-14478 p0047 A78 14840 our own good? HERGET, W F p0050 N78 12500 IRWIN R L [F78-10024] Four metre antenna system for Landsat and NOAA Instrumental sensing of stationary source emissions p0015 A78-10056 Analysis of 1.4 GHz radiometric reception ISHERWOOD, B C HERMAN & M n0098 A78-18245 A low cost system for reception and processing of line-scan data from Landsat and other sources p0074 A78 14831 Application of modified Twomey techniques to invert lidar HOLMES, Q. A. angular scatter and solar extinction data for determining Remote sensing data processing - Two years ago today aerosol size distributions p0085 N78 12602 nd two years from today

Pattern recognition of Landsat data p0072 A78-14784 A low-cost system for reception and processing of line-scan data from LANDSAT and other sources HERSCHY, R W
Site calibration of electromagnetic as ased upon temporal p0007 A78-18248 trend analysis Remote sensing data processing wo years ago today p0087 N78-14471 p0089 N78-14523 gauging stations p0062 N78 11470 ISHIYAMA, T and two years from today HESS, F R
Use of radio-controlled miniature On the photographic processing and digital texture for remote sensing of Kujukuri coast of Chiba in Japan aircraft for marine User experience with the application atmosphere sampling p0049 A78 20485 p0105 A78-12932 p0073 A78 14814 HESS. G R On the photographic processing and digital texture for Computer image processing in marine Estimation of old field ecosystem biomass using low remote sensing of Kujukuri Coast of Chiba in Japan exploration n0041 A78 12828 altitude imagery
Estimation of old field ecosystem p0003 A78 14828 n0052 N78 14506 HESS H D biomass using low p0088 N78 14520 ISMAIL S Computer image processing in altitude imagery p0041 A78 12828 Characteristics of polar cap sun-aligned arc exploration HOOPER, J O p0095 A78 13083 HIBBS A R Measuring soil moisture with an airborne ima ISTOMINA L. G An entree for large space antennas p0097 A78-16699 p0001 A78-10523 crowave radiometer HIDALGO, L. L. HORAN, J J Atmospheric transformation of solar radiation reflected p0047 A78-13803 Space instruments for oceanography from the ocean A study of suspended solids in the Reguena Dam by [AIAA 77-1612] emote sensing p0066 N78 14499 p0046 A78-13679 Spectral structure of the solar radiation field reflected p0049 A78 20055 by the ocean-atmosphere system HIGGS G K HOROWITZ, J L Analysis of photochemical oxidant and particulate pollution patterns in New England using remote sensing ISTVAN L B Application of remote sensing to state and regional A digital technique for manual extraction of data from oroblems A digital communication of an integrated data base for land use poots A78-14890 poots A78-14890 [E78-10034] p0024 N78-13506 [PB-268996/6] p0023 N78-10623 Tennessee-Tombigbee industrial siting project. A study of physical and environmental factors of potential industrial Development of all mining p0057 A/o-1-0-0-0 and water quality planning p0051 A/o-1-0-0-0 A digital technique for manual extraction of data from p0091 N78 14579 HOSKIN, R L Correlated errors in satellite altimetry geoids DO029 A78 13760 aerial photography p0091 N78 14579

Development of an integrated data base for land use [E78-10035] p0024 N78-13507 HOSSAIN A HILGEMAN, T Investigations using data from LANDSAT-2
[E78-10026] p0083 p0026 N78 14584 nd water quality planning Polarimeter measures sea state characteristics using p0083 N78-12502 ITZKAN. I p0047 A78-14821 emitted infrared radiation HOUGLAND, E 8 Airborne Oceanographic Lidar System Polarimeter measures sea state characteristics us Air pollutant monitor network design i using mathematical p0027 N78-15593 p0048 A78-14878 emitted infrared radiation n0052 N78-14513 rogramming p0027 N78-15593 UZE, R A JR Analysis of GATE radar data for a tropical cloud cluster Airborne oceanographic lidar system HILL-ROWLEY, R p0053 N78 14572 Application of aerial photography to water related programs in Michigan p0056 A78-14835 IUSHCHENKO V I in an easterly wave p0079 A78 17068 nstrument system p0095 A78 13239 Photo interpretative procedures in assessing river creation potential p0080 A78-18271 recreation potential Remote sensing of chlorophyll concentration from high Application of serial photography to water-related ograms in Michigan p0067 N78-14528 p0042 A78 12838 J HOVIS, W A, JR programs in Michigan Atmospheric transformation of solar radiation reflected HILL B C p0047 A78-13803 JAAKKOLA, 8
Automated earth resources surveys using satellite and Design of a laser interferometer for measurement of extremely small biological motions. Application to crayfish Spectral structure of the solar radiation field reflected p0049 A78-20055 the ocean-atmosphere system aircraft scanner data - A Finnish approach giant axon p0051 N78-14381 HOWARD J A p0077 A78-16518 Aerial albedos of natural vegetation in south-eastern An operational multistate earth observation data JACKSON P L p0075 A78-14882 management system p0106 A78-14823 Integration of remote sensing and surface An operational multistate earth observation data Aerial albedos of natural vegetation in South-eastern in the detection of faults p0011 N78-14576 Australia management system p0110 N78-14515 etection of faults LANDSAT/coastal processes The 20 and 30 GHz attenuation measurements using JACKSON, R D p0093 N78 15340 [E78-10011] the ATS 8 satellite p0061 N78-10536 Airborne monitoring of crop canopy temperatures for irrigation scheduling and yield prediction HSU. S Y The digital processing of Scanning Radiometer (SR) data from NOAA weather satellites as carried out in the Meteorological Institute of the Free University of Berlin e feature extraction and analysis p0086 N78-13412 [AD A045542] irrigation scheduling and yield prediction HUANG, N E Notes on the digital filtering of satellite Ocean current surface measurement using dynamic [BLLD-M 24895-(5828 4F)] p0102 N78-14747 elevations obtained by the GEOS-3 radar [AIAA 77 1566] p0 HILWIG F W p0044 A78-13658 Rare earth and trace element geochemistry of metabasalts from the Point Sal ophiolite California Visual interpretation of Landsat MSS imagery for a HUFFAKER R M reconnaissance soil survey of a part of the Indo Gangetic plain India p0006 A78-16555 Pulsed coherent lidar systems for airborne and satellite JACOBSON J S based wind field measurement p0076 A78-15012 Plants as indicators of photochemical oxidants in HUH O K Quantification of soil mapping by digital analysis of USA Surface temperatures and temperature gradient features the U.S. Guif coast waters p0048 A78-14912 p0076 A78-14908 Landsat data of the U.S. Gulf coast waters Quantification of soil mapping by digital analysis of

p0035 A78-14867 Integration of remote sensing and surface geophysics the detection of faults p0038 N78 14561

n0004 A78-14897

Airborne monitoring of crop canopy temperatures for

p0011 N78 14591

p0036 A78 20097

p0017 A78 14199

JACOBSON, M R Far-infrared photometry with an 0.4 meter liquid helium cooled balloon-born

[NASA-CR-155234] p0099 N78 11449 JAIN & C

Use of clear lakes as standard reflectors for atmosphe asurements

p0074 A78-14830 Use of clear lake as standard reflectors for atmos p0088 N78-14522

JAUCKEE, J. B. Objective analysis and classification of oceanogra pOO48 A78-17982 data

JAMES, W P

LANDSAT/coastal processes
[E78-10011] pO061 N78-10536

JARMAN J W

Corps of Engineers applications for remote sensing of the environment Corps of Engineers applications r remote sensing of p0025 N78-14493 the environment

IBRAHIM, M. M.

HUNTOON, P. W.

[PB-272308/8]

HUTCHINSON W M

GDM/GPS receiver hardware impli

DO091 N78-14602

p0098 N78 10549

ons of snow p0056 A78-14817

p0066 N78 14509

p0096 A78 13435

A preliminary study of the applicability of Nimbus 6 ESMR to surface wind speed estimates [AD-A048629] p0102 N78 15643

HO, P T
Microwave radiometric sensing of surface temperature

How to minimize the baseline drift in a COSPEC ren

LANDSAT data

[PB-270323/9]

HOFER R

HOFF & M

sensor

and wind speed from SEASAT

Microwave multispectral investiga

Microwave multispectral investiga

[REPT 6690]

Preparation of a geologic photo map and hydrologic study I the Yemen Arab Republic [E78 10008] p0037 N78-12494

ı

Surface temperatures and temperature gradient features of the US Gulf Coast waters p0053 N78-14606

Relationship of tectonic structure to aquifer mechanics the western Grand Canyon District Arizona

p0068 N78-14624

p0030 A78-15589

B-7

JAYROE R R, JR KALINOWSKI, J K
Present and future operational NOAA satellite Application of LANDSAT satellite imagery for iron ore Vector statistics of LANDSAT imagery prospecting in the Western Desert of Egypt p0093 N78-15544 [NASA-TM-78149] oceanographic products - An introduction p0039 N78-14581 p0047 A78-14820 JENSEN, H KHLEBOPROS, R G Side-looking airborne radar p0071 A78-10325 Present and future operational oceanographic products An introduction Method of obtaining and analyzing NOAA satellite characteristics of natural formations p0031 A78-18992 JENSEN J R KHOON 8 Y The impact of remote sensing on United States p0052 N78-14512 geography - The past in perspective p resent realities future p0017 A78-14783 Geological and hydrogeological investigations in west Malaysia [E78-10027] Research and simulation in support of near real time/real Automated image processing of Landsat II digital data p0032 N78-12503 time reconnaissance RPV systems r watershed runoff prediction Radar detection of surface oil slicks p0056 A78-14816 [AD-A044598] DO083 N78-12516 Remote sensing-aided systems for snow quantification KAMAT D & p0021 A78-17197 evapotranspiration estimation and their Image analysis techniques with special reference to p0056 A78-14834 The impact of remote sensing on United States hydrologic models analysis and interpretation of geological features from An investigation of natural resources from orbital station Salyut 4 geography. The past in perspective present realities future KIENKO IU P Landsat imagery p0029 A78-14850 p0109 N78-14470 Image analysis techniques with special reference to Automated image processing of LANDSAT 2 digital data analysis and interpretation of geological LANDSAT imagery poods N78-14544 p0066 N78-14508 KILPELA, E for watershed runoff prediction JIWALAI, W Automated earth resources surveys using satellite and KAMEL, A F Analysis of photogrammetric aerial camera calibrati aircraft scanner data - A Finnish approach p0082 N78-12487 Interpretation of multispectral and infrared thermal p0077 A78-16518 surveys of the Suez Canal Zone Egypt JOHNSON, R W KING D p0076 A78-14905 Quantitative mapping of suspended solids in wastewater sludge plumes in the New York Bight apex Ocean wave patterns under Hurricane Gloria Observation with an airborne synthetic aperture radar Interpretation of multispectral and infrared thermal n0015 A78-10658 surveys of the Suez Canal Zone Egypt p0047 A78-14126 Multispectral analysis of ocean dumped materials p0019 A78-14913 DO101 N78-14599 Inverse solution of the pseudoscalar transfer equation KAMIDE Y through nonlinear matrix inversion KIRSCHNER, F. R. p0084 N78-12592 Application of aircraft multispi Dependence of substorm occurrence probability on the quantitative analysis and mapping of water quality interplanetary magnetic field and on the size of the parameters in the James River Virgi p0080 A78-18730 Quantification of soil mapping by digital analysis of p0080 A78-18104 Landsat data KAMINSKY, S. A. Quantification of soil mapping by digital analysis of Remote sensing and laboratory techniques for monitoring Quantification of soil mapping by digital analysis of p0076 A78-14908 p0022 A78-18795 ocean dumping p0022 A78-18795
Quantitative analysis of aircraft multispectral-scanner LANDSAT data Landsat data [REPT-6690] DO091 N78-14602 Quantification of soil mapping by digital analysis of data and mapping of water-quality parameters in the James KLEIN W D LANDSAT data River in Virginia [NASA-TP-1021] Special Sensor H data processing at AFGWC - Preliminary [REPT-6690] p0091 N78 14602 p0065 N78-13628 p0097 A78-14972 KANE, R P Multispectral analysis of ocean dumped materials KLEMAS, V Some characteristics of the equatorial electrojet in hiopia /East Africa/ p0098 A78-17101 p0026 N78-14607 Skylab/EREP application to ecological geological and Ethiopia /East Africa/ JOHNSON, T S. oceanographic investigations of Delaware Bay National geodetic satellite program part 1 KANEKO T p0050 N78-12492 View angle effect in Landsat imagery DO032 N78-11550 KLENK, K F p0074 A78-14848 JOHNSON, W. L. View angle effect in LANDSAT imagery p0089 N78-14542 Influence of ground level SO2 on the diffuse to direct irradiance ratio in the middle ultraviolet Tree stress detection through spectral ratioing of color p0018 A78-14810 film records p0002 A78-13065 JOHNSON W R Influence of ground level SO2 on the diffuse to direct KANEMASU, E T A multispectral analysis of algal bloom in the Gulf of Using Landsat data to estimate evapotranspiration of winter wheat p0006 A78-15392 irradiance ratio in the middle ultraviolet Mexico nO025 N78-14502 p0044 A78-13657 [AIAA 77-1565] Evaluating soil moisture and yield of winter wheat A multispectral analysis of the interface between the p0007 A78-18249 Texture tone feature extraction and analysis the Great Plains using Landsat data [AD-A045542] p0086 N78-13412 Brazil and Falkland currents from Skylab KANG. G KUMUK P I n0049 A78-18246 Digital image processing KANSTAD, S. O p0076 A78-15330 An investigation of natural resources from orbital station JOHNSTON, H S p0020 A78-16506 Photochemistry in the stratosphere p0015 A78-11810 Tunable dual-line CO2 laser for atmosph KOBER, C L JOLY G and pollution monitoring p0017 A78 14082 p0042 A78-12837 nc morphogenesis Computer elaboration and visualization of remote-sensing KAPLAN, L. D. KOLOUCH D Temperature sensing The direct road to informati data p0080 A78-18241 Spectral reflection measurements of water with particle p0086 N78 12607 JONES, D C uspensions for an analysis of the water quality on the asis of multispectral recordings p0058 A78-16514 KASHIN, L. A. A quality assurance program for monitoring ozone and An investigation of natural resources from orbital station carbon monoxide [PB-271204/0] KOMAROV V B p0024 N78-13636 Salvut-4 p0020 A78-16506 The complex of optical-photographical transformation KASISCHKE, E S methods of aerial and space images used for study of natural Analysis of synthetic aperture radar ocean wave data p0077 A78-16501 Nucleonic coal detector with independent resources KOMEN M J collected at Marineland and Georges Bank hydropneumatic suspension [NASA-CR-150465] -268675/6] p0050 N78-10678 p0036 N78-11454 Radar systems for a polar mission volume 1 KAST J L [NASA-CR-156640] p0049 N78-10344 Test of spectral/spatial classifier [E78-10044] Operational utilization of remotely sensed data KONDRATEV, K IA p0087 N78-14460 p0106 A78-14790 vave remote sensing of soil moisture KATSURE, T J p0005 A78-14915 Operational utilization of remotely sensed data Electrical properties of water in rocks p0109 N78 14477 KONDRATYEV K Y p0060 A78 18864 Passive microwave remote sensing of s JONES, N L KAULA, W M p0068 N78-14609 Application of Landsat data to wetland study and land National geodetic satellite program part 2 KONRADI, A p0032 N78 11556 use classification in West Tennessee p0056 A78-14818 Significant initial results from KAURANNE, L. K the environmental Application of LANDSAT images to wetland study and measurements experiment on ATS-6 use classification in west Tennessee part 1 3-10031] p0063 N78-12505 Engineering geological interpretation of black and white blor and false color air photos p0036 A78-16503 p0102 N78-15142 [NASA-TP-1101] p0036 A78-16503 KAUTH, R J

Blob - An unsupervised clustering approach to spatial KORRAM, S. Application of LANDSAT data to wetland study and land use classification in west Tennessee p0066 N78-14510 Remote sensing-aided systems for snow qualification preprocessing of MSS imagery p0075 A78-14883
Procedure B A multisegment training selection and evapotranspiration estimation and JONES, W L p0067 N78-14527 hydrologic models The Seasat-A satellite scatterometer proportion estimation procedure for processing LANDSAT KORVER, J A p0095 A78-12832 Measurement of atmospheric ozone by satellite JORDAN R L DOOOB N78-14456 p0097 A78-15013 \$E78-10039} A survey of SAR image-formation processing for earth sources applications p0073 A78-14785 BLOB An unsupervised clustering approach to spatial reprocessing of MSS imagery p0090 N78-14577 KOSLOWSKY, D resources applications The digital processing of Scanning Radiometer (SR) data from NOAA weather satellites as carried out in the A survey of SAR image-formation processing for earth KELLY. R E p0087 N78-14472 The Gestalt Photomapping System p0030 A78 15730 resources applications Meteorological Institute of the Free University of Berlin JOYCE A T KEMMERER, A. J Part 1 Linearising the SR data [BLL M 24896-(5828 4F)] LANDSAT menhaden and thread herring resources The use of LANDSAT digital data and computer p0102 N78-14750 implemented techniques for an erosion hazard-reforestation nvestigation KOURTZ. P H ds assessment IF78-100241 p0050 N78-12500 An application of Landsat digital technology to forest p0012 N78-15540 fire fuel type mapping p0004 A78-14863 Procedures for gathering ground truth information for a Satellite application to data buoy requirements
[AIAA 77-1580] p0044 A7 An application of LANDSAT digital technology to forest re fuel type mapping p0011 N78-14557 supervised approach to a computer-implemented land cover p0044 A78-13664 fire fuel type mapping KETTLEWELL, J classification of LANDSAT acquired multispectral scanner KRAAN, C Research and simulation in support of near real time/real Evaluation of an infrared line scanner for the study of time reconnaissance RPV systems
[AD-A044598] [NASA RP-1015] p0027 N78-15549 coastal water circulation [NIWARS-PUBL-41] p0083 N78-12516 p0099 N78-11496 KHAN M A National geodetic satellite program part 1 KRAUS S P K Radar detection of surface oil slicks nOO32 N78-11550

KHAWASIK S M

p0031 A78-18183

prospecting in the western desert of

Application of Landsat satellite imagery for iron ore

Egypt p0035 A78 14887 KRAVCHUK, N V

Analysis of some models of atmospheric

according to space photo surveys

n0021 A78-17197

p0020 A78-16539

KAKKURI, J

The use of balloons for geodetic research

LYON, R J P.

PERSONAL AUTHOR INDEX KRETZSCHMAR. J The arrangement of atmospheric pollution detectors by means of a minicomputer and a multicomponent chemical p0016 A78 12975 KRIEBEL K T Anisotropic reflection properties of p0001 A78 12904 Evaluation of change detection techniques for monitoring coastal zone environments p0048 A78-14875 p0048 A78-14875 Chance detection in coastal zone p0048 A78-17198 Computer aided analysis of LANDSAT data for surveying Texas coastal zone environments [E78-10018] p0082 N78-12497 Comparing soil boundaries delineated by digital analysis of multispectral scanner data from high and low spatial resolution systems [E78-10017] p0008 N78-13500 Evaluation of change detection tech gues for monitorin p0090 N78-14569 coastal zone environments KUHNER, M Improved ground truth geoid for the GEOS-3 calibration [NASA-CR 141431] p0032 N78-12510 KUITTINEN, R
Automated earth resources surveys using satellite and aircraft scanner data - A Finnish approach DO077 A78-16518 KULKARNI, V M D The significance of an arc shaped dark patch on the impossible / III / HRIR/ imagery of India p0077 A78-16507 KUMAR. R of the Brazil and Falkland currents using THIR images of Nimbus V and oceanographic data in 1972 to 973 p0047 A78-14840 Evaluation of spectral channels and wavelength regions for separability of agricultural cover types p0004 A78-14860 Study of the Brazil and Falkland currents using their images of Nimbus 5 and oceanographic data in 1972 1973 p0052 N78-14533 Evaluation of spectral channels and wavelength regions for separability of agricultural cover types p0010 N78-14554 KIIO C Y Laboratory requirements for in situ and remote sensing of suspended material [NASA-CR-145263] p0098 N78-10539 KUOSMANEN, V Investigation of LANDSAT imagery on correlations between ore deposits and major shield structures in Finland [E78-10012] n0036 N78-10537 KUPERMAN, G Research and simulation in support of near real time/real ime reconnaissance RPV systems [AD-A044598] nOO83 N78-12516 KUPRIANOV, V Aerial methods of measuring water discharges p0063 N78-11480 KURIYAN J G Effective aerosol optical parameters from polarimeter measurements p0086 N78-12605 KURTZ, M K , JR Corps of Engineers applications for remote sensing p0018 A78-14801 Corps of Engineers applications for remote sensing of the environm p0025 N78 14493 Radar measurement of stratified earth surface cover p0030 A78 15424 KUTZ. R. L. nte Carlo simulation of wave sensing with a short pulse radar [NASA-TM X-71412] p0081 N78 10341 Special Sensor Hidata processing at AFGWC Preliminary p0097 A78 14972

L LACHOWSKI, H M Urban area delineation and detection of change along the urban rural boundary as derived from LANDSAT digital [NASA-TM X-71413] p0023 N78 10540 LAMBECK, P. F Signature extension preprocessing for LANDSAT MSS data [E78-10040] p0087 N78 14457

Some specific problems in the operation of a gaugin

eration of a gauging p0062 N78 11468

p0008 N78 14459

p0087 N78-14460

p0087 N78-14461

LAMBIE, J C

LANDGREBE D A

[E78-10044]

Agricultural scene understanding [E78-10043]

Processing techniques development [£78-10045]

ectral/spatial classifier

LAPADO R L Quality control techniques for high altitude color photography p0002 A78-13062 Airborne monitoring of crop canopy temperatures for irrigation scheduling and yield prediction p0004 A78-14897 Airborne monitoring of crop canopy temperatures for irrigation scheduling and vield prediction p0011 N78-14591 LAPPALAIMEN, V On the possibilities of using aerial photographs in the planning of the recreational use of waterways and water conservation / p0058 A78-16505 LATIMER I S JR Contributions of LANDSAT to natural resource protection and future recreational development in the state of West Virginia [E78-10019] p0024 N78-13501 LAUER, D T chnology transfer in p0106 A78-14795 An overview of remote sensing techn Canada and the United States An overview of remote sensing chnology transfer in p0110 N78-14486 Canada and the United States LAWSON, D W The application of remote sensing to water resources nlanning watershed modelling and p0059 A78-18861 LE TOAN, T Inventory of ricefields in France using Landsat a p0005 A78-14900 LEARY, C. A. tropical cloud cluste Analysis of GATE radar data for a p0079 A78-17068 in an easterfy wave LEBER. A. Remote sensing of earth resources us using a spaceborne p0098 A78-17377 microwave radiometer Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of p0075 A78-14886 ers in the Friuli earthquake area Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the p0067 N78 14536 Venetian lagoon Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruili earthquake area p0091 N78 14580 LECOMPTE, P Remote sensing of ocean color chlorophyll content

and detection of p0052 N78 14549 Remote sensing of ocean color and detection p0048 A78 14855 chlorophyll content LEESE, J A

Operational data processing - The first ten years are the Operational data processing. The first ten years are the p0088 N78-14476

Winter intrusions of the Loop Current p0043 A78 13116

LEGECKIS R V Satellite observations of mesoscale eddy dynamics in the eastern tropical Pacific Ocean p0041 A78-10027 the eastern tropical Pacific Ocean LEITAO, C D

Ocean current surface measurement using dynamic elevations obtained by the GEOS 3 radar altim [AIAA 77-1566] p0044 A78-13658

LEITH, E N Side looking airborne radar p0071 A78-10325 LELIEVRE D D

The use of Landsat imagery to locate uncharted coasta p0074 A78-14832 features on the Labrador Coast The use of LANDSAT imagery to locate uncharted coastal satures on the Labrador coast p0089 N78-14524 LEMASTER, E. W.

Further tests of the Suits reflectance mode p0003 A78-14827 Further tests of the suits reflectance model p0010 N78-14519

LEMING T D LANDSAT menhaden and thread herring resources investigation p0050 N78-12500 [F78 10024] LEMUS HIDALGO, L.

A study of suspended solids in the Requena Dam by mote sensing p0073 A78-14807 remote sensing LENNARTSSON, W On the role of magnetic mirroring in the

p0098 A78-20164 Significant initial results from the environmental rements experiment on ATS-6 [NASA-TP-1101] nO102 N78-15142 LENOBLE J

Review of radiative transfer methods in atmospheres DO084 N78-12588 LEPPANEN H

A Finnish system for forest management plann aerial photographs p0006 A78-16508 LERCH. F National geodetic satellite program part

p0032 N78 11550 LERNER R M Analysis of 1.4 GHz radiometric measurements from

p0098 A78 18245

IFSTER P F

Waves and turbulence in the vicinity of a chinook cloud p0076 A78-15455

LETOAN, T

altitude

Inventory of ncefields in France using LANDSAT and reraft p0012 N78-14594 LEUNG, K C

Remote sensing of chlorophyll concentration from high titude p0042 A78-12838

LEVANDOWSKI, D. W. Analysis of Landsat-1 data for mapping of surficial deposits - Test area in Alta commune Finnmark county

Norway o0036 A78-16553 LEVINE D M Monte Carlo simulation of wave sensing with a short

pulse radar [NASA-TM-X 71412] p0081 N78 10341

LEVY S.

Performance tests of signature extension algorithms p0005 A78-14904 Performance tests of signature extension algorithms

p0091 N78-14598

High resolution radar scattering characteristics of a sturbed sea surface and floating debris

[AD-A044216] p0099 N78-12268

LILLESAND T M

Tree stress detection through spectral ratioling of color m records p0002 A78-13065 film records LINDENLAUR. J

A case study using ECHO(Extraction and Classification

of Homogeneous Objects) for analysis of multispectral [E78-10030] n0083 N78-12504

LINK, L. E. JR Remote sensing of aquatic plants | 00056 A78-14836

Remote sensing of aquatic plants p0052 N78-14530 LISEEV I A

A mathematical theory of equivalent transformations during the equalizing of geodesic networks p0031 A78-19236

Pulsed coherent lidar systems for airborne and satellite ased wind field measurement p0075 A78-15012 based wind field measurement

LIVERAY R J Ocean mining requirements
[AIAA 77-1581]

p0044 A78-13665 LO C. P

Height measurements from satellite images p0071 A78-10519 LOBOV L I

Use of lidar to detect oil pollution of the sea surface p0022 A78 20067

LOCK, B F Testing the accuracy of remote se

p0074 A78-14819 Testing the accuracy of remote sensing land use maps p0025 N78 14511

LOHMANN P Spectral reflection measurements of water with particle

sions for an analysis of the water quality on the finultispectral recordings p0058 A78-16514 basis of multispectral recordings LONG, K S

p0056 A78 14836 Remote sensing of aquatic plants Remote sensing of aquatic plants p0052 N78-14530

The arrangement of atmospheric pollution detectors by means of a minicomputer and a multicomponent chemical unit p0016 A78-12975

LOOSEMORE, R W p0062 N78 11469 Ultrasonic river gauging

LOUAPPE M E multichannel passive microwave p0101 N78-14568 temperature sounding system

LOUISNARD, N Simultaneous measurements of nitrogen dioxide and nitric acid in the lower stratosphere

p0020 A78-16214 [ONERA TP NO 1977-154] LOUW C W

The determination of volatile organic compounds air by gas chromatography combined with standard addition selective subtraction infrared spectrometry and mass spectrometry p0015 A78-10041

LOVILL J E Measurement of atmospheric ozone by satellit

n0097 A78-15013 LOWE D 8. Remote sensing utilization of developing countries

Remote sensing utilization of developing countries. An Remote sensing utilization of developing countries. An p0111 N78-14552 appropriate technology

Land classification of south-central lows from computer nhanced images

[E78-10005] p0082 N78-12493 LUND. T

Tunable dual-line CO2 laser for atmosphe p0017 A78-14082 and pollution monitoring LYON, R J P

Application of HCMM satellite data to mineral exploration p0037 N78-13508 [E78-10036]

PERSONAL AUTHOR INDEX IVZENGA D

LYZENGA D

Basic remote sensing investigation for beach [AD-A044836] DO083 N78-12515

M

MACARTHUR, J. L.

Design of the Seasat-A radar altimeter MACDONALD, J 8. A78-12830

A low-cost system for reception and processing of line-scan data from Landsat and other sources p0074 A78-14831

A low-cost system for reception and processing of line-scan data from LANDSAT and other sources p0089 N78-14523

MACDONALD, R B

LACIE - A look to the future LACIE A look to the future n0002 A78-14804 p0009 N78-14496 MACK, A R

Differentiation of selected annual field crops throughout the growing season by their spectral pectral reflectance p0007 A78-20172

MACMILLAN R H
The 20 and 30 GHz attenuation measurements using the ATS-6 satellite p0093 N78-15340 MACPHERSON, J I

Waves and turbulence in the vicinity of a chinook arch p0076 A78-15455 MAIER, E J

artical lifting of ionization during geomagnetic storms from satellite measurements of ion composition

Localization of an experimental ecological unit in the Maradi region of Nigeria [NASA-TM-75085]

p0032 N78-12553 MAJUMDER, K. L.

Image analysis techniques with special reference to analysis and interpretation of geological features from p0029 A78-14850 Image analysis techniques with special reference to analysis and interpretation of geological features from p0038 N78-14544

LANDSAT imagery
MAKAROVIC, B Composite sampling for digital terrain models

p0072 A78-13493

MALCHOW, H L Inversion of scattered radiance horizon profiles for

gaseous concentrations and aerosol parameter n0085 N78-12595

Landsat image interpretation aids n0004 A78-14864 LANDSAT image interpretation aids

n0089 N78-14558

The influence of multispectral scanner spatial resolution forest feature classification p0004 A78-14880 on forest feature classification Multispectral system analysis through modeling and p0075 A78-14884

Investigations of spectral separability of small grains early poons natural po season wheat [E78-10015] Investigation of techniques for inventorying forested

regions. Volume 1. Reflectance modeling and empirical ectral analysis of forest canopy comp p0009 N78-14482 [E78-10046]

Investigation of techniques for inventorying forested gions Volume 2 Forestry information system requirements and joint use of remotely sensed and ancillary

[E78-10047] p0009 N78-14463 The influence of multispectral scanner spatial resolution p0011 N78-14574 on forest feature classification

Multispectral system analysis through modeling and mulation p0090 N78-14578

MAUN, P. A.

Development and application of operational techniques for the inventory and monitoring of resources and uses for the Texas coastal zone. Volume 1. Text p0053 N78-15537 [E78-10042]

Development and application of operational techniques for the inventory and monitoring of resources and uses for the Texas coastal zone. Volume 2. Appendices Appendices p0053 N78-15538 [E78-10048]

MALKEVICH, M S.

Atmospheric transformation of solar radiation reflected from the ocean p0047 A78-13803 Spectral structure of the solar radiation field reflected

p0049 A78-20055 by the ocean-atmosphere system MALONE, D Three approaches to the classification and mapping of

p0057 A78-14906 inland wetlands Three approaches to the classification of inland p0068 N78-14600

MAMANE, Y

Atmospheric particulate properties inferred from lidar and solar radiometer observations compared with simultaneous in situ aircraft measurements - A case

p0016 A78-13616

A survey of SAR image-formation processing for earth resources applications p0073 A78-14785

A survey of SAR image formation processing for earth DO087 N78-14472

MARIE, R

nventory of ncefields in France using La data n0005 A78-14900 Inventory of ricefields in France using LANDSAT and increaft p0012 N78-14594 aucraft

MARINO, C. M.

Application of conventional and advanced techniques for the interpretation of Landsat 2 images for the study of p0075 A78-14886 linears in the Friuli earthquake area Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for

DO091 N78-14580 linears in the Friuli earthquake area

National geodetic satellite program part 1 p0032 N78 11550

MARTIN, C F
SEAHT A computer program for the use of intersecting arcs of altimeter data for sea surface height refine [NASA-CR 141432]

MASEVICH A G

Intercosmos laser ranging stations p0031 A78-18108

MATEER C L.
Experience with the inversion of Nimbus 4 BUV measurements to retrieve the ozone profile p0086 N78-12606

The analysis of GEOS-3 altimeter data in the Tasman

nd Coral sea [NASA-TM 78032] n0053 N78-15550

MATHEWS, C W

Gathering and using information on a global scale DO109 N78-14479

p0079 A78-16730

MATSON, M NOAA satellite monitoring of snow cover in the northern hemisphere during the winter of 1977 [IAF PAPER 77-121] p0057 A78-15935

Satellite observations of snowcover in the Sierra Nevadas during the great California drought p0059 A78-18250 MAUL G A

Winter intrusions of the Loop Current

n0043 A78-13116

A PbSe diode laser spectrometer to be used in air pollution monitoring and mineral prospecting [CTH-IEM TR-7636] p0101 N78-14699

MAXWELL E L

Multidate mapping of mosquito habitat p0056 A78-14851

Multidate mapping of mosquito habitat p0067 N78-14545

A method of inversion of satellite magnetic anomaly data [NASA TM-78039] p0032 N78-11452

MCCALL J G

Satellite application to data buoy requirements [AIAA 77 1580] p0044 A7 p0044 A78 13664

MCCANDLESS S. W

Marine decision [AIAA 77 1611] on aids from space p0046 A78-13683

MCCAULEY, J Radar systems for a polar mission volume 1

[NASA-CR-156640] p0049 N78-10344 MCCLAIN, E P Remote sensing of ocean temperature [AIAA 77-1599] pt

p0045 A78-13674 MCCLENNY, W A

Unique ambient carbon monoxide monitor based on gas filter correlation Performance and application p0020 A78-16771

Water utilization evapotranspiration and soil moisture monitoring in the south east region of south Australia
[E78-10001] p0062 N78-11447 DO033 N78-14503

The vector classifier
MCCONNELL D G

Uses of the Space Shuttle in the NASA Applications p0107 A78-18189

MCCONNELL P R H

The Gestalt Photomapping System p0030 A78-15730 MCCORD, T B Asteroid surface materials Mineralogical

characterizations from reflectance spectra [NASA CR-154510] p0036 N78-10992 MCCULLOCH, &

Development and application of operational techniques for the inventory and monitoring of resources and uses for the Texas coastal zone. Volume 1. Text p0053 N78-15537

Development and application of operational techniques for the inventory and monitoring of resources and uses for the Texas coastal zone Volume 2 Appendices p0053 N78-15538 [E78-10048]

MCGINNIS, D F

NOAA satellite monitoring of snow cover in the northern hemisphere during the winter of 1977 [IAF PAPER 77-121] p0057 A78-15935 MCINTOSH, G F

Water utilization evapotranspiration and soil moisture monitoring in the south east region of south Australia [E78-10001] p0062 N78-11447

MCKEON, J B

Production of a water quality map of Saginaw Bay by computer processing of Landsat-2 data

p0057 A78 14857 Production of a water quality map of Seginaw Bay by computer processing of LANDSAT-2 data

p0067 N78-14551

Radar systems for a polar mission volume (NASA-CR-156640) p0049 p0049 N78 10344

MCMILLIN L Capabilities of operational infrared sounding systems from atellite attitude p0096 A78-14873 satellite altitude

Capabilities of operational infrared soul satellite altitude MEASURES R M

PROBE - A new technique for measuring the density profile of a specific constituent using counterpropagating laser pulses p0096 A78 13943 MECKEL J P

Hydrometry under Arctic conditions

p0062 N78 11475

MEGIER J Computer aided classification for remote sensing in agriculture and forestry in Northern Italy

p0004 A78 14879 Computer aided classification for remote sensing in agriculture and forestry in Northern Italy

p0011 N78 14573

Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy

p0004 A78 14879
Computer-aided classification for remote sensing in agriculture and forestry in Northern Italy n0011 N78-14573

Measuring soil moisture with an airborne imaging passive microwave radiometer n0001 A78-10523

MELENTEV. V V

assive microwave remote sensing of soil moistur p0005 A78-14915

MELENTYEV, V V

Passive microwave remote sensing of soil moisture

p0068 N78-14609

MENDELSON, V L Radar measurement of stratified earth surface co

p0030 A78 15424

MENDLOWITZ, M nance tests of signature extension algorithm p0005 A78-14904

Performance tests of signature extension algorithms p0091 N78 14598

MENZIANI, M

Proposal for an extension of the CAMAC standard suitable to low power data acquisition systems for oceanographic stations on marine platforms and buoys

p0043 A78-12941

Rare earth and trace element geochemistry of metabasaits from the Point Sal ophiolite California p0036 A78-20097

MERRY, C. J.

Airborne spectroradiometer data compared with ground water-turbidity measurements at Lake Powell Utah Correlation and quantification of data p0100 N78-12514

mapping

MEYER, E R Remote sensing and laboratory techniques for r ocean dumping p0022 A78 18795 MEYERS, W D

Techniques for ocean bottom measurements of magnetic

fields with a superconducting magnetometer p0041 A78-10389

MIDDLETON, E M Hydrographic charting from Landsat satellite imparison with aircraft imagery p0042 A78p0042 A78-12839

MILDENBERGER, S J The Gestalt Photomapping System p0030 A78-15730

How to minimize the baseline drift in a COSPEC remote

p0096 A78-13435 Detection of a plume 400 km from the source p0019 A78-15370

MILLARD, J P Airborne monitoring of crop canopy temperatures for irrigation scheduling and yield prediction

Airborne monitoring of crop canopy temperatures for irrigation scheduling and yield prediction

p0011 N78 14591

MILLER, D 8

Potential applications of digital visible and infrared data from geostationary environmental satellite D0074 A78-14839

Potential applications of digital visible, and infrared data from geostationary environmental satellites

p0101 N78-14532

p0039 N78-14562

Evaluation of algorithms for geological thermal-inertia p0029 A78-14868 Evaluation of algorithms for geological thermal-inertia

**B-10** 

PERSONAL AUTHOR INDEX NUNES, J E

MILLER, V C A comparative study of the amount and types of geologic information received from visually interpreted U 2 a Landsat (magery DO035 A78-13492 MILLER, W. F. Application of remote sensing to state and regional

E78-10034 p0024 N78-13506

Digital image correlation techniques applied to LANDSAT multispectral imagery [E78-10022] p0083 N78-12499

Landsat data from agricultural sites - Crop signature nalysis p0005 A78-14899

LANDSAT data from agricultural sites Crop signature p0012 N78-14593

MITCHELL P A Aerial ice reconnaissance and satellite ice information microfilm file 1976 supplement 1

[AD A043046] p0050 N78-11491

MITNIK, L. M.

Influence of temperature on the emissivity of moist in the microwave range n0081 A78-19114 MIYAZAWA, H Multi-seasonal data analysis and som

environmental monitoring D0003 A78 14812 Multi-seasonal data analysis and some extensions for p0025 N78 14504 environmental monitoring

exten

MOLINARI R L

Winter intrusions of the Loop Current D0043 A78 13116

MOLLARD J D Groundwater projects problems and parameters in Saskatchewan and Alberta Canada n0059 A78 18860 Integration of remote sensing techniques applied to

ater investigations p0060 A78-18865 MOLNAU, M Effect of antecedent on frozen grou

[PB-270632/3] p0065 N78-13522 MOMIN, S. A

Change detection in coastal zone environments

p0048 A78 17198 MOMIN, 8 M

Evaluation of change detection technique coastal zone environments n0048 A78-14875 Evaluation of change detection techniques for monitoring oastal zone environments p0090 N78 14569

MONGET J M Environmental mapping of the French p0031 A78-18102 remote sensing

MONTGOMERY D R Seasat-A and the commercial ocean community

[AIAA 77-1591] p0046 A78-13682 MOORE D G

Progress and needs in agricultural research, developing and applications programs p0002 A78-14791 HCMM energy budget data as a model input for assessing regions of high potential groundwater pollution
[E78-10010] p0061 N p0061 N78-10535

Progress and needs in agricultural re and applications programs search development p0009 N78-14482

Active

microwave measurement from space p0041 A78-12615 sea surface winds Radar systems for a polar mission volume 1 p0049 N78-10344

[NASA-CR-156640] MORCHIN, W C
Characteristics of sea clutter meas

radar platform DO097 A78-15664 MOREAU, M M H

The remote sensing of atmospheric pollutants by a CO2 ser apparatus p0016 A78-12982 laser apparatus Remote optical sensing of the concentration and mass

flow of particulate and gaseous pollutants in smoke discharged through chimneys p0016 A78 p0016 A78-12981 MORGAN, G B

Energy resource development monitoring n0022 A78 19616

MORGAN, R P An operational multistate earth observation data

p0106 A78 14823 An operational multistate earth observation data p0110 N78-14515

investigation of thematic mapper spatial radiometric and p0096 A78-14826 spectral resolution p0096 A78-1482
Investigation of thematic mapper spatial radiometric an p0088 N78-14518 pectral resolution

Performance tests of signature extension algorithms p0005 A78-14904 Performance tests of signature extension algorithms

n0091 N78-14598 MORRISSEY, E G

Real time satellite imagery for sea ice forecasting [AIAA 77-1601] p0046 A78p0046 A78-13675

Pilot study of the potential contributions of LANDSAT data in the construction of area sampling frames [E78-10037] p0012 N78-15536

MORSE, A.
Forestland type identification and analysis in Western Massachusetts - A linkage of a Landsat forest inverto an optimization study p0005 A78-14901
Forestland type identification and analysis in Western Massachussetts A linkage of a LANDSAT forest inv p0012 N78-14595 to an optimization study

MORRY M A. Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt

p0076 A78-14905 Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt

D0101 N78-14599 MOSHAEV B N

Image data application obtained from space to geological investigations in the USSR p0035 A78-16502

Geophysics Applied to Detection and Delineation of Non-energy Non-renewable Resources Workshop on Mining Geophysics [PB-271952/4] p0037 N78-13622

MOURAD A. G

Applications of Seasat to the offshore oil gas and mining ndustries p0045 A78-13666 [AIAA 77 1583] Improved ground truth goold for the GEOS-3 calibration

[NASA-CR-141431] p0032 N78-12510

MOYER, R H
Evaluation of a hydrogen chloride detector for p0017 A78-13843 MUKAMMAL E I

Methods of assessment of ground p0060 A78-18867

MULDER, N J
Analysis of MSS digital imagery with the aid of principal component transform p0078 A78-16547

MULLIGAN, J C Design and operation of an airborne air quality

p0021 A78-17575 MUNSTER, A C

Application of satellite-borne synthetic aperture radar to marine operations [AIAA 77 1610] p0046 A78-13687

MURANAKA, Y Multi-seasonal data analysis and some extensions for p0003 A78-14812

environmental monitoring
Multi-seasonal data analysis and some extensions for p0025 N78-14504 environmental monitoring

National geodetic satellite program part 1 p0032 N78-11550

MURTHA, P. A.

Spectral reflectance deduced from color-infrared photos for forest damage detection p0002 A78 13066 p0002 A78 13066 MYERS, V I

ress and needs in agricultural research, development p0002 A78 14791 and applications programs Progress and needs in agricultural research, development and applications programs p0009 N78-14482
Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data

[E78-10063] p0013 N78-15542 MYLLYNIEMI, M

A Finnish system for forest management planning using aerial photographs p0006 A78-16508

### Ν

NAGLER, R G

Surveying the earth's environment from space - Spectral areal temporal coverage trends
[AIAA 77-1585] p0105 A78-13667

p0105 A78-13667 Marine decision aids from space [AIAA 77-1611] n0046 A78 13683

Sensing the earth's environment from space User needs and technology opportunities p0106 A78-14778 and technology opportunities

Sensing the earth's environment from space User needs dischnology opportunities p0109 N78-14465 NAIK & D

Image analysis techniques with special reference to analysis and interpretation of geological features from p0029 A78-14850 Landsat imagery

Image analysis techniques with special reference to analysis and interpretation of geological features from LANDSAT imagery p0038 N78-14544

NALEPKA R F

Investigation of thematic mapper spatial radiometric and p0096 A78-14826

Wheat yield forecasts using Landsat data p0004 A78-14876

The influence of multispectral scanner spatial resolution of forest feature classification p0004 A78-14880 on forest feature classification eat productivity estimates using LANDSAT data (0009) p0007 N78-10534 [E78 10009] An evaluation of the signature extension approach to

large area crop inventories utilizing [E78 10016] p0007 N78-12496

Evaluation of signature extension [E78 10021] algorithms p0083 N78-12498

Investigations of spectral separability of small grains learly eason wheat detection, and multicrop invento p0008 N78-13499 [E78-10015]

Procedure B A multisegment training selection and proportion estimation procedure for processing LANDSAT cultural data

[E78-10039] p0008 N78-14456

Signature extension preprocessing for LANDSAT MSS

p0087 N78-14457 [E78-10040]

Investigation of techniques for inventorying forested agions. Volume 1. Reflectance modeling and empirical ons Volume 1 Reflectance modeling and tispectral analysis of forest canopy componer p0009 N78-14462 [E78-10046]

Investigation of techniques for inventorying forested Volume 2 Forestry information system requirements and joint use of remotely sensed and ancillary

[E78-10047] n0009 N78-14463

Investigation of thematic mapper spatial radiometric and spectral resolution p0088 N78-14518 Wheat yelld forecasts using LANDSAT data

p0011 N78-14570

The influence of multispectral scanner spatial resolution p0011 N78-14574 on forest feature classification

NANAYAKKARA, C

Digital processing system for developing countries p0075 A78-14865

Digital processing system for developing countries p0089 N78 14559

NARASIMHAN, T. N. Recent developments in modeling groundwater

[LBL 5209] p0068 N78-14616

NASCA, S. U.

Test on the mapping application of Landsat imagen

NASU, M

A multiseries digital mapping system for positioning MSS

and photographic remotely sensed data p0077 A78-16509

Geometric processing for digital mapping with multiseries imote sensing data p0082 N78-12489 remote sensing data

NATARAJAN T

Some aspects of adaptive transform multispectral data p0079 coding p0079 A78-18071

NELSEN T A

Quantitative mapping of suspended solids in wastewater sludge plumes in the New York Bight apex p0015 A78-10658

NELSON, H A

Assessment of forest plantations from low altitude p0005 A78-14903 photography

Assessment of forest plantations from low altitude aerial p0012 N78-14597 photography

NEUMANN, H H

Methods of assessment of ground truth soil moisture p0060 A78-18867

NEWTON R W

Microwave remote sensing and its application to soil moisture detection volumes 1 and 2 p0068 N78-15529 NIBLACK, C W

Resampling study [E78-10014]

p0082 N78-12495 NIERENBERG W A

The problems and opportunities

p0106 A78-14777 NOMOKANOVA, V F

The complex of optical-photographical transformation methods of aerial and space images us ed for study of natural p0077 A78-16501 resources

NOR S M Estimation of old field ecosystem

biomass using lov altitude imagery p0003 A78-14828 Photo interpretative procedures in assessing river

p0080 A78-18271 recreation potential biomass using low p0088 N78-14520 Estimation of old field ecosystem altitude imagery

NORMARK, W. R

Computer image processing in marine p0041 A78 12828 exploration NORRIS, D. R.

A multispectral analysis of algal bloom in the Gulf of

[AIAA 77-1565] p0044 A78 13657 A multispectral analysis of the interface between the Brazil and Falkland currents from Skylab

NOVAK. C.

The operational processing of wind estimates from cloud motions Past present and future p0091 N78 14604 NOVAKOVSKII B A.

Methods of analytic processing of various aerocos p0081 A78-19241 nhotoimages

NUNES. J E Airborne Oceanographic Lidar System

p0048 A78-14878

Airborne oceanographic lidar system nO053 N78-14572

n0049 A78-18246

OBRIEN, H W O OBRIEN H W Observations of the ultraviolet spectral reflectance of snow AD. ADARSAGI p0069 N78-15630 OCCHIELLO L M Temperature measurement array for internal wave pservations p0042 A78-12842 ODEGAARD, H Application of LANDSAT imagery for snow mapping in [E78-10029] p0064 N78-13505 Application of LANDSAT imagery for snow mapping in Norway [E78-10041] p0065 N78-14458 OHAGAN, M The practical application of remote sensing for the purposes of resource assessment and resource nt and resource p0071 A78-12929 management OHLHORST, C W Remote sensing and laboratory techniques for monitoring n0022 A78-18795 OKAYAMA, H On the photographic processing and digital texture for remote sensing of Kujukun coast of Chiba hiba in Japan p0073 A78-14814 On the photographic processing and digital texture for On the photographic processing on Chiba in Japan p0052 N78-14506 OKKES, R W Earth remote sensing using microwave /radar/ p0072 A78-12944 High-resolution radar scattering characteristics of a disturbed sea surface and floating debris
[AD-A044216] p0099 N78-12268 OLIVER B M Use of an inertial navigation system for accurate track recovery and coastal oceanographic measurements p0096 A78-14892 Use of an inertial navigation system for accurate track recovery and coastal oceanographic me DO053 N78-14586 OLSON C E JR Pre-visual detection of stress in pine f e forests p0004 A78-14847 Pre-visual detection of stress in pine ORHEIM O of Dronning Maud Land Antarctica

p0010 N78-14541 Glaciological and marine biological studies at perimeter

[E78-10006] n0049 N78-10532 A mask correlation remote sensor for measurements of SO2 optical depths on long light source

p0016 A78-12938 OSTERHOLT, P. A. Norwegian marine geodetic projects

p0048 A78-17648 OSTREM G Application of LANDSAT imagery for snow mapping in p0064 N78-13505 [E78-10029] OTEPKA, G

Practical experience in the rectification of MSS-imag DO077 A78-16520 OTT. W R

urement and the law - Monitoring for compliance with the Clean Air Amendments of 1970

p0022 A78-18456 OTTERMAN, J Monitoring surface albedo change with Landsat

p0029 A78-13766 OVERSTREET W C Preparation of a geologic photo map and hydrologic study of the Yemen Arab Republic

[E78-10008] p0037 N78-12494

OWEN-JONES, E. S. The use of Landsat imagery for terrain analys n0080 A78-18244

Р

PAFFRATH, D Atmospheric physics as a means of environmental research [DLR-IB-553-75/7] p0027 N78-14732 PALUZZI P R

Computer image processing in p0041 A78-12828 exploration

PAPATHAKOS, L. C. Global sensing of gaseous and aerosol trace species using automated instrumentation on 747 airliners [NASA-TM-73810] p0024 N78-13670

PARADIS, K.A. A multichannel passive microwave atmospheric p0101 N78-14568 temperature sounding system PARASHAR, S

Scatterometer results from shorefast p0047 A78-14822 Scatterometer results from shorefast and floating sea DO052 N78-14514 се

PARASHAR, S K Radar systems for a polar mission volume 1 [NASA-CR-156640] p0049 N78-10344 Microwave emission from sea ice

p0050 N78-11292

PARK, J H

Atlas of infrared absorption lines [NASA-CR-2925] n0086 N78 12608

PARMENTER F C

processes as viewed from the NOAA operational satellites [AIAA 77-1569]

Convective cloud plumes mark Canadian fire s p0005 A78-15308

Monitoring air quality from satellites p0021 A78-18300

PARRA, C G Ocean current surface measurement using dynamic

elevations obtained by the GEOS-3 radar altim p0044 A78-13658 PARSONS, C L

On the hysteresis of the sea surface and its applicability to wave height predictions
[AIAA 77 1588] p0045 A78-13669

PATCHELL, J W Systems approach to ice reconnaissance - A study p0049 A78-20169

PAUL C K Remote sensing of environmental impact of land use structies p0018 A78-14798 activities Remote sensing of environmental

impact of land use p0025 N78-14490 activities PAULSON R W Use of earth satellite technology for telemetering DO063 N78-11489 hydrometeorological station data

PEARMAN G I Measurement of atmospheric composition at the Australian baseline atmospheric monitoring station

p0021 A78-18270 PEDERSEN, R Effect of antecedent on frozen grou [PB-270632/3] p0065 N78-13522

PENTLAND, Á. P Blob An unsupervised clustering approach to spatial preprocessing of MSS imagery p0075 A78-14883 Evaluation of signature extension algorithms

p0083 N78-12498 **BLOB** An unsupervised clustering approach to spatial

preprocessing of MSS imagery
PEPERSTRAETE, H p0090 N78-14577 The arrangement of atmospheric pollution detectors by

The arrangement or authosphishic position means of a minicomputer and a multicomponent chemical pool 6 A78-12975 PEPIN T J

Inversion of solar extinction data from the Apollo-Soyuz Test Project Stratospheric Aerosol (ASTP/SAM) experiment pOC p0086 N78-12604 PEREZ SALAS, A

Analytical aerial triangulation - its obtention throi p0078 A78 16533 simple algorithm

PERKINS P J Global sensing of gaseous and aerosol trace species using utomated instrumentation on 747 airliners

p0024 N78-13670 [NASA TM-73810] PERREAULT, P D

Dependence of substorm occurrence probability on the interplanetary magnetic field and on the size of the auroral oval p0080 A78-18730

PERUZZI D Land-use change detection from Lar p0020 A78 16550 satellites

PETRAKOVSKII, I A. Method of obtaining and analyzing the

characteristics of natural formations p0031 A78 18992 Application of remote sensing to state and regional

[E78-10034] p0024 N78 13506

PHILLIPS, T L Processing techniques development [E78-10045] p0087 N78 14461

PHILPOT, W D
Skylab/EREP application to ecological geological and

oceanographic investigations of Delaware Bar [E78-10003] p005 p0050 N78-12492 PICHEL W G

Present and future operational NOAA satellite oceanographic products An introduction

p0047 A78 14820
Present and future operational NOAA satellite oceanographic products An introduction

Techniques for opening regional radiation budgets from atellite radiometer observations PINKEL R

Temperature measurement array for internal wave p0042 A78-12842 observations PITTOCK A B

Ozone sounding correction procedures p0017 A78 14448 implications PITTS, J N JR Tropospheric

ind photophysical p0015 A78-11809 photochemical and nmcesses

PLUHOWSKI, E J

Application of remotely sensed land use information to improve estimates of streamflow characteristics volume

[F78-10052] n0069 N78-15541 POCHTAREV, V I

A vector aeromagnetometer instrument system p0095 A78-13239

PODNEY, W N Measurement of ambient magnetic field gradients using super conducting magnetic gradiometer p0100 N78-12618 [AD A044997]

The magnetic field and magnetic field gradients of the NUC oceanographic research tower [AD-A045161] p0051 N78-13289 OLCYN, F C

NASA/Cousteau ocean bathymetry experiment. Remote bathymetry using high gain LANDSAT data [NASA-CR-156658] p009 p0054 N78-15662

POLLOCK D M Precipitation (radar) project of the IFYGL lake meteorology program

[PB-272152/0] p0069 N78 15660 POLOVINKO, V

Use of lidar to detect oil pollution of the sea surface p0022 A78 20067

PORCELLO, L. J Side looking airborne radar PORTER, R A p0071 A78 10325

Microwave radiometric sensing of surface temperature

and wind speed from SEASAT [PB-270323/9] n0098 N78-10549 PORTER R V

The versatile satellite p0107 A78-17141 PORTNOVA, O V

Increase in the fidelity of image during the production of diapositives AD A0462261 p0092 N78 14613 POTTER, J

Performance tests of signature extension algorith p0005 A78 14904

Performance tests of signature extension algorithms POULTNEY, S K

Quantitative remote measurements of pollutants from stationary sources using Raman lidar p0020 A78-17000

POWELL R V An entree for large space antennas p0097 A78 16699 POWERS, W L

Using Landsat data to estimate evapotranspiration of winter wheat p0006 A78-15392

PRICE, M. A.

Formation of photochemical aerosols [PB-268895/0] p0023 N78 10621 PRONI. J. R.

Quantitative mapping of suspended solids in wastewater sludge plumes in the New York Bight apex p0015 A78-10658

PUTMEY R National geodetic satellite program

p0032 N78-11550

Q

QUACH J

Inventory of ricefields in France using Landsat and aircraft p0005 A78-14900 Inventory of ricefields in France using LANDSAT and rcraft p0012 N78-14594 aircraft

QUATTROCHI D A
Application of remote sensing to state and regional [E78 10034] p0024 N78-13506

R

RABCHEVSKY, G A

Temporal and dynamic observations from satellite p0031 A78-17195 RABINOVICH IU I

Passive microwave remote sensing of soil moisture p0005 A78-14915

RABINOVICH Y I Passive microwave remote sensing of soil moisture p0068 N78-14609

Recent crustal movements registered by the aid of

p0030 A78-16534 airphoto interpretation RAE W G

Multilayered (Hg Cd)Te infrared detecto [NASA-CR-151548] p0099 N78 11453 RAFSNIDER G T

Forestland type identification and analysis in Western Massachusetts - A linkage of a Landsat forest inventory to an optimization study p0005 A78 14901 to an optimization study Forestland type identification and analysis in Western Massachussetts A linkage of a LANDSAT forest inventory p0012 N78 14595 to an optimization study

RAGAN, R M Utilization of remote sensing observations in hydrologic todels p0055 A78-14782 models

**B-12** 

Utilization of remote sensing observations in hydrologic p0065 N78-14469 models

#### RAINES, G L

Digital color analysis of color-ratio composite Landsat p0075 A78-14898 Digital color analysis of color ratio composite LANDSAT nO091 N78-14592

RAMAPRIYAN, H. K.

Data handling for the geometric correction of large p0080 A78-18649 mages

#### RANEY, R K.

A solution to the problem of SAR range curvature p0090 N78-14571

RANGO A
The utility of short wavelength /less than 1 mm/ remote sensing techniques for the monitoring and assess hydrologic parameters p0055 A78 14780

The utility of short wavelength (1mm) remote sensing techniques for the monitoring and assessment of hydrologic parameters p0065 N78-14467

RAO, B C N

Vertical lifting of ionization during geomagnetic storms from satellite measurements of ion composit p0079 A78 16730

Ion temperature estimation with on trap data from p0098 A78 17113 rockets and satellites

#### RAO. R G S

Optimal spatial sampling techniques for ground truth data in microwave remote sensing of soil moisture p0058 A78 18247

RAO, Y R

Use of clear lakes as standard reflectors for atmospheric easurements p0074 A78-14830 measurements

Use of clear lake as standard refle ctors for atmospher p0088 N78-14522 reasurement RAPER, O F

The vertical distribution of HCI in the stratosphere DO019 A78-15890

#### RASMUSSEN, V P

Evaluating soil moisture and yield of winter wheat in the Great Plains using Landset data p0007 A78-18249

### RASTOGI, R G

Some characteristics of the equatorial electrojet in Ethiopia /East Africa/ p0098 A78-17101

#### RAWSON, R F

Analysis of synthetic aperture radar ocean wave data collected at Manneland and Georges Bank D0050 N78-10678

#### REAGAN, J A

Atmospheric particulate properties inferred from lidar and solar radiometer observations compared with simultaneous in situ aircraft measurements - A case study

p0016 A78-13616

Skylab/EREP application to ecological geological and oceanographic investigations of Delaware Bay [E78-10003] p0050 p0050 N78-12492

Measurement of sea surface by means of microwave altimeters - A computer simulation for system evaluation p0095 A78-12836

### REGINATO, R J

Airborne monitoring of crop canopy temperatures for irrigation scheduling and yield prediction

p0004 A78-14897

Airborne monitoring of crop canopy temperatures for

irrigation scheduling and yield prediction DO011 N78-14591

#### RENGER, W

Concept for an airborne multidisciplinary lidar system p0023 N78-11634

#### REST R G

Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify on criteria for spatial data [E78 10053] p0013 N78 15542

RICE D P

Wheat yield forecasts using Landsat data p0004 A78 14876

Wheat productivity estimates us LANDSAT dat [E78 10009] p0007 N78 10534

Wheat yelld forecasts using LANDSAT data p0011 N78 14570

#### RICHARDS J F

The determination of volatile organic compounds in city ed with standard addition air by gas chromatography combi selective subtraction infrared spectrometry and mass spectrometry p0015 A78 10041 spectrometry RICHARDSON A. J

Distinguishing vegetation from soil background p0006 A78-17199 RICHARDSON W

Procedure B A multisegment training selection and proportion estimation procedure for processing LANDSAT agricultural data

78-10039) p0008 N78 14456 RIGONE J L

# Data processing for the DMSP microwave radiomete

p0101 N78 14605 system RINGEL M B

an airborne pulse Doopler radar p0097 A78 15662

#### RIVASI, M R

Proposal for an extension of the CAMAC standard surtable to low power data acquaition systems for oceanographic stations on marine platforms and buoys p0043 A78-12941

ROBBINS, B D

The vertical distribution of HCI in the stratosphere p0019 A78-15890 ROBERTS. J L

# IERTS, J L Tree stress detection through spectral rationg of color p0002 A78-13065

film records ROBINSON A. C Applications of Seasat to the offshore oil gas and mining

industries [AIAA 77 1583] p0045 A78-13666

ROBINSON, J E Homomorphic processing of Landsat data

p0081 A78-20173

### ROCHON, G Use of clear lakes as standard reflectors for atmospheric easurements p0074 A78-14830

measurements Use of clear lake as standard reflectors p0088 N78-14522 measurement RODENHUIS, D

An intercomparison of satellite images and radar rainfall

[PB 270299/1] RODGERS, C. D

Statistical principles of inversion theory p0084 N78-12591

#### ROGERS. .

LWIR (7-24-micrometer) measurements from the launch a rocket borne spectrometer into a quiet atmosphere (1974)

AD-A0454661 ROGERS, R H

p0100 N78-13684

p0063 N78-11647

Production of a water quality map of Saginaw Bay by computer processing of Landsat-2 data

p0057 A78-14857 Forestland type identification and analysis in Western Massachusetts - A linkage of a Landsat forest inventory to an optimization study n0005 A78-14901

sh optimization study p0005 A78-14901 Skylab/EREP application to ecological geological and oceanographic investigations of Delaware Bay p0050 N78-12492 [E78 10003] Application of LANDSAT to the surveillance of lake

eutrophication in the Great Lakes basin

p0064 N78-13503 p0064 N78-13503 production of a water quality map of Saginaw Bay by computer processing of LANDSAT-2 data

Forestland type identification and analysis in Western Massachussetts A linkage of a LANDSAT forest to an optimization study p0012 N p0012 N78-14595 ROMUN, M A

ALJN, M A
Primer for the production of Landsat colour composites
p0072 A78-13496

Establishment of the hydro-morphometric characteristics using photogrammetric and igs p0058 A78-16540 for water bodies emote-se nsing recordings

#### ROSE, F. W.

Determination of design and operational criteria for offshore facilities

[AIAA 77-1577] p0044 A78-13663 ROSINI. E

Results of a remote sensing study of the effects of hail pool A78-12878 on vegetation Remote sensing for the medium-scale assessment of ground-level thermal and hydrologic variations - An application to the local prediction of storms by use of the Project Tellus system nO055 A78-12930

#### ROTHE, K W

Remote sensing using tunable lasers p0015 A78-11811

ROTSHTEIN, A IA

A vector aeromagnetometer instrument system p0095 A78-13239

#### ROUSE G

Landsat detection of hydrothermal alteration in the No Canyon Cauldron New Mexico p0029 A78-14 p0029 A78-14815

LANDSAT detection of hydrothermal alteration in th Nogal Canyon Cauldron New Mexico p0037 N78-14507 ROUSE J W JR

Predictions on future use of active microwave systems

for all weather sensing of the earth [AIAA 77-1584] p0072 A78-13686

#### ROUSE, L. J. JR

Surface temperatures and temperature gradient features of the U.S. Gulf coast waters p0048 A78-14912 p0048 A78-14912 Surface temperatures and temperature gradient features of the US Gulf Coast waters p0053 N78-14606

ROYRVIK O

Pulsating aurora - Local and global morphology p0035 A78-13082

### RUIZ AZUARA, P

A study of suspended solids in the Requena Dam by emote sensing p0073 A78-14807 remote sensing

### RUPPERSBERG, G H

Concept for an airborne multidisciplinary lidar system p0023 N78-11634

#### RUSKEY. F

egration of remote sensing and s surface geophysics p0035 A78-14867 in the detection of faults

Integration of remote sensing and surface geophysics in the detection of faults p0038 N78-14561

#### RUSSELL J

A case study using ECHO(Extraction and Classification of Homogeneous Objects) for analysis of multispectral scanner data

[E78 10030]

n0083 N78-12504

RUSSELL O R Development of airborne electromagnetic survey instrumentation and application to the search for buried

sand and gravel a summary report [PB-271331/1] DO039 N78-14622

S

#### SABATINI, R. R.

A preliminary study of the applicability of Nimbus 6 ESMR to surface wind speed estimates

[AD-A046629] p0102 N78 15643

#### SADOWSKI, F G

The influence of multispectral scanner spatial resolu on forest feature classification DOOD4 A78 14880 Investigation of techniques for inventorying forested Volume 1 Reflectance modeling and multispectral analysis of forest canopy componer [E78-10046] p0009 N78-14462

The influence of multispectral scanner spatial resolution p0011 N78-14574 on forest feature classification

#### SAFIR. G

Estimation of old field ecosystem p0003 A78 14828 altitude imagery Estimation of old field ecosystem biomass using low p0088 N78-14520 altitude imagery

#### SAGDEEV, R Z.

Investigation of earth from space Joint experiment of USSR and GDR scientists on the Soluz 22 spacecraft p0109 N78-13511

Proposal for an extension of the CAMAC standard suitable to low power data acquisition systems for oceanographic stations on marine platforms and buoys

nOO43 A78-12941

DO065 N78-14467

Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt

p0076 A78 14905 Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt

p0101 N78-14599

#### SALMON-DREXLER. B C

Reducing Landsat data to parameters with physical significance and signature extension - A view of Landsat p0075 A78-14881 Reducing LANDSAT data to parameters with physical significance and signature extension. A view of LANDSAT p0090 N78-14575

### SALOMONSON, V

The utility of short wavelength /less than 1 mm/ remote sensing techniques for the monitoring and assessment of hydrologic parameters p0055 A78-14780 The utility of short wavelength (1mm) remote sensing

#### techniques for the monitoring and assessment of hydrol arameters

SAMONENKO IU A.
Comparison of various methods of determin p0095 A78 13218

# solar proton spectra SAND, C R

Processing techniques development [E78 10045] DO087 N78 14461

#### SANDMESS, G. A.

Prototype active scanner for nighttime oil spill m p0019 A78 14896 and classification Detection identification and quantification techniques for spills of hazardous chemicals p0019 A78-14914 p0019 A78-14914 Prototype active scanner for nighttime oil spill mapping

p0026 N78 14590 Detection identification and quantification techniques for spills of hazardous chemicals p0026 N78-14608

Proposal for an extension of the CAMAC standard suitable to low power data acquisition systems for oceanographic stations on marine platforms and buoys

DO043 A78 12941

The influence of multispectral scanner spatial resolution on forest feature classification
The influence of multispectral scan p0004 A78-14880 ner spatial resolution p0011 N78-14574 on forest feature classification

Environmental mapping of the French coastal zo

#### emote sensing p0031 A78-18102 SASSO, R R

Automated image processing of Landsat II digital data or watershed runoff prediction p0056 A78-14816
Automated image processing of LANDSAT 2 digital data for watershed runoff prediction p0066 N78-14508 for watershed runoff prediction

SASSONE, P G Benefit assessment of ozone monitoring satellites p0021 A78-17574

# SAVASTANO K J LANDSAT menhaden and thread herring resources

[E78-10024] n0050 N78-12500 SAYN-WITTGENSTEIN, L. SAYN-WITTGENSTEIN, L Remote sensing and today's forestry issues p0002 A78 14792 Remote sensing and today's forestry issues p0009 N78-14483 SCHAEFFER, M A An operational multistate earth observation data p0106 A78-14823 management system p0106 A78-14823
An operational multistate earth observation data p0110 N78-14515 management system Microwave multispectral investigations of snow p0056 A78-14817 Microwave multispectral investigations of snow p0066 N78-14509 Development and application of operational techniques for the inventory and monitoring of r for the Texas coastal zone. Volume 1 resources and uses Text [F78 10042] p0053 N78-15537 Development and application of operational techniques for the inventory and monitoring of resources and uses for the Texas coastal zone. Volume 2. Appendices Appendices p0053 N78 15538 SCHERZ J P Lake water quality mapping from Landsat p0057 A78-14893 Application of LANDSAT to the surveillance of lake eutrophication in the Great Lakes basin [E78-10023] 78-10023] p0064 N78-13503 Lake water quality mapping from LANDSAT p0026 N78-14587 SCHMER, F A Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes cell selection criteria for spatial data [F78-10053] SCHMERLING E R Spacelab - A new tool for cooperative p0108 A78-19595 SCHMIDT, D Mass appearance of marine blue algae in the Baltic Sea detected in satellite images p0022 A78-18508

improve agricultural censusing map Aspen and quantify p0013 N78-15542

p0022 A78-18508 SCHMUGGE, T Microwave radiometry for soil moisti

p0060 A78-18869 SCHNEIDER S

Satellite observations of snowcover in the Sierra Nevadas during the great California drought p0059 A78-18250 SCHNEIDER S J

Monitoring of polluted rivers by p0020 A78-16530 methods

A case study using ECHO(Extraction and Classification of Homogeneous Objects) for analysis of multispectral scanner data

[F78-10030] n0083 N78-12504 SCHOLZ D K Evaluation of change detection tech

DOC48 A78 14875 coastal zone environments Change detection in coastal zone environments p0048 A78-17198 Evaluation of change detection techniques for monitoring

p0090 N78-14569 SCHOTT, J R

Thermal remote sensing calibration techniques
[PB-269471/9] p0061 N78-10630 SCHROEDER M Spectral reflection measurements of water with particle

uspensions for an analysis of the water quality on the p0058 A78-16514 basis of multispectral recordings SCHUHR W

Digital rectification of multispectral imagery p0078 A78 16532 SCHULER, K. W.

Compression wave studies in [SAND-76-0279] p0037 N78-13688 SCHULTINK, G

Estimation of old field ecosystem altitude imagery p0003 A78-14828 Estimation of old field ecosystem

biomass using low p0088 N78-14520 altitude imagery SCHUMACHER, P M The fate of nitrogen oxides in the atmosphere [PB-267784/7] p0023 N p0023 N78-10619

SCHUTT J R Remote sensing of vegetation and soil using microwave

ellipsometry [NASA-CASE GSC-11976-1] n0007 N78-10529 SCIARRETTA. M. R.

Results of a remote sensing study p0001 A78-12878 on vegetation SEARS, R D Ionospheric irregularities Optical support of HAES

scintillation experiments [AD-A043666] p0082 N78-11561 SENCHURO, I N

of determining Comparison of various methods solar-proton spectra p0095 A78-13218 SERGEEV M A

A vector aeromagnetometer instrume nt system n0095 A78-13239 SERVOIN, J L Analysis of infrared reflectivity in the presence of strical phonon lines p0035 A78 13932

SEYMOUR D W low-cost system for reception processing and distribution of line-scan data from environmental satellites

p0045 A78-13673 IAIAA 77 15981 SHAHROKHI, F

Application of Landsat data to wetland study and land use classification in West Tennessee p0056 A78-14818 Application of LANDSAT images to wetland study and se classification in west Tennessee part 1 0031] p0063 N78-12505

The application of LANDSAT 1 imagery for monitoring strip mines in the new river watershed in northeast

Tennessee part 2 [E78-10032] p0037 N78 12506

Application of LANDSAT data to wetland study and land use classification in west Tennessee p0066 N78 14510 SHARBER L A

The application of LANDSAT-1 imagery for monitoring strip mines in the new river watershed in northeast Tennessee part 2 [F78-10032] n0037 N78-12506

SHAVRIN P I of determining Comparison of various methods

p0095 A78-13218 solar-proton spectra SHEMDIN O H The Seasat surface truth experiments

p0042 A78-12834 SHEPHERD, K J Water utilization evapotranspiration and soil moisture

monitoring in the south east region of south Australia p0062 N78-11447 [E78-10001] SHERMAN J W III
1978 - A space focus for oceanology
[AIAA 77 1564] p

p0043 A78-13656 Current and future satellites for oceanic monitoring p0047 A78 14793

Current and future satellites for oceanic monitoring p0051 N78 14484

SHIMABUKURO F I Estimation of the daytime and nighttime distribution of atmospheric ozone from ground-based p0016 A78-13617 vavelength measurements

SHUCHMAN R Basic remote sensing investigation for beach reconnaissance

p0083 N78-12515 AD-AD44836 SHUCHMAN, R A Integration of remote sensing and surface geophysics

p0035 A78-14867 in the detection of faults Analysis of synthetic aperture radar ocean wave data collected at Marineland and Georges Bank

p0050 N78-10678 [PB-268675/6] Digital exploitation of synthetic aperture radar

p0088 N78-14505 Integration of remote sensing and surface geophysics the detection of faults p0038 N78-14561

SHULGINA, E M Passive microwave remote sensing of soil moisture p0005 A78-14915

Passive microwave remote sensing of soil moisture p0068 N78-14609

Directional reflectances of terrain objects from p0078 A78 16531 B&W-aerial photos SIGMAN R S.

The auxiliary use of LANDSAT data in estimating crop acreages Results of the 1975 Illinois crop acreage experiment p0012 N78 15539 [F78-10049]

SIGNORE, T L Present and future operational NOAA satellite oceanographic products - An introduction

Present and future operational NOAA satellite oceanographic products An introduction

Agricultural scene understanding [E78-10043] p0008 N78 14459

SIMON, R L The summertime stratus over the offshore waters of p0043 A78-13108 SIMONETT D 8

The impact of remote sensing on United States geography - The past in perspective present realities future potentials p0017 A78 14783

The impact of remote sensing on United States geography The past in perspective present realities future

p0109 N78-14470

Quantification of soil mapping by digital analysis of Landsat data Quantification of soil mapping by digital analysis of I ANDSAT data

p0091 N78-14602 SINITSIN, S. G.

Approaches for solving forestry problems by utilizing pospace methods p0006 A78-16515 aerospace methods SIRMANS, D

Simulation of attenuation by rainfall at a wavelength of cm p0058 A78-17019 5 cm

SIVITER, J. H. JR

Quantitative remote measurements of pollutants from stationary sources using Raman lidar p0020 A78-17000 SKORVE, J E

Application of LANDSAT imagery for snow mapping in

p0065 N78-14458 [E78-10041]

SLOAN D S
A low cost system for reception processing and distribution of line-scan data from environmental satellite p0045 A78-13673 [AIAA 77-1598] A low-cost system for reception and processing of line-scan data from Landsat and other source

p0074 A78 14831 A low-cost system for reception and processing of line-scan data from LANDSAT and other sources

n0089 N78-14523

A survey of users of earth resources remote sensing data p0107 A78-14859 A survey of users of earth resources remote sensing p0111 N78-14553

SMANIA F Agricultural applications of satellite remote sensing - The measurement and prediction of principal harvests p0001 A78-12931

SMITH G W Surface temperatures and temperature gradient feature of the U.S. Gulf coast waters p0048 A78-1491: p0048 A78-14912 Surface temperatures and temperature gradient features of the US Gulf Coast waters p0053 N78-14606

SMITH P L Estimation of the daytime and nighttime distribution of

atmospheric ozone from ground-based wavelength measurements p0016 -pased millimeter p0016 A78-13617

Preliminary eastern Indian Ocean geoid from GEOS 3 data [AD-A043788] n0050 N78 10675

SMITH V E
Production of a water quality map of Saginaw Bay by

computer processing of Landsat-2 data p0057 A78-14857 Application of LANDSAT to the surveillance of lake

hication in the Great Lakes basin p0064 N78 13503

Production of a water quality map of Seginaw Bay by computer processing of LANDSAT-2 data o0067 N78-14551

SMITH, W. C. Special Sensor H data processing at AFGWC - Preliminary sults p0097 A78 14972 results

SOLOMON J L Application of remote sensing to state and regional problems

E78-100341 p0024 N78 13506 SORENSEN B M Remote sensing of water quality in 7 lakes in northern p0058 A78 16528

SPANN G W Indicators of international remote se ensing activities p0107 A78-14842

Indicators of international remote p0111 N78-14535 SPEIGHT, J. G.

Description of landform patterns on air photos p0020 A78 16529 SPICER C W

The rate of nitrogen oxides in the atmosphere [PB-267784/7] p0023 N p0023 N78 10619 INHIRNE, J D

Atmospheric particulate properties inferred from lidar and solar radiometer observations compared with simultaneous in situ aircraft measurements - A case study

p0016 A78 13616 STAELIN, D H Atmospheric sounding with passive microwaves

p0018 A78 14802 and prognosis Inversion of passive microwave remote sensing data from p0085 N78 12599 satellites Atmospheric sounding with passive microwaves Review

p0088 N78-14494 and prognosis STAETTER R

Spectral reflection measurem suspensions for an analysis of the water quality on the basis of multispectral recordings p0058 A78 16514 pasis of multispectral recordings

STAIR, A. T JR
Rocketborne measurement of an infrared enhancement associated with a bright auroral breakup AD-A046474] p0102 N78 15632

STANLEY, T W Measurement and the law Monitoring for compliance

with the Clean Air Amendments of 1970 p0022 A78 18456

Quality assurance research plan fiscal year 1978 1982 [PB-272421/9] p0027 N78 14700

STARBUCK, R R

The auxiliary use of LANDSAT data in estimating crop acreages Results of the 1975 Illinois crop-acreage experiment p0012 N78 15539 [E78-10049]

STEEN A. Ocean mining requirements [AIAA 77-1581] p0044 A78-13665

SUITS G H Microwave scattering from the sea surface Basic remote sensing investigation for beach [ESA-TT 422] p0051 N78-13313 THOMPSON D R [AD-A044836] p0083 N78-12515 STEINMANN C R Remote infrared spectroscopy of the e SUK. M vegetation water deficiencies Satellite land use acquisition nd applications to p0057 A78-14870 p0029 A78-14849 The use of LANDSAT digital data hydrologic planning models
Satellite land use acquisition
hydrologic planning models
SUKHIKH, V I vegetation water deficiencies Remote infrared spectroscopy of the earth nd applications n0038 N78-14543 THOMPSON, G M p0068 N78-14564 STELLINGWERF D A Trichlorofluoromethane a new hydrologic tool for tracing and dating ground water

Approaches for solving forestry problems by utilizing erospace methods p0006 A78-16515 aerospace methods SULLIVAN, T J Optimum ratio of photo-field plots for aerial volume and Measurement of atmospheric ozone by satellite

nO111 N78-14553

p0101 N78 14605

p0097 A78-15013

SUTHERLAND, R A. Remote sensing as a tool in assessing the impact of topographical alterations on the microclimate

p0029 A78-11099 Cold climate mapping using satellite high resoluti p0076 A78-14978 thermal imagery SUZIUMOV, A. E

The floor structure of the southwest Pa p0047 A78-13899

SWAIN. P A case study using ECHO(Extraction and Classification of Homogeneous Objects) for analysis of multispectral

scanner data [E78 10030] n0083 N78-12504 SWAMINATHAN V L Image analysis techniques with special reference to

analysis and interpretation of geological features from p0029 A78-14850 Image analysis techniques with special reference to analysis and interpretation of geological features from LANDSAT imagery p0038 N78-14544

p0038 N78-14544 SWANN, G A ical remote sensing from space

[TID-27689] DO039 N78-14615

T

TAKEDA, K On the photographic processing and digital texture for remote sensing of Kujukuri coast of Chiba

p0073 A78-14814 On the photographic processing and digital texture for remote sensing of Kujukuri Coast of Chiba in Japan hiba in Japan p0052 N78-14506

TALVITIE J Automated earth resources surveys using satellite and aircraft scanner data - A Finnish approach

p0077 A78-16518 TANAKA, 8 Multi-seasonal data analysis and son p0003 A78-14812 environmental monitoring Multi-seasonal data analysis and

rronmental monitoring p0025 N78-14504 TARANIK J V Land classification of south central lows from computer

enhanced images [E78-10005] p0082 N78-12493 TARNOWEKI, A. A.

Cartographic Electron Beam Recorder (EBR) system
[AD-A044401] p0100 N78-12513

TARPLEY J D

Potential applications of digital visible and infrared data from geostationary environmental satellites p0074 A78-14839

Potential applications of digital visible and infrared data from geostationary environmental satellites p0101 N78-14532

Interim hierarchical regional classification scheme for oastal ecosystems of the United States and its territories PB-272691/7] p0027 N78-15553 THADANI S

Performance tests of signature extension algorithms p0005 A78-14904 Performance tests of signature extension algorithms p0091 N78-14598

THEPENIER, R M ole of cumulonimbus in the evolution of cyclonic disturbances in Mediterranean regions

THIRLWELL A The 20 and 30 GHz attenuation meas the ATS 6 satellite p00 p0093 N78-15340

p0077 A78-16364

THOMAS, G \$ Blob An unsupervised clustering mach to spatial preprocessing of MSS imagery p0075 A78-14883

BLOB An unsupervised clustering preprocessing of MSS imagery approach to spatial p0090 N78-14577 THOMAS, J. R. Yield/reflectance relations in cabbage

p0001 A78-10521

THOMAS R F Characterization of terrestrial service environments. The simultaneous occurrence of combined conditions of sola insolation and climatic variables p0015 A78-11283

THOMAS, R. W. Two phase sampling for wheat acreage estima p0003 A78-14844 Two phase sampling for wheat acreage estimation p0010 N78-14538

The use of Landsat digital data to detect and monitor p0004 A78-14846 to detect and monito

p0010 N78-14540

THOMPSON, M D Remote sensing in operational range management programs in Western Canada p0019 A78-14862 Remote sensing in operational range management ograms in Western Canada p0026 N78-14556

p0069 N78 15531

THOMPSON, T W Seasat-A Synthetic Aperture Radar p0095 A78-12833 implementation

Ocean wave patterns under Hurricane Gloria Observation with an airborne synthetic-aperture rada p0047 A78-14126

THOMSON, D. W. Atmospheric particulate properties inferred from lidar and solar radiometer observations compared with simultaneous

in situ aircraft measurements - A case study n0016 A78 13616 THOMSON, F Basic remote sensing investigation for beach

reconnaissance AD A044836] p0083 N78 12515 THOMSON, K P B

Snow mapping from Landsat digital data p0055 A78-12933 THORLEY, G

User experience with the applications of Landsat data p0105 A78 12932 TIBBITTS G C JR

Preparation of a geologic photo map and hydrologic study of the Yemen Arab Republic p0037 N78-12494 [F78-10008]

TILMANN, S E Application of aerial photography to water-related

Application of aerial photography to water-related Application of aerial photography to water-related p0067 N78 14528 TIRABASSI, T

A mask correlation remote sensor for measurements of SO2 optical depths on long light source - Instrument distances p0016 A78 12938 TITUS, S J

Use of multispectral data in design of forest sample SULVAVS p0002 A78 14808 Use of multispectral data in design of forest sample p0009 N78 14500 surveys

TIWARI S N Remote estimation of surface temperature in po DO019 A78-14992 measurement experiments

Estimation of ground temperature from GFCR radiometric signal [NASA-CR 145291] p0102 N78 15626 TOMMERDAHL J B

Design and operation of an measurement system airbome p0021 A78-17575 TOPP G C

Flectro p0059 A78 18863 report II

Norwegian marine geodetic projects p0048 A78-17648 TOTH, R A

The vertical distribution of HCI in the stratosphere p0019 A78-15890

TRESHNIKOV, A F
Soviet studies of the Arctic and Southern Oceans in the current stage p0049 A78-19850

Image data application obtained from space to geological p0035 A78 16502 investigations in the USSR

Test on the mapping application of Landsat ima

p0077 A78 16527 TSENG. Y C

Study of the Brazil and Falkland currents using THIR images of Nimbus V and oceanographic data in 1972 to 1973 p0047 A78-14840 p0047 A78-14840 Study of the Brazil and Falkland currents using their images of Nimbus 5 and oceanographic data in 1972 -1973 p0052 N78 14533

TRIEN D S A numerical algorithm for remote sensing of density profiles of a simple ocean model by acoustic pulses p0080 A78-18910

A numerical algorithm for remote sensing of ocean density profiles by acoustic pulses [AD-A042372] n0050 N78-10674

Classification of Landsat agricultural data based upon color trends p0003 A78 14845 Pattern recognition of Landsat data based upon temporal analysis p0007 A78-18248 trend analysis Classification of LANDSAT agricultural data based upon plor trends p0010 N78-14539 color trends

TUELLER, P T Large scale 70mm photography for range resources analysis in the western United States p0005 A78-14902

Mean annual volume growth from sequential volume determination on permanent aerial photographic plots p0006 A78-16522

aerial volume growth regression construction

p0006 A78-16523

STEPANOV, P V

Analysis of some models of atmospheric optical grood p0020 A78-16539 according to space photo surveys

STEPHAN, J G A survey of users of earth resources DO107 A78-14859 data A survey of users of earth resources remote se

data STEPHENS, E. R.

of photochemical aerosols

Formation of [PB-268895/0] p0023 N78-10621

STEVENS, A R Remote monitoring and Tennessee Valley Authority programs

p0018 A78-14800 Remote monitoring and Tennessee Valley Authority rograms p0066 N78-14492 programs

STEVENS, N J Development of environmental charging effect me p0098 N78-10174 for operational satellites

STILES W H Experiments on the radar backscatter of sno-

p0055 A78-10386 Space radar system specifications p0073 A78 14803 Space radar system specifications p0101 N78 14495

STINSON, J. L. An evaluation of the signature extension approach to large area crop inventories utilizing space image data p0007 N78-12496 [E78-10016]

STOCK P The application of IR- and MSS-data in the Ruhr distr D0074 A78 14838 Germany

The application of IR and MSS data in the Ruhr District Germany p0089'N78 14531 STOGRYN, A P Data processing for the DMSP micro

system STONER. E R

Comparing soil boundaries delineated by digital analysis of multispectral scanner data from high and low spatial resolution systems n0008 N78-13500 [E78-10017] STOWE, R F

The development of international law relatin sensing of the earth from outer space p0105 A78 10358

STRANGEWAYS, I Telemetering river level from a large p0063 N78-11476

STRELNIKOV 8 1 Image data application obtained from space to geological vestigations in the USSR p0035 A78 16502 investigations in the USSR

STRINGER, W J Reindeer range inventory in western Alaska from computer aided digital classification of Landsat data p0003 A78-14824

Reindeer range inventory in western Alaska from computer aided digital classification of LANDSAT data D0009 N78 14516

STROMBERG W D

Computer processing of SAR L-band p0055 A78 10524

STROME, W M An overview of remote sensing technology transfer in anada and the United States p0106 A78-14795 Canada and the United States An overview of remote sensing chnology transfer in p0110 N78-14486

Canada and the United States STRONG, R B Design and operation of an airborne neasurement system p0021 p0021 A78-17575

STRUVE H Acquisition of terrain information using Landsat multispectral data. Report 2 an interactive procedure for

classifying terrain types by spectral characteristics [AD-A045871] p0033 N78 p0033 N78-13516 STUMPF, H G

Satellite observations of mesoscale eddy dynamics the eastern tropical Pacific Ocean p0041 A78-10027 STURM, B

Remote sensing of water quality in 7 lakes in northern p0058 A78-16528 STURMAN J C

Development of environmental charging effect monitors operational satellites p0098 N78-10174 for operational satellites

SUGA. Multi-seasonal data analysis and some environmental monitoring Multi-seasonal data analysis and o0003 A78-14812 some extensions for p0025 N78-14504 environmental monitoring

TUNHEIM, J PERSONAL AUTHOR INDEX

Large scale 20mm photography for range resources nalysis in the Western United States p0012 N78 14596

HCMM energy budget data as a model input for assessing regions of high potential groundwater pollution [E78-10010] p0061 p0061 N78-10535

TUOMINEN. H V

Investigation of LANDSAT imagery on correlations between ore deposits and major shield structures in [E78-10012] p0036 N78-10537

TURBIN IU G

A vector aeromagnetometer instrument p0095 A78-13239

TURDEANU, L

A compensation procedure in a block of simply overlapping photograms for the case of flat terrain p0077 A78-16526

TWOMEY, S

Some aspects of the inversion problem in remote sensina

### U

UGLEV U V

The complex of optical-photographical transformation methods of aerial and space images used for study of natural resources

ULABY, F T

Experiments on the radar backscatter p0055 A78-10386

Microwave remote sensing of hydrologic parameters p0055 A78-14781

Space radar system specifications p0073 A78-14803 Estimation of soil moisture with rada lar remote sensing p0005 A78-14907 Optimal spatial sampling techniques for ground truth data

in microwave remote sensing of soil mo noisture p0058 A78-18247

An evaluation of radar as a soil me p0060 A78-18868

Microwave remote sensing of hydrologic parameters p0065 N78-14468 Space radar system specifications p0101 N78-14495

Estimation of soil moisture with rada p0101 N78-14601

ULBRICHT K A

Application of the DIBIAS image processing system on Landsat pictures of central Morocco and Southern p0035 A78-12934 Mass appearance of marine blue alg e in the Baltic pae in the Baitic Sea p0022 A78-18508 detected in satellite images

ULLMAN, J. J.

Detection of oak wilt with color IR aerial photograph p0001 A78-10522

ULWICK, J C

Rockethorne measurement of an infrared enhancement associated with a bright auroral breakup

[AD-A046474] p0102 N78 15632

UNCAPHER, J A

Development of airborne electromagnetic instrumentation and application to the search for buried sand and gravel a summary report

p0039 N78-14622 [PB-271331/1]

UNDERWOOD D

Vector statistics of LANDSAT image [NASA-TM-78149] p0093 N78-15544

USRY J W

spectra of dilute primary treated sewage sludg [NASA-TP-1038] Laboratory measurements of radiance and reflectance p0023 N78-12554

Laboratory measurements of radiance and reflectance spectra of dilute secondary-treated sewage sludge [NASA-TP-1089] p0024 N78-12555 [NASA-TP-1089]

Laboratory measurements of upwelled radiance and reflectance spectra of Calvert Ball Jordan and Feldspar soil sediments

[NASA-TP-1039] p0024 N78-12645

VAN ES E

The dry deciduous forests of Bastar Central India p0006 A78-16551 Landsat-1

VAN EVERDINGEN R O

Use of Landsat imagery in studies of spring icings and seasonally flooded karst in permafrost areas p0061 A78-18872

VAN GENDEREN J. L.

esting the accuracy of remote sensing land use map: p0074 A78-14819

VANDEHULST H C

p0084 N78-12587 Hybrid methods are helpful VANGENDEREN. J L

Testing the accuracy of remote sensing land use maps p0025 N78-14511

VANSCHAYK, C

Development of an integrated data base for land use of water quality planning p0057 A78-14890 and water quality planning Development of an integrated data base for land use p0028 N78-14584 water quality planning

VANSELOUS, T M
LANDSAT menhaden and thread herring resources

[E78-10024] p0050 N78-12500

VANWIE, P

**AOIPS** water resources data manag [NASA TM-X 71396] p0061 N78-10542 VASS P A

Testing the accuracy of remote sensing land use map p0074 A78-14819

Testing the accuracy of remote sensing land use maps p0025 N78-14511

VAVASSEUR C

Remote optical sensing of the concentration and mass flow of particulate and gaseous pollutants in smoke plumes discharged through chimneys p0016 A78-12981

VEDESHIN, L. A.

Investigation of natural environment by space means Geobotany Geomorphology soil sciences agricultural lands landscape study lands landscape study [NASA TM-75041] o0108 N78-11448

VENTO D Results of a remote sensing study of the effects of hail

p0001 A78-12878 VERGER E

Environmental mapping of the French coastal zo p0031 A78-18102 remote sensing Computer elaboration and visualization of remote-se p0080 A78-18241 data

VINCENT, R K

Landsat detection of hydrothermal alteration in the Nogal Canyon Cauldron New Mexico p0029 A78-14815 LANDSAT detection of hydrothern Nogal Canyon Cauldron New Mexico p0037 N78-14507

VIOLUER, M Remote sensing of ocean color and detection chlorophyll content p0048 A78 14855 Remote sensing of ocean color florophyll content and detection p0052 N78 14549

VISCONTI G

ary results from the Lidar syste of L Aquila p0022 A78 18476 VITTORI O

A mask correlation remote sensor for measurements of SO2 optical depths on long light source - Instrument p0016 A78-12938 VOGEL T C

An analysis of LANDSAT systems for cartographic and terrain informat n0031 N78 10544

VOLLMERS, R R

Radar detection of surface oil slicks p0021 A78-17197

Remote monitoring and Tennessee p0018 A78-14800 Remote monitoring and Tennessee Valley Authority rograms p0066 N78 14492 programs

### W

WAGNER, H

Digital processing system for develop ping countries p0075 A78-14865 Integration of remote sensing and surface geophysics p0035 A78-14867 the detection of faults Digital processing system for developing countries

DO089 N78 14559 Integration of remote sensing and surface geophysics p0038 N78-14561

in the detection of faults WAGNER H L Digital exploitation of synthetic aperture radar

p0088 N78-14505

Applications of Landsat data to the integrated econ development of Mindoro Philippines p0107 A78-14889
Applications of LANDSAT data to the integrated nic development of Mindoro Phillip DO011 N78-14583

WALLIS, D. D.

Characteristics of polar cap sun-aligned arc p0095 A78 13083

WALTHER, H

Remote sensing using tunable lasers

p0015 A78 11811 WALTON, C C

Present and future NOAA satellite operational oceanographic products - An introduction p0047 A78-14820

Present and future operational oceanographic products An introduction NOAA satellite p0052 N78-14512

WARD G F

fate of nitrogen oxides in the atmosphere [PB-267784/7] p0023 N78-10619 WARD, S H

Geophysics Applied to Detection and Delineation of Non-energy Non-renewable Resources Workshop on Mining Geophysics [PB-271952/4] p0037 N78-13622

WASHBURN, J F

Detection identification and quantification techniques p0019 A78-14914 for spills of hazardous chemicals

Detection identification and quantification techniques rispills of hazardous chemicals p0026 N78-14608 for spills of hazardous chemicals RS, M P , III

Sea surface temperature gradient analysis from digital meteorological satellite data [AIAA 77 1604]

Potential applications of digital visible and infrared data from geostationary environmental satellites

p0074 A78-14839

Potential applications of digital visible and infrared data from geostationary environmental satellites p0101 N78-14532

Evaluation of algorithms for geological thermal-inertia p0029 A78-14868 mapping Evaluation of algorithms for ged gical thermal-inertia mapping WEBER, B L p0039 N78-14562

Ocean surface currents mapped by radar p0041 A78-10344

WEHDE, M E

Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data [E78-10053] p0013 N78-15542

WEHMAMEN O

Performance tests of signature exte nsion algorithms p0005 A78-14904

WEHMANEN O A
The use of Landsat digital data to detect and monitor
p0004 A78-14848 The use of LANDSAT digital data to detect and monitor p0010 N78-14540 vegetation water deficiencies erformance tests of signature nsion algorithms p0091 N78-14598

WEIRLE M L

Simulation of attenuation by rainfall at 5 cm DO058 A78-17019

WEISMILLER, R A Evaluation of change detection techniques for monitorin

DO048 A78-14875 coastal zone environments digital analysis of p0076 A78-14908 Quantification of soil mapping by Landsat data Change detection in coastal zone

p0048 A78-17198 Computer aided analysis of LANDSAT data for surveying

Texas coastal zone environments [E78 10018] nOO82 N78-12497 Evaluation of change detection tech p0090 N78-14569 coastal zone environments Quantification of soil mapping by digital analysis of

n0091 N78-14602 [REPT-6690]

WELCH. R

LCH, R Height measurements from satellite images p0071 A78-10519

WELLER G

OCS environmental research technology in ice covered poods A78-12845

p0081 A78 20171

p0100 N78-13716

HRPT ground station WENSEL, L. C Use of multispectral data in design of forest sample p0002 A78-14808 Use of multispectral data in design of forest sample inveys p0009 N78-14500

survevs WENTZ, F J

Computation of theoretical brightness temperatures corresponding to the Cape Cod Canal radiometer measurements [NASA-CR 145277]

p0100 N78-13
Radar backscattering from a sea having an anisotri large-scale surface part 2
[NASA-CR 145278] p0054 N78-15 p0054 N78-15663

Acquisition of terrain information using Landsat multispectral data Report 2 an interactive procedure for classifying terrain types by spectral characteristics
[AD-A045871] h0033 N76 p0033 N78-13516

WESTWATER E R

Application of statistical inversion to ground based microwave remote sensing of temperature and water vapor ture and water vapor p0085 N78-12600 profiles

WETZEL L B

A model for sea backscatter inter p0043 A78-13312 grazing angles

WHEELER, S G Landsat data from agricultural sites - Crop signature p0005 A78-14899

LANDSAT data from agricultural sites Crop signature analysis

p0012 N78 14593 WHITE, J H Design and operation of an measurement system irbome air quality p0021 A78-17575

WHITE, L. P

Aerial photography and remote sensing for soil surve p0080 A78-18749

WHITING, J M

Airborne thermal infra red sensing of soil moisture and p0060 A78-18866 groundwater

WHITLOCK C H

Laboratory measurements of radiance and reflectance spectra of dilute primary-treated sewage sludge p0023 N78-12554 [NASA TP-1038]

PERSONAL AUTHOR INDEX ZVONAREV. K. A.

Laboratory measurements of radiance and reflectance spectra of dilute secondary-treated sewage studge [NASA-TP 1089] p0024 N78 12555 Laboratory measurements of upwelled radiance and reflectance spectra of Calvert Ball Jordan and Feldspar oil sediments [NASA-TP-1039] p0024 N78-12645 WHITLOCK, C H, III

Fundamental analysis of the linear multiple regression

technique for quantification of water quality parameters from remote sensing data p0063 N78-12490

WHITNEY, C K
Inversion of scattered radiance horizon profiles for gaseous concentrations and aerosol paramete p0085 N78-12595

WIECZOREK U

Textural analysis by statistical parameters and its application to the mapping of flow-structures in wetlands /Mudflat area at the German coast of the North Sea/

p0056 A78-14856 Textural analysis by statistical parameters and its application to the mapping of flow structures in wetlands p0067 N78-14550

WIEGAND, C L Distinguishing vegetation from soil background poons A78-17199 information

WIESNET, D R

NOAA satellite monitoring of snow cover in the northern hemisphere during the winter of 1977 [IAF PAPER 77 121] pOO57 A78-15935

WILHELM J K

US initiatives for remote sensing applications in the developing world p0110 N78-14480 WILHELM, K

Remote sensing experiment for magnetospheric electric fields parallel to the magnetic field p0080 A78-18440 WILKINS R D

Benefit assessment of ozone monitoring satellites p0021 A78-17574

WILLIAMS, D L
Forest land management by satellite LANDSAT derived information as input to a forest inventory system
[E78-10038] pO008 N78-14455

WILSON, J W Radar observed land/lake precipitation differences p0058 A78-17074

Precipitation (radar) project of the IFYGL lake meteorology program [PB-272152/0]

p0069 N78-15660

WILSON, W J

Estimation of the daytime and nighttime distribution of atmospheric ozone from ground-based millimeter wavelength measurements p0016 A78-13617 wavelength measurements

WINNINGHAM, J D
Dependence of substorm occurrence probability on the interplanetary magnetic field and on the size of the auroral oval p0080 A78-18730

WITHERSPOON P A

Recent developments in modeling groundwater systems [LBL-5209] p0068 N78-14616

TTE, W G
The use of Landsat for monitoring water parameters in the coastal zone

[AIAA 77-1597] p0045 A78-13672

Laboratory measurements of radiance and reflectance spectra of dilute primary treated sewage sludge [NASA TP-1038] p0023 N78-12554

[NASA TP-1038] p0023 N78-12554 Laboratory measurements of radiance and reflectance spectra of dilute secondary-treated sewage sludge [NASA-TP 1089] p0024 N78-12555

Laboratory measurements of upwelled radiance and reflectance spectra of Calvert Ball Jordan and Feldspar soul sediments p0024 N78-12645

[NASA-TP-1039] WOELKERLING, W J

Application of LANDSAT to the surveillance of lake eutrophication in the Great Lakes basin

[E78-10023] DO064 N78-13503

Techniques for ocean bottom measurements of magnetic fields with a superconducting magnetomete p0041 A78-10389

WOLFF, P

Seasat-A and the commercial ocean communi [AIAA 77-1591] p0048 A p0046 A78-13682

WOOD, 8 G
ERTS B imagery to monitor large scale cleaning and development programmes in the Daly Basin northern territory [E78-10002]

p0081 N78-10530 (E78-19404)

WOODZICK, T L

Multidate mapping of mosquito habitat

p0056 A78-14851

Multidate mapping of mosquito habitat p0067 N78-14545

WORSFOLD R

REFOLD, N
Scatterometer results from shorefast and floating sea e p0047 A78-14822 Scatterometer results from shorefast and floating sea p0052 N78-14514

WRIDE, M. C.

Thermal imagery for census of ungulates p0010 N78-14555

Geophysics Applied to Detection and Delineation of Non energy Non renewable Resources Workshop on Mining Geophysics [PB-271952/4] p0037 N78-13622

WUKELIC, G E

A survey of users of earth resources remote sensing data p0107 A78-14859 A survey of users of earth resources remote sensing ata p0111 N78-14553

Y

YASUNARI, T

Stationary waves in the Southern Hemisphere mid-latitude zone revealed from average brightness charts p0071 A78 10543

Effect of antecedent on frozen ground floods p0065 N78 13522 [PB-270632/3]

YOUNG, J D

Active microwave measurement from space of pa-surface winds p0041 A78 12615 VOUNG M

The operational processing of wind estimates from cloud motions Past present and future p0091 N78-14604

Z

ZACHARY, A. L.

Comparing soil boundaries delineated by digital analysis of multispectral scanner data from high and low spatial resolution systems

o0008 N78 13500

[E78-10017] ZANFERRARI A

Application of conventional and advanced techniques for the interpretation of Landsat 2 images for innears in the Friuli earthquake area p007! Inears in the Fruil earthquake area p0075 A78 14886
Application of conventional and advanced techniques for the interpretation of LANDSAT 2 images for the study of linears in the Fruil earthquake area. linears in the Friuli earthquake area p0091 N78 14580

ZETTWOOG, P
Remote optical sensing of the concentration and mass flow of particulate and gaseous pollutants in smoke plumes discharged through chimneys p0016 A78 12981

ZHIVICHIN, A. N Models for the identification of topographic objects during the deciphering of aerial photographs, p0031 A78 19243

ZISSIS, G J

Remote sensing A partial technology
[PB-271278/4] p0111 N78 14612

ZOBRIST G W

Clustering of ERTS data using various orthogonal ansforms p0079 A78-17543 transforms

Results and prospects of the study of natural resources

by aerospace methods p0107 A78 18522 Investigation of natural environment by space means Geobotany Geomorphology soil sciences agricultural lands landscape study
[NASA-TM-75041] p0108 N78-11448

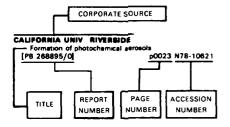
ZVONAREV, K A

The transfer of the contents of satellite pictures onto geographic maps [BLLD-M 24900-(5828 4F)] p0033 N78 14453

# CORPORATE SOURCE INDEX

Earth Resources / A Continuing Bibliography (Issue 17)

### **Typical Corporate Source** Index Listing



The title of the document is used to provide a brief description of the subject matter. The page number and the accession number are included in each entry to assist the user in locating the abstract in the abstract section. If applicable a report number is also included as an aid in identitying the document

### A

#### ACADEMY OF SCIENCES (USSR), MOSCOW

Atmospheric transformation of solar r ar radiation reflected p0047 A78-13803 from the ocean Spectral structure of the solar radiation field reflected p0049 A78-20055 by the ocean-atmosphere system AEROJET ELECTROSYSTEMS CO. AZUSA, CALIF wave atmospheric p0101 N78 14568 multichannel passive microwave temperature sounding system Data processing for the DMSP microwave radiometer p0101 N78-14605

AGENCY FOR INTERNATIONAL DEVELOPMENT,

WASHINGTON, D C
US initiatives for remote sensing applications in developing world p0110 N78-14480 Remote sensing of environmental impact of land use p0025 N78-14490 Remote sensing utilization of developing countries An appropriate technology p0111 N78-14552

AGRICULTURAL RESEARCH SERVICE, PHOENIX

ARIZ.

Airborne monitoring of crop canopy temperatures for irrigation scheduling and yield prediction p0004 A78-14897

#### AIR FORCE GEOPHYSICS LAB . HANSCOM AFB. MASS

Inverse solution of the pseudoscalar transfer through nonlinear matrix inversion p0084 N78-12592 LWIR (7-24 micrometer) measurements from the launch of a rocket borne spectrometer into a quiet atmosphere (1974)

[AD A045466] p0100 N78-13684 Rocketborne measurement of an infrared enhancement associated with a bright auroral breakup

[AD-A046474] p0102 N78-15632

# AIR FORCE SYSTEMS COMMAND. WRIGHT-PATTERSON AFB, OHIO

Updated system for calculated ins of coordinates for locating points on computer GEO 2 [AD A045434] p0033 N78-13514

Increase in the fidelity of image during the production of dianositives

p0092 N78-14613

ALASKA UNIV , FAIRBANKS.

Dependence of substorm occurrence probability on the interplanetary magnetic field and on the size of the auroral pools A78-18730 Reindeer range inventory in western Alaska from computer-aided digital classification of LANDSAT data

p0009 N78-14516

#### ARIZONA UNIV TUCSON

Some aspects of the inversion problem in remote p0084 N78-12589 sensina Application of modified Twomey techniques to invert lidar angular scatter and solar extinction data for determining aerosol size distributions p0085 N78-12602 ARKANSAS UNIV. FAYETTEVILLE

Classification of LANDSAT agricultural data based upon plor trends p0010 N78-14539 color trends

ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND ABERDEEN PROVING GROUND, MD

Infrared absorption spectra attributed to ion-nucleated water clusters p0064 N78-12518

[AD A044661] p00
ARMY COLD REGIONS RESEARCH AND

ENGINEERING LAB HANOVER, N H
Airborne spectroradiometer data compared with ground

water-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA CR-155290] p0100 N78-12514

Aerial photointerpretation of a small ice jam kD-A045870] p0064 N78-13513 [AD-A045870] Observations of the ultraviolet spectral reflectance of

[AD A046349] p0069 N78-15630 ENGINEER TOPOGRAPHIC LABS FORT BELVOIR, VA

An analysis of LANDSAT systems for cartographic and errain information p0031 N78-10544

[AD A044431] Corps of Engineers applications for remote sensing of e environment p0025 N78-14493 the environment

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS

Acquisition of terrain information using Landsat multispectral data. Report 2 an interactive procedure for classifying terrain types by spectral characteristics

Remote sensing of aquatic plants p0033 N78-13516 [AD-A045871] ATMOSPHERIC ENVIRONMENT SERVICE, OTTAWA

Experience with the inversion of Nimbus 4 BUV

measurements to retrieve the ozone profile p0086 N78-12606

#### ATOMIC ENERGY COMMISSION, DACCA (BANGLADESH)

Investigations using data from LANDSAT 2
[E78-10026] p0083

Investigations using data from LANDSAT 2
[E78-10026] p0083 N78-12502
ATOMIC ENERGY ESTABLISHMENT, CAIRO (EGYPT)
Application of LANDSAT satellite imagery for iron ore prospecting in the Western Desert of Egypt

Groundwater studies in and areas in Egypt using LANDSAT satellite images p0068 N78-14582 Interpretation of multispectral and infrared thermal surveys of the Suez Canal Zone Egypt

p0101 N78-14599 ATOMIC ENERGY RESEARCH ESTABLISHMENT, HARWELL (ENGLAND)

Ultrasonic river gauging p0062 N78-11469
AVCO-EVERETT RESEARCH LAB, EVERETT, MASS Airborne Oceanographic Lidar System p0048 A78-14878

### В

### BATTELLE COLUMBUS LABS, OHIO

Characterization of terrestrial service environments The simultaneous occurrence of combined conditions of solar insolation and climatic variables p0015 A78-11283 Applications of Seasat to the offshore oil gas and mining industries [AIAA 77 1583]

p0045 A78-13666 A survey of users of earth resources remote sensing p0107 A78-14859

The fate of nitrogen oxides in the atmosphere p0023 N78-10619 [PB-267784/7] Improved ground truth geoid for the GEOS 3 calibration

[NASA-CR 141431] p0032 N78-12510

# NASA-CR 141431; A survey of users of earth resources remote sensing p0111 N78-14553

### BATTELLE PACIFIC NORTHWEST LABS RICHLAND,

Comprehensive Information Retrieval and Model Input nce (CIRMIS) [BNWL-2235] p0087 N78-13951

Prototype active scanner for nighttime oil spill mapping nd classification p0026 N78-14590 and classification Detection identification and quantification techniq o0026 N78-14608 for soils of hazardous chemicals

#### BENDIX CORP ANN ARBOR, MICH

Application of LANDSAT to the surveillance of lake utrophication in the Great Lakes basin [E78-10023] ... n0064 N78-13503

Production of a water quality map of Saginaw Bay by computer processing of LANDSAT-2 data p0067 N78-14551

#### BERN UNIV (SWITZERLAND)

Microwave multispectral investigations of snow p0066 N78-14509

### BRITISH LIBRARY LENDING DIV. BOSTON SPA

The transfer of the contents of satellite pictures onto p0033 N78-14453

[BLLD-M-24900-(5828 4F)] The digital processing of Scanning Radiometer (SR) data from NOAA weather satellites as carried out in the Meteorological Institute of the Free University of Berlin Part 2 Notes on the digital filtering of satellite pictures

[BLLD-M 24895-(5828 4F)] p0102 N78-14747 The digital processing of Scanning Radiometer (SR) data weather satellites as carried out i

Meteorological Institute of the Free University of Berlin Part 1 Unearising the SR data [BLL-M-24896-(5828 4F)] p0102 N78-14750

# BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS, CANBERRA (AUSTRALIA)

Water utilization evapotranspiration and soil moisture monitoring in the south east region of south Australia [E78 10001] p0062 N78-11447

#### CALIFORNIA UNIV. RERKELEY

Use of multispectral data in design of forest samp p0002 A78-14808 surveys

Two phase sampling for wheat acreage estimation p0003 A78-14844

Geometric processing for digital mapping with multiseries mote sensing data p0082 N78-12489

Effective aerosol optical parameters from polarimeter p0086 N78-12605 Use of multispectral data in design of forest sample greeys p0009 N78-14500 surveys

Remote sensing-aided systems for snow qualification

evapotranspiration estimation and their application in hydrologic models p0067 N78-14527 Two phase sampling for wheat acreage estimation p0010 N78-14538

#### CALIFORNIA UNIV BERKELEY LAWRENCE BERKELEY LAB

Geological remote sensing from space [TID-27689] p0 DO039 N78-14615 developments in modeling groundwater Recent

systems p0068 N78-14616 LBL-52091 CALIFORNIA UNIV. DAVIS.

Rare earth and trace element geochemistry of metabasalts from the Point Sal ophiolite California

p0036 A78-20097 nd applications to p0068 N78-14564 Satellite land use acquisition and

hydrologic planning models
CALIFORNIA UNIV , LOS ANGELES National geodetic satellite program part

p0032 N78-11556 CALIFORNIA UNIV , RIVERSIDE

Formation of photochemical aerosols

[PB-268895/0] p0023 N78-10621 CAUFORNIA UNIV SANTA BARBARA.

Automated image processing of Landsat II digital data for watershed runoff prediction p0056 A78-14816 p0056 A78-14816 The impact of remote sensing on United States geography The past in perspective present realities future potentials p0109 N78-14470

A perspective on the state of the art of photographic terpretation p0087 N78 14473 interpretation Automated image processing of LANDSAT 2 digital data

p0066 N78-14508

Automated image processing of LANDSAT 2 of for watershed runoff prediction p0066 N7 CALSPAN CORP SUFFALO N Y
Thermal remote sensing calibration techniques [PB-269471/9] p0061 N7 Applications of HCMM satellite data p0061 N78-10630

[E78-10033] p0064 N78 12507
CANADA CENTRE FOR REMOTE SENSING, OTTAWA

(ONTARIO) Remote sensing data processing - Two years ago today p0072 A78-14784 and two years from today Scatterometer results from shorefast and floating sea e p0052 N78-14514

Use of clear lake as standard reflectors for atmospheric p0088 N78-14522 A solution to the problem of SAR range curvature p0090 N78 14571

CANADIAN FORESTRY SERVICE OTTAWA

Remote sensing and today's forestry issues

p0009 N78 14483
An application of LANDSAT digital technology to forest e fuel type mapping p0011 N78 14557 fire fuel type mapping CASPAN CORP, HOUSTON TEX

indexing screening coding and cataloging of earth resources aircraft mission data [NASA-CR-151549] p0108 N78-12508

CATHOLIC UNIV OF AMERICA WASHINGTON, D. C. Application of digital filtering to satellite geodesy p0082 N78 12486

CENTER FOR THE ENVIRONMENT AND MAN, INC. HARTFORD, CONN

Precipitation (radar) project of the IFYGL lake meteorology [PB-272152/0] o0069 N78 15660

NTRAL INTELLIGENCE AGENCY WASHINGTON, DC

CAM Cartographic Automatic Mapping program documentation 5th edition [PR-270304/9] n0032 N78 11498 D'ETUDE SPATIALE DES RAYONNEMENTS,

TOULOUSE (FRANCE)

Inventory of ricefields in France using LANDSAT and increase p0012 N78 14594 aircraft CENTRE NATIONAL D'ETUDES SPATIALES, PARIS

French space program p0109 N78-13978 CENTRE NATIONAL D'ETUDES SPATIALES, TOULOUSE (FRANCE)

Test system for earth observation - SPOT Volume 1 Systems analysis and development plan

p0092 N78-14617
Test system for earth observation - SPOT Volume 3 Test system for earth observation - SPOT Volume 3
Multimission platform - subsystems p0092 N78 14618 Test system for earth observation - SPOT Volume 4

First mission payload Test system for earth observation - SPOT Volume 4bis rest system for earth observation - SPUT Volume 4bis First mission payload and microwave payload compatibility study p0092 N78-14620 Test system for earth observation SPOT Volume 5 Multipurpose ground facilities and dedicated image

DO092 N78-14621

CHALMERS UNIV OF TECHNOLOGY, GOTEBORG (SWEDEN)

A PbSe diode laser spectrometer to be used in air pollution monitoring and mineral prospecting [CTH IEM TR 7636] p0101 N78-14699

CHIBA UNIV (JAPAN) On the photographic processing and digital texture for

remote sensing of Kujukuri Coast of Chiba p0052 N78-14506

CHICAGO UNIV. ILL.

Temperature sensing The direct road to inform p0086 N78-12607

COAST GUARD RESEARCH AND DEVELOPMENT
CENTER GROTON CONN
Field infrared method to discriminate natural seeps from non-seeps Santa Barbara California area
[AD-A042861] p0023 N78-10608
COLLEGE OF WILLIAM AND MARY WILLIAMSBURG

Atlas of infrared absorption lines

[NASA-CR 2925] p0086 COLORADO STATE UNIV, FORT COLLINS p0086 N78-12608

Multidate mapping of mosquito habitat

COMMITTEE ON SCIENCE AND TECHNOLOGY (U.S.

Earth resources information systems

[GPO-95 881] p0108 N78 11450

Earth resources information system [GPO-94 462] p0108 N78-12509 COMPUTER SCIENCES CORP SILVER SPRING, MD

Remote sensing of chlorophyll concentration from p0042 A78-12838 Hydrographic charting from Landsat satellite

p0042 A78-12839 comparison with aircraft imagery Data handling for the geometric correction of large p0080 A78 18649 images

CONSIGLIO NAZIONALE DELLE RICERCHE, MILAN (ITALY) Application of conventional and advanced techniques for

the interpretation of LANDSAT 2 images for the study of linears in the Friuli earthquake area p0091 N78-14580 CONSIGLIO NAZIONALE DELLE RICERCHE VENICE

Quantitative evaluation of water bodies dynamic by means of thermal infrared and multispectral surveys on the p0067 N78 14536

CONTROL DATA CORP MINNEAPOUS MINN

Digital image correlation techniques applied to LANDSAT multispectral imagery

p0083 N78 12499 [E78-10022] COOPERATIVE INST. FOR RESEARCH IN

ENVIRONMENTAL SCIENCE BOULDER COLO Dependence of substorm occurrence probability on the interplanetary magnetic field and on the size of the auroral oval p0080 A78 18730 CORNELL UNIV ITHACA, N Y

Far-infrared photometry with an 0.4-meter liquid helium cooled balloon-borne telescope [NASA-CR 155234] p0099 N78-11449

Analytical aerial triangulation with corrections for systematic errors p0086 N78 13498 Recent vertical crustal movements from geodetic measurements Alaska and the eastern United States p0033 N78-15622

CUTLER-HAMMER, INC., MELVILLE NY

Remote sensing of earth resources using a spaceborne microwave radiometer p0098 A78-17377

#### D

DARTMOUTH COLL, HANOVER, N H

Airborne spectroradiometer data compared with ground rater-turbidity measurements at Lake Powell Utah Correlation and quantification of data [NASA CR 155290] p0100 N78-12514

DELAWARE UNIV, NEWARK

Skylab/EREP application to ecological geological and oceanographic investigations of Delaware Bay [E78 10003] p0050 N78-12492 [F78 10003]

DEPARTMENT OF AGRICULTURE, WASHINGTON.

Pilot study of the potential contributions of LANDSAT ta in the construction of area sampling frames
78 10037] p0012 N78-15536

The auxiliary use of LANDSAT data in estimating crop acreages Results of the 1975 Illinois crop-acreage experiment [E78 10049] p0012 N78-15539

DEPARTMENT OF ENERGY, MINES AND RESOURCES, OTTAWA (ONTARIO)

The use of LANDSAT imagery to locate uncharted coastal features on the Labrador coast p0089 N78-14524 DEPARTMENT OF ENVIRONMENT, HULL (QUEBEC)

Application of electronic distance measuring devices to measurement of discharge and sediment deposition p0062 N78-11467

DEPARTMENT OF THE ENVIRONMENTAL WATER DATA UNIT READING (ENGLAND)

Site calibration of electromagnetic and p0062 N78-11470 gauging stations

DEPARTMENT OF THE NORTHERN TERRITORY DARWIN (AUSTRALIA)

ERTS B imagery to monitor large scale clearing and development programmes in the Daly Basin northern

[E78-10002] p0081 N78-10530

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT COLOGNE (WEST GERMANY)

Remote infrared spectroscopy of the earth

p0038 N78-14543 DEUTSCHE FORSCHUNGS- UND

VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT OBERPFAFFENHOFEN (WEST GERMANY) Concept for an airborne multidisciplinary lidar system p0023 N78-11634

Atmospheric physics as a means of environmental research [DLR-IB-553-75/7] n0027 N78-14732

DRAPER (CHARLES STARK) LAB, INC. CAMBRIDGE, Inversion of scattered radiance horizon profiles for

gaseous concentrations and aerosol parameter p0085 N78 12595

DREXEL UNIV PHILADELPHIA PA

Techniques for opening regional radiation budgets from p0099 N78 11446 satellite radiometer observations The use of canonical correlation analysis for measuring

p0027 N78-15592 environmental health quality

#### Ε

EARTH SATELLITE CORP WASHINGTON D C

AOIPS water resources data management sys [NASA-TM X-71396] p0061 N p0061 N78-10542 Development of airborne electromagnetic survey

instrumentation and application to the search for buried sand and gravel a summary report [PB-271331/1] n0039 N78 14622

A preliminary study of the applicability of Nimbus 6 ESMR to surface wind speed estimates [AD-A046629] p0102 N78 15643

ECOSYSTEMS INTERNATIONAL, INC. GAMBRILLS,

Applications of remote sensing to water [NASA-CR 150467] p0064 N78 13509

EG AND G WASHINGTON ANALYTICAL SERVICES
CENTER INC., POCOMOKE CITY MD

Ocean current surface measurement using dynamic elevations obtained by the GEOS-3 radar altimeter [AIAA 77-1566] p0044 A78 13658 p0044 A78 13658 ENVIRONMENTAL PROTECTION AGENCY LAS

Remote sensing of air pollutants p0024 N78 14489

**ENVIRONMENTAL PROTECTION AGENCY** RESEARCH TRIANGLE PARK, N C

Instrumental sensing of stationary source emissions p0015 A78-10056 ENVIRONMENTAL PROTECTION AGENCY.

WASHINGTON, D C
Quality assurance research plan fiscal year 1978

1982 [PB-272421/9] p0027 N78-14700 ENVIRONMENTAL RESEARCH AND TECHNOLOGY,

INC , CONCORD, MASS Analysis of photochemical oxidant and particulate pollution patterns in New England using remote sensing

[PB-268996/6] DO023 N78-10623 ENVIRONMENTAL RESEARCH INST OF MICHIGAN, ANN ARBOR

Remote sensing data processing. Two years ago today and two years from today p0072 A78-14784
A survey of SAR image-formation processing for earth resources applications p0073 A78-14785 p0072 A78-14784 Investigation of thematic mapper spatial radiometric and spectral resolution p0096 A78 14826

Remote sensing and geographically based information p0075 A78 14866 Wheat yield forecasts using Landsat data

n0004 478 14876 The influence of multispectral scanner spatial resolu on forest feature classification p0004 A78 14880 Blob - An unsupervised clustering preprocessing of MSS imagery approach to spatial p0075 A78 14883 Multispectral system analysis through modeling and p0075 A78 14884
Wheat productivity estimates using LANDSAT data

Analysis of synthetic aperture radar ocean wave data collected at Marineland and Georges Bank [P8-268675/6]

An evaluation of the signature extension approach to large area crop inventories utilizing space image data [E78-10016] p0007 N78-12496

Evaluation of signature extension algorithms [E78-10021] p0083 N78-12498 Basic remote sensing investigation for beach

p0083 N78 12515 [AD-A044836] Investigations of spectral separability of small grains early eason wheat detection and multicrop inventory planning p inventory planning p0008 N78 13499

[E78 10015] Procedure B A multisegment training selection and proportion estimation procedure for processing LANDSAT aricultural data

[E78-10039] p0008 N78-14456 Signature extension preprocessing for LANDSAT MSS

data p0087 N78-14457 [E78-10040]

Investigation of techniques for inventorying forested agions. Volume 1. Reflectance modeling and empirical altispectral analysis of forest canopy components

p0009 N78-14462 [E78-10046] Investigation of techniques for inventorying forested regions. Volume 2. Forestry information system requirements and joint use of remotely sensed and ancillary

[E78-10047] Proceedings of the Eleventh International Symposium on Remote Sensing of Environment volume 1

[NASA-CR 155361] p0109 N78-14464 Remote sensing data processing Two years ago today and two years from today p0087 N78-14471 processing for earth p0087 N78-14472 A survey of SAR image-formation resources applications

a global scale p0109 N78-14479 Gathering and using information of Digital exploitation of synthetic aperture radar

n0088 N78-14505 Proceedings of the Eleventh International Symposium on

Remote Sensing of Environment volume 2 [NASA CR-155362] p01 p0110 N78-14529 Digital processing system for deve oping countries p0089 N78-14559

Remote sensing and geographically based information stems p0090 N78-14560 systems Integration of remote sensing and surface geophysics the detection of faults p0038 N78-14561

in the detection of faults Wheat yelld forecasts using LANDSAT data p0011 N78-14570

The influence of multispectral s er enatial resolution p0011 N78-14574 on forest feature classification BLOB An unsupervised clustering approach to spatial eprocessing of MSS imagery p0090 N78-14577 preprocessing of MSS imagery Multispectral system analysis through modeling and

p0090 N78-14578 simulation A digital technique for manual extraction of data from p0091 N78-14579 aerial photography

Applications of LANDSAT data to the economic development of Mindoro Phillipines to the integrated p0011 N78 14583

Remote sensing A partial technology p0111 N78-14612 [PB-271278/4] NASA/Cousteau ocean bathymetry experiment. Remote bathymetry using high gain LANDSAT data
[NASA-CR-156658] p0054 N78-15662

EROS DATA CENTER SIQUX FAILS, S. DAK

Monstoring irrigated land acreage using LANDSAT imagery An application example p0066 N78 14501

ESL, INC , SUNNYVALE, CALIF

Airborne monitoring of crop canopy temperatures for irrigation scheduling and yield prediction p0004 A78-14897

EUROPEAN SPACE AGENCY, PARIS (FRANCE)

Microwave scattering from the sea surface
[ESA-TT-422] p0051 N78-13313

FAIREY SURVEYS LTD MAIDENHEAD (ENGLAND) Testing the accuracy of remote sensing land use maps p0025 N78-14511

FISH AND WILDLIFE SERVICE FT COLUNS COLO Interum hierarchical regional classification scheme for coastal ecosystems of the United States and its territories [PB 272691/7] p0027 N78-15553

FLORIDA INST OF TECH, MELBOURNE

A multispectral analysis of algal bloom in the Gulf of Marica [AIAA 77 1565] p0044 A78-13657

FLORIDA UNIV, GAINESVILLE

Cold climate mapping using satellite high resolution thermal imagery p0076 A78-14978 Influence of ground level SO2 on the diffuse to direct irradiance ratio in the middle ultraviolet

DO025 N78-14502

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME (ITALY)
Aerial albedos of natural vegetation

Australia p0011 N78-14576

FOREST SERVICE UPPER DARBY PA

Forestland type identification and analysis in Western Massachussetts. A linkage of a LANDSAT forest inventory to an optimization study n0012 N78-14595

### G

### GENERAL ACCOUNTING OFFICE WASHINGTON, D

LANDSATS role in an earth resources information system National Aeronautics and Space Administration
Office of Science and Technology Policy
[NASA CR-155217] pO108 N78-10968

p0108 N78-10968 The SEASAT A project. Where it stands today. National Aeronautics and Space Administration National Oceanic and Atmospheric Administration

[PB-272004/3] p0053 N78-14772

GENERAL DYNAMICS CORP , CHICAGO ILL.

Real Time Dust Fall Monitor (RTDFM) [NASA-CR-150446] p0

| NASA-CR-150446| p0098 N78-10436 | GENERAL DYNAMICS/FORT WORTH, TEX Active microwave measurement from space of sea-surface winds p0041 A78-12615

sea-surface winds

GENERAL ELECTRIC CO , BELT8VILLE MD

Thunderstorm monitoring from a geosynchronous p0076 A78-15010 Remote sensing exploration for metallic mineral resources in central Baja California p0038 N78-14517
GENERAL LAND OFFICE, AUSTIN TEX.

Development and application of operational techniques for the inventory and monitoring of resources and uses for the Texas coastal zone Volume 1 Text p0053 N78 15537 [E78 10042]

Development and application of operational techniques for the inventory and monitoring of resources and uses for the Taxas coastal zone Volume 2 Appendices [E78-10048]

GEOLOGICAL SURVEY, ANCHORAGE, ALASKA Hydrometry under Arctic conditions

p0062 N78 11475

GEOLOGICAL SURVEY, DENVER COLO

Evaluation of algorithms for geological thermal-inertia p0039 N78-14562 Digital color analysis of color-ratio composite LANDSAT enes p0091 N78 14592

GEOLOGICAL BURVEY HELENA, MONT

Use of thermal infrared imagery in ground-water investigations in Montana p0067 N78 14563 GEOLOGICAL SURVEY, IOWA CITY, IOWA

Land classification of south-central lowa from computer

enhanced (mages

p0082 N78 12493

GEOLOGICAL SURVEY MALAYSIA

Geological and hydrogeological investigations in west Malaysia [F78-10027]

p0032 N78-12503 GEOLOGICAL SURVEY, MENLO PARK CALIF

marine

Computer image processing in exploration GEOLOGICAL SURVEY, RESTON, VA p0041 A78 12828

Use of earth satellite technology for telemetering hydrometeorological station data p0063 N78 11489 Preparation of a geologic photo map and hydrologic study of the Yemen Arab Republic [E78-10008] p0037 N78-12494

Coastal wetlands The present and future role of remote poole N78 14485 sensina

Application of remotely sensed land-use information to improve estimates of streamflow characteristics volume

[E78-10052]

GEOLOGICAL SURVEY, SIOUX FALLS 8 DAK
An overview of remote sensing technology transfer Canada and the United States nO110 N78 14486

GEOLOGICAL SURVEY, SUFFOLK, VA. Three approaches to the classification wetlands p0068

p0068 N78-14600 GEOSAT COMMITTEE INC. SAN FRANCISCO, CALIF Industrial use of geological remote sensing from space p0037 N78-14474

#### GEOSPECTRA CORP. ANN ARBOR, MICH.

LANDSAT detection of hydrothermal alteration in the Nogal Canyon Cauldron New Mexico p0037 N78 14507 Reducing LANDSAT data to parameters with physical ignificance and signature extension. A view of LANDSAT capabilities p0090 N78 14575

#### GOODYEAR AEROSPACE CORP LITCHFIELD PARK ARIZ.

A survey of SAR image formation processing for earth sources applications p0073 A78-14785 resources applications

GRUMMAN AEROSPACE CORP BETHPAGE NY
Polarimeter measures sea state characteristics using emitted infrared radiation p0052 N78-14513

HACKING LABS SANTA CLARA, CALIF
Design and fabrication of nosecone for WB-57F aircraft
fitted with APC-102A side looking radar [NASA-CR 151592] p0102 N78 15028

HAWAII UNIV, HONOLULU Asteroid surface materials characterizations from reflectance spectra Mineralogical

[NASA-CR 154510] p0036 N78 10992

HELSINKI UNIV (FINLAND)
Investigation of LANDSAT imagery on correlations between ore deposits and major shield structures in Finland [E78 10012] o0036 N78 10537

HELSINKI UNIV OF TECHNOLOGY, ESPOO (FINLAND)

Microwave emission from sea ice

p0050 N78-11292 [REPT S-90]

## HONEYWELL RADIATION CENTER LEXINGTON

Multilayered (Hg Cd)Te infrared detector

p0099 N78-11453

HOSEI UNIV, TOKYO (JAPAN) Multi-seasonal data analysis and some extensions for environmental monitoring p0025 N78-14504

HUMBOLDT STATE COLL, ARCATA CALIF
The effect of soil water deficit on the reflectance of conifer p0010 N78-14521 seedling canopies

#### IRM FEDERAL SYSTEMS DIV HOUSTON TEXAS View angle effect in Landsat imagery

D0074 A78-14848

Landsat data from agricultural sites - Crop signature

IDAHO UNIV. MOSCOW

Effect of antecedent on frozen ground floods [PB 270632/3] p0065 N p0065 N78-13522

IFE UNIV ILE-IFE (NIGERIA)

The transfer of remote sensing technology in the developing nations. An observation p0110 N78-14488

IMAGE GRAPHICS INC. FAIRFIELD, CONN
Cartographic Electron Beam Recorder (EBR) system
[AD A044401] p0100 N78-12513 INDIAN SPACE RESEARCH ORGANIZATION.

### ADMEDABAD

Image analysis techniques with special reference to analysis and interpretation of geological features from LANDSAT imagery p0038 N78-14544 LANDSAT imagery

INDIANA UNIV BLOOMINGTON

Trichlorofluoromethana a new hydrologic tool for tracing and dating ground water p0069 N78-15531

### INLAND WATERS DIRECTORATE, OTTAWA

(ONTARIO) Data retransmission by satellite te for operational p0063 N78-11490 nurnosas

INSTITUTE FOR ATMOSPHERE OPTICS AND REMOTE SENSING, HAMPTON, VA

Inversion of solar aureole measurements for determining p0085 N78-12596 aerosol characteristics

### INSTITUTE OF HYDROLOGY, WALLINGFORD

### (ENGLAND)

Telemetering river level from a large remote tropical p0063 N78 11476 area

#### INSTITUTE OF OCEAN SCIENCES, VICTORIA (BRITISH COLUMBIA)

Use of an inertial navigation system for accurate track recovery and coastal oceanographic measure p0053 N78-14586

#### INSTITUTO DE PESQUISAS ESPACIAIS SAO JOSE DOS CAMPOS (BRAZIL)

Evaluation of spectral channels and wavelength regions for separability of agricultural cover types

n0004 A78-14860 Study of the Brazil and Falkland currents using their images of Nimbus 5 and oceanographic data in 1972 -

Evaluation of spectral channels and wavelength regions for separability of agricultural cover types

p0010 N78-14554 Application of remote sensing to geothermal anomaly mapping in the Caldas Novas County Goias [INPE-1129-TPT/070] GOIAS POO39 N78-14810

Application of remote sensing to geological and mineral

deposits surveys of the northern Minas Gerais state utilizing images from LANDSAT [INPE-1096-PE/073] p0039 N78-14611

Boundary detection in images Optical formulation in terms of signal detection theory [INPE-1118-TPT-067]

p0092 N78-14894 INTERA ENVIRONMENTAL CONSULTANTS LTD

CALGARY (ALBERTA) Remote sensing in operational range management programs in Western Canada p0028 N78-14556

INTERA ENVIRONMENTAL CONSULTANTS LTD

HOUSTON, TEX.

Thermal imagery for census of ungulates DO010 N78-14555

INTERIOR DEPT, WASHINGTON D.C.

Rebirth of remote sensing our own good?

Do we know enough for p0109 N78-14478 pO109 N78-14478

INTERNATIONAL ASTRONAUTICAL FEDERATION PARIS (FRANCE)

The present status of remote sensing in the United ations 8 April 1977 p0110 N78-14481 Nations 8 April 1977

INTERNATIONAL BUSINESS MACHINES CORP.

GAITHERSBURG, MD

Resampling study [E78-10014] nOO82 N78-12495 INTERNATIONAL BUSINESS MACHINES CORP.

HOUSTON, TEX
LANDSAT data from agricultural sites Crop signature p0012 N78-14593

### J

JAHANGIRNAGAR UNIV DACCA (BANGLADESH)
Land utilization and ecological aspects in the
Sylhet-Mymensingh Haor Region of Bangladesh An
analysis of LANDSAT data p0028 N78-14565

#### JET PROPULSION LAB CALIF INST OF TECH PASADENA

Computer processing of SAR L-band imagery

p0055 A78-10524 Characterization of terrestrial service environments - The simultaneous occurrence of combined conditions of solar insolation and climatic variables p0015 A78-11283 marine resource p0041 A78 12828 Computer image processing in exploration

The Seasat A project. An overview

p0042 A78 12829 The Seasat A Scanning Multichannel Microwave adiometer p0095 A78-12831 Radiometer

Seasat-A Synthetic Aperture Radar p0095 A78-12833 implementation The Seasat surface truth experiments

p0042 A78-12834 pu042 A78-12834
Surveying the earth's environment from space - Spectral areal temporal coverage trends
[AIAA 77-1585] p0105 A78-13667

nO105 A78-13667 Seasat-A and the commercial ocean n community p0046 A78-13682 **IAIAA 77-1591** 

Marine decision [AIAA 77 1611] on aids from space p0046 A78 13683

Hurricane Gloria Ocean wave patterns under Observation with an airborne synthetic-aperture radar p0047 A78 14126

Sensing the earth's environment from space. User needs technology opportunities p0106 A78-14778 and technology opportunities
A survey of SAR image-formation processing for earth p0073 A78 14785 resources applications Landset-D thematic mapper simulation using aircraft ultispectral scanner data p0073 A78 14806 multispectral scanner data

The vertical distribution of HCl in the stratosphere in entree for large space antennas p0097 A78 16699

Generalization of the relaxation method for the inverse solution of nonlinear and linear transfer equations p0084 N78 12590 Inversion methods in temperature and aerosol remote sounding. Their commonality and differences and some unexplored approaches p0085 N78 12601

Sensing the earth's environment from space User needs and technology opportunities p0109 N78 14465 and technology advances in active and passive microwave sensing through 1985 pO087 N78-14466 LANDSAT D thematic mapper similation using aircraft multispectral scanner data p0088 N78-14498 JOHNS HOPKINS UNIV , LAUREL, MD

Observation of the development of individual clear as convective cells p0020 A78 17061

p0055 A78 14780 for meteorological

p0076 A78 15004

The utility of short wavelength /less than 1 mm/ remote

processing

sensing techniques for the monitoring and asses

Interactive image processing for meteoro applications at NASA/Goddard Space Flight Center

hydrologic parameters

#### JOINT PUBLICATIONS RESEARCH SERVICE. Utilization of remote sensing observations in hydrologic odels p0065 N78-14469 ARLINGTON, VA models Translations on USSR resources no 768 [JPRS-70524] p011 MASSACHUSETTS INST OF TECH, CAMBRIDGE p0111 N78-15557 A model for microwave intensity propagation in an homogeneous medium p0096 A78-13971 JOINT RESEARCH CENTRE OF THE EUROPEAN inhomogeneous medium MUNITIES, ISPRA (ITALY) Atmospheric sounding with passive microwaves - Review po prognosis p0018 A78-14802 Computer-aided classification for remote sensing in and prognosis agriculture and forestry in Northern Italy Inversion of passive microwave remote sensing data from p0011 N78-14573 satellites p0085 N78-12599 Atmospheric sounding with passive microwaves Review p0088 N78-14494 METRICS INC. ATLANTA, GA Indicators of international remote sensing activities p0111 N78-14535 KANSAS STATE UNIV, MANHATTAN Using Landsat data to estimate evapotranspiration of winter wheat p0006 A78-15392 MIAMI UNIV, CORAL GABLES, FLA One-parameter characterization of the ocean's inherent optical properties for remote sensing p0041 A78-10161 Some aspects of adaptive transform coding of p0079 A78 18071 ultispectral data Evaluating soil moisture and yield of winter wheat in e Great Plains using Landsat data p0007 A78-18249 MICHIGAN STATE UNIV, EAST LANSING Planting data and wheat yield models [E78-10013] Estimation of old field ecosystem biomass using low p0003 A78-14828 p0007 N78-10538 Application of aerial photography to water-related programs in Michigan p0056 A78-14835 KANSAS UNIV, LAWRENCE Radar systems for a polar mission volume 1 [NASA-CR-156640] p0049 N Use of remote sensing for land use policy formulation p0008 N78 13502 p0049 N78-10344 [E78-10020] Estimation of soil moisture with radar remote sensing p0101 N78-14601 Estimation of old field ecosystem biomass using low titude imagery p0088 N78 14520 altitude imagery KANSAS UNIV CENTER FOR RESEARCH INC. Application of aerial photography to water-related LAWRENCE programs in Michigan p0067 N78 14528 microwave measurement from space of e winds p0041 A78-12615 MICHIGAN UNIV ANN ARBOR sea-surface winds re-visual detection of stress in pine forests Optimal spatial sampling techniques for ground truth data p0010 N78 14541 in microwave remote sensing of soil moisture MINNESOTA UNIV, ST PAUL p0058 A78-18247 Quaternary geologic map of Minnesota Microwave remote sensing of hydrologic parameters p0065 N78-14468 p0038 N78 14526 MISSISSIPPI STATE OFFICE OF SCIENCE AND TECHNOLOGY, JACKSON The use of LANDSAT digital data and computer Space radar system specifications p0101 N/8-14495 KENTUCKY DEPT OF NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION, FRANKFORT Onsite control of sedimentation utilizing the modified block-cut method of surface mining implemented techniques for an erosion hazard-reforestation needs assessment [E78-10050] p0012 N78 15540 MISSISSIPPI STATE UNIV, MISSISSIPPI STATE [PB-272244/5] n0040 N78 15552 Nucleonic coal detector hydropneumatic suspension [NASA-CR 150465] with independent L p0036 N78-11454 Application of remote sensing to state and regional LEIDEN UNIV (NETHERLANDS) Hybrid methods are helpful p0084 N78-12587 LENINGRAD (A A ZHDANOV) STATE UNIV (USSR) [E78-10034] p0024 N78 13506 Tennessee-Tombigbee industrial siting project. A study of physical and environmental factors of potential industrial Passive microwave remote sensing of soil moisture p0068 N78 14609 sites [E78-10035] p0024 N78-13507 MITRE CORP MCLEAN, VA Determination of scattering functions and their effects on remote sensing of turbidity in natural waters LOCKHEED ELECTRONICS CO HOUSTON, TEX. A multispectral analysis of algal bloom in the Gulf of Mexico [AIAA 77 1565] p0044 A78-13657 The use of Landsat digital data to detect and monitor agetation water deficiencies p0004 A78-14846 p0004 A78-14864 [NASA CR-145239] p0094 N78 15551 vegetation water deficiencies Performance tests of signature extension algorithms p0005 A78-14904 A multispectral analysis of the interface between the NATIONAL AERONAUTICS AND SPACE Brazil and Falkland currents from Skylab ADMINISTRATION, WASHINGTON D C p0049 A78-18246 Marine decision aids from space NAA 77 1611] p0046 A78 13683 Uses of the Space Shuttle in the NASA Applications rogram p0107 A78-18189 Rare earth and trace element geochemistry of metabasalts from the Point Sal ophiolite California p0036 A78-20097 Spacelab - A new tool for cooperative research LANDSAT image interpretation aids p0108 A78 19595 Investigation of natural environment by space means p0089 N78-14558 Performance tests of signature extension algorithms p0091 N78-14598 Geobotany Geomorphology soil sciences agricultural lands landscape study [NASA-TM-75041] LOCKHEED MISSILES AND SPACE CO , PALO ALTO, p0108 N78-11448 Localization of an experimental ecological unit in the Maradi region of Nigeria [NASA-TM-75085] p0032 N78-12553 lonospheric irregularities Optical support of HAES scintillation experiments [AD-A043666] p0082 N78-11561 Inversion Methods in Atmospheric Remote Sounding [NASA-CP-004] p0084 N78-12586 Investigation of earth from space Joint experiment of [NASA-CP-004] p0084 N78-12586 NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AMES RESEARCH CENTER, MOFFETT FIELD, CALIF Altborne monitoring of crop canopy temperatures for irrigation scheduling and yield prediction USSR and GDR scientists on the Soluz-22 spacecraft p0109 N78-13511 LOUISIANA STATE UNIV, BATON ROUGE Surface temperatures and temperature gradient features of the US Gulf Coast waters n0053 N78-14606 p0004 A78-14897 Airborne monitoring of crop canopy temperatures for imgation scheduling and yield prediction LUDWIG-MAXIMILIANS-UNIVERSITAT, MUNICH (WEST GERMANY) Textural analysis by statistical parameters and its p0011 N78 14591 NATIONAL AERONAUTICS AND SPACE application to the mapping of flow structures in wetlands p0067 N78-14550 LUND UNIV (SWEDEN) LANDSAT digital data for water pollution and water ADMINISTRATION GODDARD INST FOR SPACE STUDIES, NEW YORK quality studies in Southern Scandinavia Remote sensing of vegetation and soil using microwave ellipsometry [NASA-CASE-GSC-11976-1] p0025 N78-14534 p0007 N78-10529 INDICATE SECTION OF THE PROOF WAS TO THE PROOF OF T M MACDONALD, DETTWILER AND ASSOCIATES LTD. p0095 A78-12831 Radiometer RICHMOND (BRITISH COLUMBIA) p0042 A78-12838 Remote sensing of chlorophyll con-A low cost system for reception and processing of line-scan data from LANDSAT and other sources Hydrographic charting from Landsat satellite comparison with aircraft imagery p0042 A78-1

p0089 N78-14523

p0063 N78-11647

p0042 A78-12839

p0029 A78-13766

p0047 A78-13803

Monitoring surface albedo change with Landsat

Atmospheric transformation of solar radiation reflected

Thunderstorm monitoring from a geosynchronous p0076 A78 15010 Vertical lifting of ionization during geomagnetic storms from satellite measurements of ion composition p0079 A78-16730 Microwave radiometry for soil moisture sensing p0060 A78-18869 Spectral structure of the solar radiation field reflected p0049 A78-20055 Monte Carlo simulation of wave sensing with a short ulse radar Urban area delineation and detection of change along the urban-rural boundary as derived from LANDSAT digital [NASA-TM X-71413] n0023 N78-10540 AOIPS water resources data management system
[NASA-TM X-71396] p0061 N78-10542 Aircraft sensor analysis package system description [NASA-TM 78038] p0081 N78-11451 A method of inversion of satellite magnetic anomaly [NASA-TM 78039] p0032 N78 11452 National geodetic satellite program part 1 p0032 N78 11550 Backus-Gilbert theory and its application to retrieval of one and temperature profiles p0084 N78-12593 ozone and temperature profiles A cost-benefit evaluation of the LANDSAT flow-on operational system [NASA-TM-78052] n0108 N78-13510 The utility of short wavelength (1mm) remote sensing techniques for the monitoring and assessment of hydrologic p0065 N78 14467 the environmental Significant initial results from measurements experiment on ATS-6 [NASA-TP 1101] LANDSAT 1 p0102 N78-15142 cumulative US standard catalog 1976/1977 [NASA-TM-74993] p0093 N78-15535 LANDSAT US standard catalog 1 October - 31 October [NASA TM-74992] p0093 N78 15545 LANDSAT non-US standard catalog 1 31 October [NASA-TM-74990] p0093 N78 15546 LANDSAT 1 non US cumulative catalog 1976/1977 NASA-TM-74991] p0093 N78-15547 [NASA-TM-74991] ASA-TM-74991]
LANDSAT Non-US standard catalog p0093 N78-15548 [NASA-TM-74988] The analysis of GEOS 3 altimeter data in the Tasman nd Coral seas [NASA TM 78032] n0053 N78 15550 LANDSAT US standard catalog 1 - 31 August 1977 GSFC/LU-C/008] 1 - 31 August 1977 p0094 N78 15554 [GSFC/LU-C/008] LANDSAT Non-US standard catalog 1-30 September p0094 N78 15555 [NASA-TM-74956] LANDSAT US standard catalog 1 30 September 1977 IASA-TM 74957} p0094 N78 15556 [NASA-TM 74957] NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LYNDON B JOHNSON SPACE CENTER, HOUSTON, TEX. Remote sensing data processing - Two years ago today and two years from today p0072 A78 14784 LACIE - A look to the future p0002 A78-14804 Investigation of thematic mapper spatial radiometric and spectral resolution p0096 A78 14826 The use of Landsat digital data to detect and monitor getation water deficiencies p0004 A78-14846 vegetation water deficiencies View angle effect in Landsat imagery D0074 A78-14848 A multispectral analysis of the interface between the Brazil and Falkland currents from Skylab p0049 A78-18246 Pattern recognition of Landsat data based upon temporal p0007 A78 18248 trend analysis Rare earth and trace element geochemistry of metabasalts from the Point Sal ophiolite California p0036 A78-20097 A technique for the determination of Louisiana marsh salinity zone from vegetation mapped by multispectral scanner data. A comparison of satellite and aircraft data [NASA-TM-58203] p0061 N78-10541 Remote sensing of oceanic parameters during the Skylab/gamefish experiment [NASA-RP-1012] p0051 N78-12644 Investigation of thematic mapper spatial radiometric and p0088 N78-14518 The use of LANDSAT digital data to detect and monitor vegetation water deficiencies p0010 N78 14540 getation water denotes to the state of the s

Procedures for gathering ground truth information for a

supervised approach to a computer-implemented land cover

classification of LANDSAT-acquired multispectral scanner

p0027 N78-15549

[NASA RP 1015]

rates

[PB-270299/1]

MARYLAND UNIV. COLLEGE PARK

An intercomparison of satellite images and radar rainfall

### NATIONAL AFRONAUTICS AND SPACE ADMINISTRATION LANGLEY RESEARCH CENTER, LANGLEY STATION, VA

Quantitative mapping of suspended solids in wastewater sludge plumes in the New York Bight apex p0015 A78 10658

The Seasat-A satellite scatterometer

p0095 A78 12832 The use of Landsat for monitoring water parameters in the coastal zone

n0045 A78-13672

Evaluation of a hydrogen chloride detector for p0017 A78-13843 vironmental monitoring Multispectral analysis of ocean dumped materials

p0019 A78-14913 Quantitative remote measurements of pollutants from

stationary sources using Raman lidar p0020 A78-17000 Aircraft versus spacecraft for remote monitoring of water quality in U.S. coastal zones n0021 A78-17576 Application of aircraft multispectral scanners to

quantitative analysis and mapping of water quality parameters in the James River Virginia ±0080 A78-18104

Remote sensing and laboratory techniques for monitoring p0022 A78-18795
An introduction to orbit dynamics and its application to

satellite-based earth monitoring systems p0099 N78-12113

[NASA RP-1009] p0099 N78-12113 Laboratory measurements of radiance and reflectance spectra of dilute primary-treated sewage sludge [NASA TP-1038] p0023 N78-12554

Laboratory measurements of radiance and reflectance ectra of dilute secondary-treated sewage sludge

IASA TP-1089] p0024 N78-12555
Laboratory measurements of upwelled radiance and [NASA TP-1089] reflectance spectra of Calvert Ball Jordan and Feldspar

Quantitative analysis of aircraft multispectral-scanner data and mapping of water-quality parameters in the James River in Virginia

o0065 N78-13628 [NASA-TP-1021] ACIE A look to the future

# NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LEWIS RESEARCH CENTER, CLEVELAND, OHIO Devices

Development of environmental charging effect monitors for operational satellites p0098 N78 10174 Global sensing of gaseous and serosol trace species using automated instrumentation on 747 airliners

automated instrumentation on 747 aininers
[NASA-TM 73810]
In-situ laser retorting of oil shale
[NASA-CASE-LEW-12217-1]
p0037 N78 14452
NATIONAL AERONAUTICS AND SPACE

# NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MARSHALL SPACE FLIGHT CENTER, MUNTSVILLE, ALA Vector statistics of LANDSAT imagery [NASA-TM 78149] P0093 N78-15544 NATIONAL AERONAUTICS AND SPACE

ADMINISTRATION WALLOPS STATION, WALLOPS ISLAND, VA Ocean current surface measurement using dynamic

elevations obtained by the GEOS 3 radar altimeter
[AIAA 77-1566] p0044 A78-13658 On the hysteresis of the sea surface and its applicability

to wave height predictions [AIAA 77-1588] nOO45 A78-13669 Airborne Oceanographic Lidar System

p0048 A78-14878 Airborne oceanographic lidar system

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH. BOULDER, COLO

Inversion of infrared limb emission measurements for temperature and trace gas concentrations p0084 N78-12594 NATIONAL ENVIRONMENTAL SATELLITE SERVICE SUITLAND MD

The operational processing of wind estimates from cloud motions Past present and future p0091 N78-14604 NATIONAL ENVIRONMENTAL SATELLITE SERVICE

WASHINGTON, D C
Comparison of linear inversion methods by examination

of the duality between iterative and inverse matrix p0085 N78-12598 Meteorological sensors and related technology for the ghties p0088 N78-14475

Operational data processing. The first ten years are the p0088 N78-14476

Current and future satellites for oceanic monitoring p0051 N78-14484
Capabilities of operational infrared sounding systems from tellite altitude p0101 N78-14567

NATIONAL MARINE FISHERIES SERVICE, BAY SAINT LOUIS MISS.

LANDSAT menhaden and thread herring resources

p0050 N78-12500 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ANN ARBOR MICH

On the use of microwave radiation for Great Lakes ice surveillance [PB 271254/5] p0051 N78-12632 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, SOULDER COLO

Application of statistical inversion to ground-based rowave remote sensing of temperature and water vapor iles p0085 N78-12600

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, MIAMI, FLA.

OMINISTRATION, MIAMI, Fun.

Quantitative mapping of suspended solids in westewater sludge plumes in the New York Bight apex p0015 A78-10658

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ROCKVILLE, MD

Remote sensing and laboratory techniques for monitorin ocean dumping p0022 A78-18795
NATIONAL OCEANIC AND ATMOSPHERIC

ADMINISTRATION, SUITLAND MD
Present and future operational oceanographic products An introduction NOAA satellite

p0052 N78 14512
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON D C

Potential applications of digital visible and infrared data from geostationary environmental satellites

p0101 N78 14532 Processing of satellite imagery at the National Environmental Satellite Service p0089 N78-14548 NATIONAL PHYSICAL LAB , NEW DELHI (INDIA)

Vertical lifting of ionization during geomagnetic storms from satellite measurements of ion composition n0079 A78-16730

NATIONAL WEATHER SERVICE, CAMP SPRINGS.

Meteorological support for remote sensing programs p0091 N78-14585

NATIONAL WEATHER SERVICE SILVER SPRING.

Operational utilization of remotely sensed data n0109 N78-14477

NAVAL OCEANOGRAPHIC OFFICE, WASHINGTON D

Aerial ice reconnaissance and satellite ice information microfilm file 1976 supplement 1 n0050 N78-11491

NAVAL RESEARCH LAB, WASHINGTON, D. C. High-resolution radar scattering characteristics of a

disturbed sea surface and floating debris n0099 N78-12268

NAVAL SUPPLY SYSTEMS COMMAND, WASHINGTON D C

Preliminary eastern Indian Ocean geoid from GEOS 3

[AD A043788] n0050 N78 10675

NETHERLAND, SEWELL AND ASSOCIATES INC

DALLAS, TEX.

Preliminary study of the present and possible future oil and gas development of areas immediately surrounding the Interior Salt Domes Upper Gulf Coast Salt Dome basins of east Texas north Louisiana and Mississipp [ORNL/SUB 75/87988] p0036 p0036 N78 10545

NETHERLANDS INTERDEPARTMENTAL WORKING GROUP ON THE APPLICATION OF REMOTE SENSING, DELFT

Evaluation of an infrared line scanner for the study of coastal water circulation [NIWARS-PUBL-41] p0099 N78 11496

NEVADA UNIV RENO
Large scale 20mm photography for range resources analysis in the Western United States p0012 N78-14596

NEW ORLEANS UNIV LA A study of gas solid reactions and air pollution

detectors [AD-A046646] p0027 N78 15601 NORSK POLARINSTITUTT, OSLO

Glaciological and marine biological studies at perimeter of Dronning Maud Land Anterctica [E78 10006] p0049 N78 10532

NORWEGIAN WATER RESOURCES AND ELECTRICITY BOARD, OSLO

Application of LANDSAT imagery for snow mapping in [E78-10029] p0064 N78 13505 Application of LANDSAT imagery for snow mapping in

[E78-10041] p0065 N78-14458 NUMERICAL COMPUTATIONAL CORP STONY

BROOK, N Y A numerical algorithm for remote sensing of ocean density profiles by acoustic pulses

[AD-A042372] p0050 N78-10674

0

OCEAN DATA SYSTEMS INC, MONTEREY CALIF Seasat-A and the commercial ocean community [AIAA 77-1591] p0046 A78-13682 p0046 A78-13682

OFFICINE GALILEO 8.P A , FLORENCE (ITALY)
IRFES - Infra-Red Fan beam Earth Sensor Prototype

p0100 N78-13518 [ESA-CR(P) 974]

OHIO STATE UNIV. COLUMBUS. Analysis of photogrammetric aerial calibration

pO082 N78-12487

OLD DOMINION COLL. NORFOLK VA

Estimation of ground temperature from GFCR radiometric p0102 N78-15626 [NASA-CR-145291]

OLD DOMINION UNIV NORFOLK VA

Laboratory requirements for in situ and remote sensing suspended material [NASA-CR-145263] n0098 N78-10539

Fundamental analysis of the linear multiple regression technique for quantification of water quality parameters from remote sensing data p0063 N78-12490 Inversion of solar aureole measurements for determining DO085 N78-12596 aerosol characteristics

The inversion of stratospheric aerosol and ozone vertical profiles from spacecraft solar extinction measurements p0086 N78-12603

Necessity to adapt land use and land cover classification systems to readily accept radar data p0025 N78-14546
OLD DOMINION UNIV RESEARCH FOUNDATION

NORFOLK VA.
Remote estimation of surface temperature in pollution p0019 A78-14992 A modular radiative transfer program for gas filter correlation radiometry [NASA CR-2895] n0022 N78-10526

OXFORD UNIV (ENGLAND)

Statistical principles of inversion theory

DO084 N78-12591

P

PACIFIC SOUTHWEST FOREST AND RANGE EXPERIMENT STATION, BERKELEY, CALIF

Evaluation of Skylab (EREP) data for forest and rangeland surveys [PB-270543/2]

p0007 N78-12521 PAN AMERICAN UNIV EDINBURG, TEX

Further tests of the Suits reflectance model

p0003 A78 14827

Further tests of the suits reflectance model p0010 N78-14519

PENNSYLVANIA STATE UNIV UNIVERSITY PARK Floodplain delineation using multispectral scanner data

p0081 N78-10528 A remote display system utilizing compressed data ansmission p0086 N78 13497

PERKIN-ELMER CORP, NORWALK CONN

Quantitative remote measurements of pollutants from stationary sources using Raman lidar p0020 A78 17000

PHYSICAL DYNAMICS INC. LA JOLLA, CALIF
Measurement of ambient magnetic field gradients using

a super conducting magnetic gradiometer p0100 N78-12618 [AD-A044997]

PHYSICAL DYNAMICS INC. MCIEAN VA

The magnetic field and magnetic field gradients of the NUC oceanographic research tower

p0051 N78-13289 [AD-A045161] POST OFFICE RESEARCH DEPT. IPSWICH

The 20 and 30 GHz attenuation measi p0093 N78-15340 the ATS-6 satellite

PURDUE UNIV, LAFAYETTE, IND Image modeling with application to measure p0082 N78-12491

Computer aided analysis of LANDSAT data for surveying Texas coastal zone environments p0082 N78-12497

A case study using ECHO(Extraction and Classification of Homogeneous Objects) for analysis of multispectral canner data

p0083 N78 12504

Comparing soil boundaries delineated by digital analysis of multispectral scanner data from high and low spatial solution systems [E78-10017] p0008 N78 13500

Agricultural scene understanding [E78-10043] n0008 N78 14459

Test of spectral/spatial classifier [E78-10044] p0087 N78 14460

Processing techniques development [E78-10045] p0087 N78-14461 Evaluation of change detection tech niques for monitoring p0090 N78-14569 coastal zone environments

digital analysis of Quantification of soil mapping by ANDSAT data [REPT 6690] n0091 N78-14602

R

RADIAN CORP AUSTIN TEX

A quality assurance program for monitoring ozone and carbon monoxide p0024 N78 13636

[PB-271204/0] RADIOMETRIC TECHNOLOGY, INC. WAKEFIELD,

Microwave rediometric sensing of surface temperature and wind speed from SEASAT [PB-270323/9] p0098 N78 10549

### PACKY MOUNTAIN EAGEST AND BANGE EXPERIMENT STATION, FORT COLLINS, COLO Evaluation of Skylab (EREP) data for forest and rangeland

p0007 N78 12521

RUHR PLANNING AUTHORITY ESSEN (WEST

The application of IR and MSS-data in the Ruhr District p0089 N78 14531

#### S

### SANDIA LABS, ALBUQUERQUE N MEX

Compression wave studies in Solenhoten limestone
(SAND-76-0279) 00037 N78-13688 SCIENCE APPLICATIONS, INC. LA JOLLA, CAUF

Comment on Relative atmospheric aerosol content from ERTS observations by Yu Mekler H Quenzel G Ohring and I Marcus p0017 A78-13837

Determination of aerosol content in the atmosphere from LANDSAT data p0022 N78-10531 [F78-10004]

SOIL CONSERVATION SERVICE WASHINGTON, D C
Quantification of soil mapping by digital analysis of
Landsat data
p0076 A78-14908 SOUTH AUSTRALIAN INST OF TECHNOLOGY, INGLE

The vector classifier n0033 N78-14503

SOUTH DAKOTA STATE UNIV. BROOKINGS

HCMM energy budget data as a model input for assessing regions of high potential groundwater pollution p0061 N78-10535 F78-10010Ĭ

Progress and needs in agricultural research develop p0009 N78-14482 and applications programs p0009 N78-14482
Application of remote sensing technology in South Dakota to assess wildlife habitat change describe meandering lakes

improve agricultural censusing map Aspen and quantify cell selection criteria for spatial data p0013 N78-15542 [F78-10053]

STANFORD RESEARCH INST, MENLO PARK, CALIF Dependence of substorm occurrence probability on the

interplanetary magnetic field and on the size of the auroral p0080 A78-18730 Interactive aids for cartography and photo

p0031 N78 10543

STANFORD UNIV, CALIF
Alteration mapping at Goldfield Nevada by cluster and discriminant analysis of Landsat digital data

p0029 A78 14833

Application of HCMM satellite data to mineral p0037 N78 13508 [F78-10036]

Design of a laser interferometer for measurement of extremely small biological motions. Application to crayfish p0051 N78 14381

Alteration mapping at Goldfield Nevada by cluster and Alteration mapping at Goldfield Neveus by Closes and discriminant analysis of LANDSAT digital data p0038 N78-14525

#### STANSAAB ELEKTRONIK A B, JAERFAELLA (SWEDEN)

Quick-look capability in a European earth resources satellite data network volume 1 [FU15-4-VOL-1] p0109 N78 13519

STATE HYDROLOGICAL INST (USSR) Aerial methods of measuring water discharge

n0063 N78-11480

### STATE UNIV OF NEW YORK BINGHAMTON

Texture tone feature extraction and analys [AD-A045542] p008 p0086 N78 13412

### STATE UNIV OF NEW YORK STONY BROOK

Quantitative mapping of suspended solids in wastewater sludge plumes in the New York Bight apex p0015 A78 10658

SWEDISH SPACE CORP , SOLNA

Quick-look capability in a European earth resources satellite data network Volume 2 Appendices 5 to 7 [FU15 4-VOL 2 APP-5 7] Quick-look capability in a European earth resources

satellite data network volume 1

#### n0109 N78-13519 SYSTEMATICS GENERAL CORP MCLEAN, VA

Frequency band justifications for passive sensors 1 to 10 GHz

[NASA CR-155531] o0092 N78 15327

Frequency band justifications for passive sensors 100 to 385 GHz chapter 1 [NASA CR-155530] p0093 N78-15328

Frequency band justifications for passive sensors 100 to 385 GHz chapter 2 [NASA-CR-155532]

p0093 N78 15329 SYSTEMS RESEARCH LABS INC. DAYTON, OHIO Research and simulation in support of near real time/real

time reconnaissance RPV systems [AD A044598] p0083 N78-12516

#### TEL-AVIV UNIV (ISRAEL)

Monitoring surface albedo change with Landsat p0029 A78 13766

#### TENNESSEE UNIV SPACE INST. TULLAHOMA

Application of Landsat data to wetland study and land use classification in West Tennessee p0058 A78 14818 Application of LANDSAT images to wetland study and and use classification in west Tennessee part

p0063 N78 12505 [E78 10031]

The application of LANDSAT-1 imagery for monitoring strip mines in the new river watershed in northeast Tennessee part 2 [E78 10032] p0037 N78-12506

Application of LANDSAT data to wetland study and land

use classification in west Tennessee p0066 N78-14510 TENNESSEE VALLEY AUTHORITY, CHATTANOOGA Remote monitoring and Tennessee Valley Authority n0066 N78-14492

TEXAS AAM UNIV COLLEGE STATION

Monitoring aquatic plants in Texas p0049 N78-10527

LANDSAT/coastal processes [E78-10011] p0061 N78-10536

Microwave remote sensing and its application to soil moisture detection volumes 1 and 2 p0068 N78-15529

TEXAS INSTRUMENTS INC. DALLAS Some aspects of adaptive transform multispectral data p0079 p0079 A78-18071

Aerial gamma-ray and magnetic survey of the Red River area Block C Texas and Oklahoma volume 2 [GJBX 17(77)-VOL-2] p0037 N78-13517 p0037 N78-13517

TEVAS IMIV AT DALLAS DICHARDSON

Dependence of substorm occurrence probability on the interplanetary magnetic field and on the size of the auroral oval p0080 A78-18730

# TOLEDO METROPOLITAN AREA COUNCIL OF

GOVERNMENTS, OHIO

Development of an integrated data base for land use p0026 N78 14584 and water quality planning

#### UNITED NATIONS NEW YORK

Technical assistance and the transfer of remote sensing technology

#### IIVERSIDAD NACIONAL AUTONOMA DE MEXICO VILLA OBREGON

A study of suspended solids in the Requena Dam b p0066 N78-14499

# UNIVERSITE DES SCIENCES ET TECHNIQUES DE

Review of radiative transfer methods in scattering nospheres p0084 N78-12588
Remote sensing of ocean color and detection of p0052 N78-14549 chlorophyll content

UTAH UNIV, SALT LAKE CITY

Geophysics Applied to Detection and Delineation of Non energy Non-renewable Resources Workshop on Mining Geophysics [P8 271952/4] p0037 N78-13622

#### VIRGINIA POLYTECHNIC INST. AND STATE UNIV BLACKSBURG

Air pollutant monitor network design using mathematical p0027 N78-15593 en mina

VOUGHT CORP HAMPTON VA

Quantitative mapping of suspended solids in wastewater studge plumes in the New York Bight apex p0015 A78-10658

#### WASHINGTON UNIV. ST LOUIS, MO

An operational multistate earth observation data An operational multistate earth observation data management system poliof A78 14823 [maging natural materials with a quasi-microscope [NASA-CR-155250] p0099 N78-11813 An operational multistate earth observation data

management system p0110 N78-14515
WATKINS AND ASSOCIATES, LEXINGTON, KY
Onsite control of sedimentation utilizing the modified

block cut method of surface mining

### p0040 N78 15552 WENTZ (FRANK J ) AND ASSOCIATES, CAMBRIDGE,

Computation of theoretical brightness temperatures corresponding to the Cape Cod Canal radiometer

[NASA-CR 145277] p0100 N78-13716

Radar backscattering from a sea having an anisotropic large-scale surface part 2
[NASA-CR-145278] p0054 N78-15663

#### EST VIRGINIA DEPT OF NATURAL RESOURCES, CHARLESTON

Contributions of LANDSAT to natural resource protection and future recreational development in the state of West Virginia [E78-10019]

#### p0024 N78-13501 WEYERHAUSER CO. PLYMOUTH N C

Forest land management by satellite LANDSAT-derived formation as input to a forest inventory system [E78-10038] p0008 N78-14455

Assessment of forest plantations from low altitude aerial p0012 N78-14597

#### WISCONSIN LINIV MADISON

Lake water quality mapping from Landsat

DO057 A78 14893 On multidisciplinary research on the application of remote sensing to water resources problems [E78-10028]

78-10028] p0064 N78 13504
Lake water quality mapping from LANDSAT -0026 N78 14607

## WOLF RESEARCH AND DEVELOPMENT CORP.

POCOMOKE CITY, MD
SEAHT A computer program for the use of intersecting arcs of altimeter data for sea surface height refinement [NASA-CR 141432] 0083 N78 12511 [NASA-CR 141432] p0083 N

## GENEVA (SWITZERLAND)

Modern developments in hydrometry volume 2 [WMO-427] n0062 N78 11455

Some specific problems in the operation eration of a gauging etation

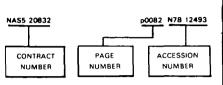
OMING UNIV, LARAMIE Inversion of solar extinction data from the Apollo-Soyuz est Project Stratospheric Aerosol Measurement p0086 N78-12604 (ASTP/SAM) experiment

(ASTP/SAM) experiment p0086 N78-12804
Relationship of tectonic structure to aquifer mechanics in the western Grand Canyon District Arizona
[PB-272308/8] p0068 N78-14624

Earth Resources/A Continuing Bibliography (Issue 17)

**APRIL 1978** 

### Typical Contract Number Index Listing



Listings in this index are arranged alphanumerically by contract number. Under each contract number, the accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order with the AIAA accession numbers appearing first. The accession number denotes the number by which the citation is identified in the abstract section. Preceding the accession number is the page number on which the citation may be found.

AF PROJ 7184	p0083 N78-12516
ARPA ORDER 1649	p0100 N78-12618
	p0051 N78-13289
ARPA ORDER 2894	p0031 N78-10543
AT(05 1)-1635	p0075 A78-14881
A1(U3 1)-1033	
	p0090 N78-14575
BMFT WRK 274/3	p0080 A78-18440
BMFT WRT-1074	p0080 A78-18440
CNRS-RCP-353	p0031 A78-18102 p0069 N78-15630
DA PROJ 1T1-61102-B 52A DA PROJ 4A7 62707-A 855	p0031 N78-10544
DAAG29 76-C 0057	p0031 N78-10543
DAAG53-75-C-0221	p0100 N78-12513
DAHC04 74 G-0119	p0027 N78-15601
DEMR DSS-05Z76-00183	p0019 A78-14862
DI-14-34 0001 6134	p0068 N78-14624
DNA001 76 C-0182	p0082 N78-11561
DOT CG-54323 A	p0026 N78-14608
DOT CG-54323A	p0019 A78-14914
DOT CG-63898-A	p0021 A78-17197
DOT FH 11-9144	p0039 N78-14622
E(11 1) 3563	p0049 A78-20485
EPA-R 80068	p0023 N78-10621
EPA-R 800649	p0015 A78-11809
EPA S 802681	p0040 N78-15552
EPA 68-02-1383	p0024 N78-13636
EPA 68 02-2048	p0021 A78-17575
EPA 68 02-2533	p0023 N78-10623
ESA SC/128-HQ	N78-13397
FETTC 1300/30 AA	p0109 N78-13519
ESTEC 1799/72 AA EY-76 C 04-0789	p0100 N78-13518 p0037 N78-13688
EY-76 C 04-0789 EY-76 C 06 1830	p0087 N78-13951
EY-76 C 13 1664	p0037 N78-13517
F04701-75 C 0090	p0101 N78-14568
F19628-75 C 0122	p0085 N78-12599
F19628-76-C 005	p0080 A78-18730
F19628-76-C 074	p0080 A78-18730
F19628-77-C 0001	p0094 N78-15551
F30602 72-C 0494	p0100 N78-12618
<del>-</del> -	p0051 N78-13289
F30602 76-C-0211	p0086 N78-13412
F33615-75-C 0127	p0083 N78-12516
HL PROJ 22	p0102 N78-15028
NAS 14988	p0090 N78-14578
NASA ORDER G 21990	p0037 N78-12494
NASA ORDER L 24420 A	p0100 N78-13716
	p0054 N78-15663
NASA ORDER \$-54114	p0050 N78-12500
NASA ORDER \$-55812 A	p0061 N78-10536
NASA ORDER 5-70243 AG	p0069 N78-15541
NASA ORDER T-4105-B	p0006 A78-17199
NASW-2790	p0032 N78-12553
NASW-2791	p0108 N78-11448
NASW-2800 NAS1 3213	p0045 A78-13666 p0086 N78-12604
NAS1 3213 NAS1 11707	
MAST 11/U/	p0098 N78-10539

NAS1 12304 NAS1 14150 NAS5 20570 NAS5 20680 NAS5 20832	
NASS 20899	
NAS5 20942	
NAS5-20986 NAS5 21865 NAS5 21980	
NAS5 22325 NAS5 22327 NAS5 22389	
NAS5 22597 NAS5 22894 NAS5 22963 NAS5 23434	
NAS5 23677	
NASS 24106 NASS 24206 NASS 24263 NAS6 2451 NAS6 2639 NAS7 100	
NASB 21805 NASB 31682 NASB-31980	
NAS8 32214 NAS8 32408 NAS9 11275 NAS9 13642 NAS9-14016	
NAS9 14052 NAS9 14123	
NAS9 14180 NAS9 14350	
NAS9-14533 NAS9 14552	
NAS9 14565	
NAS9 14819 NAS9-14970	
NAS9 14988	

p0050 N78-12492		p0075 A78-14884
p0085 N78-12595 p0083 N78-12499		p0007 N78-12496
p0106 A78-14823		p0083 N78 12498 p0008 N78 13499
p0082 N78-12493		p0008 N78-14456
p0017 A78-13837		p0087 N78-14457
p0022 N78-10531 p0057 A78-14893		p0009 N78-14462
p0064 N78-13503		p0009 N78-14463 p0090 N78-14560
p0026 N78-14587 p0053 N78-15537		p0011 N78-14574
p0082 N78 12495		p0090 N78-14577
p0096 A78-13971 p0018 A78-14802	NAS9 15145 NAS9 15189	p0108 N78-12508 p0102 N78-15028
p0085 N78-12599	NAS9-15200	p0004 A78-14846
p0088 N78-14494 p0049 N78-10344		p0004 A78-14864
p0024 N78-13501		p0005 A78-14904 p0010 N78-14540
p0004 A78-14876 p0007 N78-10534		p0089 N78-14558
p0011 N78-14570	NCA2 OR363-601	p0091 N78-14598 p0079 A78-18071
p0054 N78-15662 p0061 N78-10542	NGL 15-005-112	p0004 A78-14860
p0041 A78-10161	NGL 15-005-186	p0078 A78-16542 p0076 A78-14908
p0092 N78-15327 p0093 N78-15328		p0091 N78-14602
p0093 N78-15329	NGL 23 004-083	p0003 A78-14828 p0056 A78-14835
p0018 A78-14802 p0088 N78-14494		p0008 N78-13502
p0037 N78-13508		p0088 N78-14520 p0067 N78-14528
p0061 N78-10535	NGL 25-001-054	p0024 N78-13506
p0064 N78 12507 p0032 N78-12510	NGL 42-003-007	p0024 N78-13507 p0013 N78-15542
p0083 N78 12511	NGL 44-004-130	p0080 A78-18730
p0055 A78-10524 p0015 A78-11283	NGL 50-002-127	p0057 A78-14893 p0064 N78-13504
p0041 A78 12828		p0026 N78-14587
p0042 A78-12829 p0095 A78-12833	NGR 05-007-328 NGR 05-025-001	p0086 N78-12605
p0105 A78-13667	NGR 33-010 172	p0066 N78-14508 p0099 N78-11449
p0046 A78-13683 p0047 A78-14126	NGR-44-004-150	p0080 A78 18730
p0106 A78-14778	NOAA-OCD 14830 NOAA-6-35-217	p0079 A78-17068 p0098 N78-10549
p0073 A78-14806 p0019 A78-15890	NOAA-03-5-022-17	p0058 A78-17074
p0084 N78 12590	NOAA-04-4 158-48	p0069 N78-15660 p0063 N78-11647
p0085 N78 12601 p0109 N78-14465	NOAA-04-6 158-44078	p0050 N78-10678
p0087 N78-14466	NRC A-7 NRC A-6762	p0095 A78-13083 p0095 A78-13083
p0088 N78 14498 p0080 A78 18649	NSF AEN-73 02904-A02	p0015 A78-11809
p0098 N78-10436	NSF AER-76-80802 NSF ATM 72-01381	p0037 N78-13622 p0086 N78-12607
p0056 A78 14818 p0063 N78-12505	NSF ATM-74 23832	p0080 A78-18730
p0037 N78-12506	NSF ATM-75 15791 NSF ATM-75 21962	p0020 A78-17061 p0018 A78-14810
p0066 N78-14510 p0036 N78-11454		p0025 N78 14502
p0064 N78-13509	NSF DES-71-00632-A01 NSF DES-72-01309-A03	p0043 A78-13108 p0016 A78 13616
p0098 A78-17377	NSF DES-75-15551	p0016 A78 13616
p0041 A78-12615 p0048 A78-14875	NSF ERS-76-14462 NSF GA-31916X2	p0111 N78-14612 p0016 A78 13616
p0078 A78 16542	NSF GA-42464	p0072 A78 14314
p0048 A78 17198 p0082 N78 12497	NSF GP 5246 NSF GP-35424	p0035 A78-13082 p0015 A78 11809
p0008 N78-13500	NSF MPS-73 08638 A02	p0015 A78-11809
p0090 N78-14569 p0058 A78-18247	NSF OCE-76-15627 NSG-722	p0049 A78-20485 p0056 A78-14816
p0004 A78-14880	NSG-1060	p0020 A78-17000
p0011 N78 14574 p0099 N78-11453	NSG-1084 NSG 1127	p0099 N78-11813 p0022 N78 10526
p0074 A78-14848	NSG 1203	p0022 N78 10328
p0005 A78-14899 p0089 N78 14542	NSG-1252	p0085 N78 12596 p0086 N78 12605
p0012 N78 14593	NSG 1270 NSG 1282	p0019 A78 14992
p0007 N78 10538 p0002 A78 14808	NGC 5014	p0102 N78 15626
p0009 N78 14500	NSG-5014 NSG-5050	p0100 N78 12514 p0029 A78 14833
p0003 A78 14844 p0010 N78-14538	NSG-7310	p0036 N78-10992
p0096 A78-14826	NSG-9033 NSR-05-007 060	p0003 A78-14827 p0032 N78-11556
p0088 N78 14518	N00014 74-C 0273	p0083 N78-12515
p0082 N78 12497 p0083 N78-12504	N00014 75-C-1023 N00014-76-C 0804	p0042 A78-12842 p0050 N78-10874
p0008 N78-14459	N00017 76-C-0804	p0080 A78-18910
p0087 N78 14460	N00123 73-C-2352 N00228 75-C-2269	p0001 A78-10523 p0102 N78 15643
p0087 N78 14461	OWRT PROJ B-031 WYO(1)	p0068 N78 14624
p0075 A78 14866 p0004 A78-14880	SF1214141B SNF G0223-060	p0099 N78 12268 p0015 A78-12405
p0075 A78-14883	SRI PROJ 5300	p0031 N78-10543
		5.4

### CONTRACT NUMBER INDEX

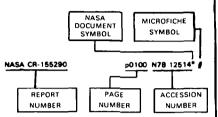
USBLM-D85 50-IA5-26	p0043	A78-13116
USDA-AG 47-SCS00210	p0056	A78-14818
W 7405-ENG-26	p0036	N78-10545
W-7405-ENG-48	p0039	N78-14615
	p0068	N78-14616
W-07405-ENG 48	p0097	A78-15013
176 20-32-01	p0022	N78-10526
176-30-31-01	p0065	N78-13628
176 30-31-11	p0024	N78-12555
177 52-83-07-72	p0061	N78-10541
177 52-89-00-72	p0027	N78-15549
177-55-31-01	p0024	N78-12645
640 03-00-00-72	p0051	N78-12644
683 75-33 02	p0099	N78-12113
776 30 31 11	p0023	N78-12554

# REPORT/ACCESSION NUMBER INDEX

Earth Resources/A Continuing Bibliography (Issue 17)

**APRII 1978** 

### Typical Report/Accession Number Index Listing



Listings in this index are arranged alphanumerically by report number. The page number indicates the page on which the citation is located. The accession number denotes the number by which the citation is identified. An asterisk (\*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche. A plus sign (+) indicates a document that cannot be microfiched but for which one-to-one facsimile is available.

p0050 N78-10674 #

AD A042372

AD A042861 p0023 N78 10608 AD A043046 n0050 N78-11491 AD A043418 p0031 N78 10543 AD-A043666 n0082 N78 11561 AD A043788 n0050 N78 10675 AD A044216 AD A044401 DO099 N78 12268 n0100 N78 12513 AD A044431 AD A044598 p0083 N78 12516 p0064 N78 12518 p0100 N78 12514 AD A044661 AD A044793 AD A044836 n0083 N78 12515 AD A044997 AD A045161 n0051 N78-13289 p0033 N78-13514 p0100 N78-13684 AD A045434 AD A045466 AD A045542 DOORG N78 13412 AD A045870 AD A045871 D0033 N78-13516 AD A046226 p0092 N78 14613 p0069 N78-15630 AD A046349 AD 4046474 00102 N78-15632 AD A046629 AD A046646 DO027 N78 15601 AFGL-ERP-597 p0100 N78-13684 # p0100 N78-13684 # p0102 N78-15632 # AFGI-TR-77-0157 AIAA 77-1550 p0046 A78 13681 AIAA 77-1564 00043 A78-13656 p0044 A78 13657\* p0044 A78 13658\* AIAA 77-1566 AIAA 77-1569 AIAA 77-1571 p0044 A78 13660 p0044 A78 13662 p0044 A78 13663 p0044 A78 13664 p0044 A78 13665 AIAA 77-1577 AIAA 77-1581 p0045 A78-13666 AIAA 77 1584 p0072 A78 13686 p0105 A78 13667\* p0045 A78 13669\* p0045 A78 13670 AIAA 77-1585 AIAA 77-1590 AIAA 77-1591 AIAA 77-1596 n0045 A78 13671 p0045 A78-13672 p0045 A78-13672 p0045 A78-13673 p0045 A78-13674 ΔIΔΔ 77-1597 AIAA 77-1598 AIAA 77-1599 p0046 A78-13675 p0046 A78-13676 AIAA 77-1601 AIAA 77-1604 p0048 A78-13687 p0048 A78-13683 AIAA 77-1610 AIAA 77-1812 A78.13679 p0096 A78 13688

AMRL TR 77-33 nOO83 N78-12516 # ARCSL-TR-77-59 p0064 N78-12518 # ARO-11753 9-C n0027 N78 15601 # BGI D-75 1 p0032 N78 11498 # BLL M 24896-(5828 4F) DO102 N78-14750 BLLD M 24895 (5828 4F) BLLD M 24900-(5828 4F) p0102 N78-14747 n0033 N78-14453 BLLD TRANS-1287 n0033 N78-14453 BNWL 2235 p0087 N78 13951 # BSFC/LU C/009 p0094 N78 15556\* # BSR-4291 n0064 N78 13503\* # CALSPAN NA-6019-M-1 n0061 N78 10630 # CGR/DC-15/76 p0023 N78 10608 # CIA/DF-77/006A n0032 N78 11498 # CMS-NASA 1-76 p0050 N78 12492\* # CRC-APRAC CAPA 9-71 p0023 N78-10619 # CRREL-SR-77-28 p0100 N78-12514\* p0064 N78-13513 # CRREL SR-77-32 CRRF1 77-27 p0069 N78 15630 # CRSR-673 n0099 N78 11449\* # CTH IEM-TR-7636 o0101 N78 14699 # DLR-FB-77 09 p0051 N78 13313 # DLR-18-553-75/7 p0027 N78 14732 # DNA-HAES 50 DNA-HAES 64 p0102 N78-15632 p0100 N78 13684 DNA-4240F p0082 N78-11561 # E-9398 n0024 N78-13670\* # EIRM 122700 34 F n0008 N78 13499\* # EPA 600/3 77-044 EPA 600/7 77-068 EPA-600/8 77-008 EPA 901/9 77-002 p0023 N78 10621 p0040 N78 15552 p0027 N78 14700 n0023 N78 10623 EPA 906/9 77-003 D0083 N78 12515 FRIM 108900.Q.P ERIM 114800-37 L ERIM 118500-1-F p0007 N78-10534\* n0054 N78 156621 RIM 122700-29-T N78 12498\* RIM 122700-31-F p0008 N78-14456 p0087 N78-14457 ERIM 122700-32 F RIM 122700-33-F p0007 ERIM 122700-35-F1-VOL-1 n0009 N78-14462 ERIM 122700-35-F2 VOL-2 ERIM 123600-1 F DO111 N78 14612 ERP 605 n0102 N78-15632 FRT P-2273 p0023 N78-10623 # ESA CR(P)-974 n0100 N78 13518 SA CR(P)-977-VOL-1 n0109 ESA CR(P)-977-VOL-2-APP-5 7 N78 13397 ESA TT 422 n0051 N78 13313 ETL-0103 p0031 N78 10544 ETL-0111 p0100 N78 12513 E7B 10001 n0062 N78 11447\* A E78 10002 p0081 N78 10530\* # E78 10003 p0050 N78 12492\* # E78 10004 p0022 N78 10531\* # E78 10005 p0082 N78 12493\* E78 10006 p0049 N78 10532\* #

E78-10008 n0037 N78-12494\* 4 E78-10009 p0007 N78-10534\* E78 10010 n0061 N78-10535\* E78 10011 p0061 N78-10536\* # p0036 N78-10537\* E78 10012 F78 10013 n0007 N78-10538\* E78-10014 p0082 N78-12495\* # E78 10015 n0008 N78-13499\* E78-10016 p0007 N78-12496\* E78-10017 p0008 N78-13500\* F78 10018 n0082 N78-12497\* p0024 N78-13501\* E78 10019 E78 10020 p0008 N78-13502\* E78 10021 00083 N78-12498\* p0083 N78-12499\* p0084 N78-13503\* E78 10023 p0050 N78-12500\* p0083 N78-12502\* E78-10024 E78-10024 p0032 N78-12503\* p0064 N78-13504\* p0064 N78-13505\* E78 10027 F78 10029 p0083 N78-12504° p0083 N78-12505° E78-10030 E78 10031 E78 10032 00037 N78-125064 E78 10032 D0024 N78-13506\* E78 10034 E78 10035 E78 10036 p0024 N78-13507<sup>4</sup> p0037 N78-13508<sup>6</sup> E78 10037 p0012 N78-15536\* p0008 N78-14455\* E78-10038 F78-10039 n0008 N78-14456\* E78-10040 p0087 N78-14457\* p0085 N78-14458\* E78-10041 E78-10042 00053 N78-15537° E78-10043 p0008 N78-14459\* 00087 N78-14460\* E78-10044 E78-10045 E78-10046 p0087 N78-14461\* p0009 N78-14462\* p0009 N78-14463\* E78-10047 E78-10049 E78-10049 p0012 N78-15539\* p0012 N78 15540\* p0069 N78 15541\* E78-10052 E78-10053 n0013 N78 15542\* FHWA-RD 77-35 n0039 N78 14622 # FSD 7700-01 p0082 N78-12495\* # FSRP PSW-113 p0007 N78 12521 # FTD ID(RS)I-0667-77 p0033 N78-13514 # FTD ID(RS)T-0325-77 p0092 N78-14613 # FTD 77-C 000430 p0092 N78-14613 # p0051 N78-13289 # FTR-2 FU15-4 VOL-1 FU15-4 VOL 2-APP 5-7 p0109 N78-13519 N78 13397 FWS/ORS-77/48 n0027 N78-15553 # G-7702F 15 p0102 N78-15142\* # GC-77 10126 p0032 N78-11498 # GJBX 17(77)-VOL 2 p0037 N78-13517 # p0108 N78-12509 GPO-94-462 GPO-95-881 p0108 N78-11450 p0093 N78-15548\* GSFC/LN-C/009 GSFC/LN-C/010 p0093 N78-15546\* # GSFC/LN-77/013 GSFC/LN-77/013A p0093 N78-15535 p0093 N78-15547\* # p0094 N78-15554\* # p0093 N78-15545\* # GSFC/LU-C/008 GSFC/LU-C/010 p0057 A78-15935 IAF PAPER 77-121 IFYGL-SPECIAL-BULL-20 p0069 N78-15660 # INPF-1098-PF/073 n0039 N78-14811 INPE 1118-TPT-067

### REPORT/ACCESSION NUMBER INDEX

INPE-1129-TPT/070	p0039 N78 14610 #	NASA-CR-155342	p0053 N78-15537* #	PB 272152/0	p0069 N78-15660 #
	pecce	NASA-CR 155358	p0053 N78-15538* #	PB-272244/5	p0040 N78 15552 #
ISBN-92-63-10427-1	p0062 N78 11455 #	NASA-CR-155361	p0109 N78-14464* #	PB-272308/8	p0068 N78 14624 #
ISBN-951-750 797-6	p0050 N78-11292 #	NASA-CR-155362	p0110 N78-14529* #	PB-272421/9	p0027 N78 14700 #
JPRS-70524	p0111 N78-15557 #	NASA-CR-155365	p0069 N78-15541* #	PB-272691/7	p0027 N78 15553 #
		NASA-CR-155508	p0012 N78-15539* #	PD-76-107	pO100 N78 12618 #
JSC-S 468	p0051 N78-12644 #	NASA-CR-155509	p0012 N78-15540* #	PD 76 109	p0051 N78-13289 #
JSC-12529	p0061 N78-10541* #	NASA-CR-155514	p0013 N78-15542* #	PGSTR-AP77-49	p0022 N78 10526* #
JSC-12910	p0027 N78-15549* #	NASA-CR-155530 NASA-CR-155531	p0093 N78-15328* + p0092 N78-15327* #	T GOTH AT 77-45	poole 1175 10320 #
		NASA-CR-155532	p0093 N78-15329* #	PR-5	p0082 N78 12493* #
L-10968 L-11710	p0065 N78-13628* # p0099 N78-12113* #	NASA CR-156640	p0049 N78 10344*#	PR-11	p0022 N78-10531* #
L-11767	p0099 N78-12173 # p0023 N78-12554* #	NASA-CR-156643 NASA CR-156647	p0082 N78-12495* #	PSAD-77-58	p0108 N78 10968* #
L-11854	p0024 N78-12645* #	NASA CR-156647 NASA CR-156658	p0083 N78-12499* # p0054 N78-15662* #	PSAD-77-126	p0053 N78-14772 #
L-11870	p0024 N78-12555* #	NASA-CR-156677	p0024 N78-13501* #	N	
LARS-PUBL-082477	p0008 N78-13500* #	NASA BRAGOS	-0000 NZC 12112# #	PUBL-151	p0036 N78-10992* #
LARS-PUBL-090177	p0083 N78-12504* #	NASA-RP-1009 NASA-RP-1012	p0099 N78-12113* # p0051 N78-12644 #	QR-1	p0061 N78-10535* #
1 A D C TD 000077		NASA-RP-1015	p0027 N78-15549* #	QR-1	p0064 N78-12507* #
LARS-TR 090677	p0082 N78-12497* #	NACA THE V 71000	0001 N70 10540# #	RAD-TN-100-044-16	p0024 N78-13636 #
LARS 112677	p0008 N78 14459* #	NASA-TM-X 71396 NASA-TM-X 71412	p0061 N78-10542* # p0081 N78-10341* #	111 111 111 111	p0024 1170 13030 #
LARS 112777	p0087 N78 14461* #	NASA-TM-X 71413	p0023 N78-10540* #	RADC-TR-77-100	p0100 N78 12618 #
LARS-112877	p0087 N78 14460* #			RADC-TR-77-101 RADC-TR 77-279	p0051 N78 13289 # p0086 N78 13412 #
LBL 5209	p0068 N78 14616 #	NASA TM-58203 NASA-TM-73810	p0061 N78 10541* # p0024 N78 13670* #	77-273	poods 1478 13412 #
144 40074		NASA TM-74956	p0094 N78 15555* #	REPT-S 90	p0050 N78 11292 #
MA-129TA MA-129TA	p0008 N78 14459* #   p0087 N78 14460* #	NASA TM-74957	p0094 N78-15556* #	REPT 2	p0023 N78 10619 #
MA-129TA	p0087 N78-14461* #	NASA-TM-74988 NASA TM-74990	p0093 N78-15548* # p0093 N78-15546* #	REPT-165	p0012 N78 15540* #
		NASA TM-74991	p0093 N78-15547* #	REPT-6690	p0091 N78 14602* #
MARMAP-CONTRIB-145	p0050 N78-12500* #	NASA TM-74992	p0093 N78-15545* #	REPT 123000 11 F	p0050 N78 10678 #
MP KB/E/038/RS	p0032 N78-12503* #	NASA TM-74993 NASA TM-75041	p0093 N78-15535* +	RSC-3380	p0061 N78 10536* #
		NASA TM-75041 NASA TM-75085	p0108 N78-11448* # p0032 N78-12553* #		pode: 10000 #
NASA-CASE GSC 11976 1	p0007 N78-10529*	NASA TM-78032	p0053 N78-15550* #	RSL-TR-291 2 VOL 1	p0049 N78 10344* #
NASA-CASE LEW 12217 1	p0037 N78-14452*	NASA TM-78038	p0081 N78-11451* #	S-478	p0027 N78 15549* #
	<b>P</b>	NASA TM-78039 NASA-TM-78052	p0032 N78-11452* # p0108 N78-13510* #	1 * ***	pool: 11.0 10043 #
NASA-CP-004	p0084 N78-12586* #	NASA-TM-78149	p0093 N78-15544* #	SAI-77-911-W	p0022 N78-10531* #
NASA CR-2895	p0022 N78 10526* #	NACA TR 4004		SAND-76-0279	p0037 N78-13688 #
NASA-CR-2925	p0086 N78 12608* #	NASA TP-1021 NASA-TP-1038	p0065 N78-13628* # p0023 N78-12554* #	SAND-70-0275	poos/ 11/0-13088 #
NASA CR-141431	p0032 N78 12510* #	NASA TP 1039	p0024 N78 12645* #	SAPR-8	p0024 N78-13506* #
NASA CR-141432 NASA-CR-144976	p0083 N78 12511* # p0086 N78-12608* #	NASA-TP-1089	p0024 N78-12555* #	SB-6238(A)77C 219	p0108 N78 12508* #
NASA CR-145239	p0094 N78-15551* #	NASA-TP-1101	p0102 N78-15142* #	3B-0238(A)//C 219	po 106 1476 12508. #
NASA CR-145263	p0098 N78 10539* #	NCC-1	p0050 N78-10674 #	SDSU-RSI-77-17	p0013 N78 15542* #
NASA-CR-145277 NASA CR-145278	p0100 N78 13716* # p0054 N78-15663* #			SEEG CONTRIB 77 46	-0050 NZB 12500# #
NASA CR 145291	p0102 N78-15626* #	NEPRF-TR 6 76(ESC)	p0102 N78-15643 #	SEFC-CONTRIB-77 16	p0050 N78-12500* #
NASA-CR-150422	p0063 N78-12505* #	NIWARS PUBL-41	p0099 N78-11496 #	SER 66	p0068 N78 14624 #
NASA CR-150423	p0037 N78-12506*#			T 1214/4	•
NASA CR-150423 NASA CR 150446	p0037 N78-12506* # p0098 N78 10436* #	NOAA-TM-ERL-GLERL-13	p0051 N78-12632 #	T-1314/4 T-1314/4	p0008 N78-14459* #
NASA CR-150423 NASA CR 150446 NASA CR-150465 NASA CR-150467	p0037 N78-12506* # p0098 N78 10436* # p0036 N78 11454* # p0064 N78 13509* #	NOAA-TM-ERL-GLERL-13	p0051 N78-12632 #	T-1314/4 T-1314/4 T-1314/4	•
NASA CR-150423 NASA CR-150446 NASA CR-150465 NASA CR-150467 NASA-CR-151525	p0037 N78-12506* # p0098 N78 10436* # p0036 N78 11454* # p0064 N78 13509* # p0007 N78-10538* #	NOAA-TM-ERL-GLERL-13 NOAA-77052503 NOAA-77062709	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-11647 #	T-1314/4 T-1314/4	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* #
NASA CR-150423 NASA CR 150446 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151530	p0037 N78-12506* # p0098 N78 10436* # p0036 N78 11454* # p0064 N78 13509* # p0007 N78-10538* # p0008 N78-13500* #	NOAA-7M-ERL-GLERL-13 NOAA-77052503 NOAA-77082709 NOAA-77082710	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-11647 # p0098 N78-10549 #	T-1314/4	p0008 N78-14459* # p0087 N78-14460* #
NASA CR-150423 NASA CR 150446 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151530 NASA-CR-151532 NASA-CR-151536	p0037 N78-12506° # p0038 N78 10436° # p0036 N78 11454° # p0064 N78 13509° # p0007 N78-10538° # p0008 N78-13500° # p0083 N78-12504° # p0082 N78 12497° #	NOAA-TM-ERL-GLERL-13 NOAA-77052503 NOAA-77062709	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-11647 # p0098 N78-10549 # p0051 N78-12632 #	T-1314/4 T-1314/4	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* #
NASA CR-150423 NASA CR-150446 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151530 NASA-CR-151532 NASA CR-151536 NASA-CR-151536	p0037 N78-12506* # p0098 N78 10436* # p0036 N78 11454* # p0064 N78 13509* # p0007 N78-10538* # p0083 N78-13500* # p0083 N78-12504* # p0082 N78 12497* # p0083 N78 12498* #	NOAA-TM-ERL-GLERL-13 NOAA-77052503 NOAA-77062709 NOAA-77062710 NOAA-77072206 NOAA-77082507	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-11647 # p0098 N78-10549 # p0051 N78-12632 # p0069 N78 15660 #	T-1314/4 T-1314/4 TID-27689 TR 76 C2	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0039 N78-14615 # p0039 N78-10539* #
NASA CR-150423 NASA CR-150466 NASA CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151537 NASA-CR-151537	p0037 N78-12506* # p0038 N78 11454* # p0036 N78 11454* # p0064 N78 13509* # p0007 N78-10538* # p0008 N78-13500* # p0082 N78-12504* # p0083 N78-12504* # p0083 N78-12498* # p0083 N78-12458* #	NOAA-TM-ERL-GLERL-13 NOAA-77052503 NOAA-77062709 NOAA-77062710 NOAA-77072206	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-11647 # p0098 N78-10549 # p0051 N78-12632 #	T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0039 N78-14615 # p0098 N78 10539* # p0007 N78 10529*
NASA CR-150423 NASA CR 150446 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151530 NASA-CR-151536 NASA-CR-151536 NASA-CR-151537 NASA-CR-151548 NASA-CR-151549 NASA CR-151549	p0037 N78-12506* # p0098 N78 10436* # p0064 N78 11454* # p0064 N78 13509* # p0007 N78-10538* # p0083 N78-13500* # p0083 N78-12504* # p0083 N78-12504* # p0083 N78-12498* # p0099 N78-11453* # p0108 N78-12508* # p007 N78-12498* # p	NOAA-TM-ERL-GLERL-13 NOAA-77052503 NOAA-77062709 NOAA-77082710 NOAA-77072206 NOAA-77082507 NOO-RP-17(76)-SUPPL-1	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-11647 # p0098 N78-10549 # p0051 N78-12632 # p0069 N78-15660 # p0050 N78-11491 #	T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0087 N78-14615 # p0098 N78-10539* # p0007 N78-10529* p0007 N78-10529*
NASA CR-150423 NASA CR-150465 NASA CR-150465 NASA CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151536 NASA-CR-151548 NASA-CR-151548 NASA CR-151552 NASA CR-151552	p0037 N78-12506* # p0038 N78 10436* # p0036 N78 11454* # p0064 N78 13509* # p0007 N78-10538* # p0008 N78-13500* # p0083 N78-12504* # p0082 N78 12497* # p0083 N78 12497* # p0099 N78-11453* # p0108 N78-12508* # p0007 N78-12436* # p0007 N78-12436* # p0008 N78-13499* #	NOAA-TM-ERL-GLERL-13 NOAA-77052503 NOAA-77062709 NOAA-77062710 NOAA-77072206 NOAA-77082507 NOO-RP-17(76)-SUPPL-1 NRL 8131	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-11647 # p0098 N78-10649 # p0051 N78-12632 # p0050 N78-11491 # p0099 N78-12268 #	T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0099 N78-14615 # p0098 N78 10529* p0007 N78 10529* p0037 N78 14452*
NASA CR-150423 NASA CR-150446 NASA CR-150465 NASA-CR-151525 NASA-CR-151530 NASA-CR-151530 NASA-CR-151536 NASA-CR-151536 NASA-CR-151548 NASA-CR-151549 NASA CR-151553 NASA CR-151553 NASA CR-151553	p0037 N78-12506* # p0038 N78 10436* # p0036 N78 11454* # p0064 N78 13509* # p0007 N78-10538* # p0008 N78-13500* # p0083 N78-12504* # p0082 N78 12498* # p0099 N78-11453* # p0108 N78-12508* # p0007 N78-12496* # p0008 N78-13499* # p0008 N78-13499* # p0008 N78-13499* # p0009 N78-134	NOAA-TM-ERL-GLERL-13 NOAA-77052503 NOAA-77062709 NOAA-77082710 NOAA-77072206 NOAA-77082507 NOO-RP-17(76)-SUPPL-1 NRL 8131 NSF/RA 770167	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-11647 # p0098 N78-10549 # p0051 N78-12632 # p0069 N78-11491 # p0099 N78-12268 # p0111 N78-14612 #	T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-248	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0039 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0037 N78 14452*
NASA CR-150423 NASA CR-150465 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151536 NASA-CR-151548 NASA-CR-151549 NASA CR-151552 NASA CR-151553 NASA CR-151553 NASA CR-151561 NASA-CR-151561	p0037 N78-12506° # p0038 N78 10436° # p0036 N78 11454° # p0064 N78 13509° # p0007 N78-10538° # p0083 N78-13500° # p0083 N78-12504° # p0082 N78 12497° # p0083 N78-12508° # p0093 N78-11453° # p0108 N78-12508° # p0007 N78-12496° # p0008 N78-13496° # p0008 N78-13496° # p0009 N78-14457° # p0099 N78-14453° # p0099 N78-144	NOAA-TM-ERL-GLERL-13 NOAA-77052503 NOAA-77062709 NOAA-77062710 NOAA-77072206 NOAA-77082507 NOO-RP-17(76)-SUPPL-1 NRL 8131	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-11647 # p0098 N78-10649 # p0051 N78-12632 # p0050 N78-11491 # p0099 N78-12268 #	T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78-14615 # p0098 N78-10539* # p0007 N78-10529* p0037 N78-14452* p0037 N78-14452* p0037 N78-14452* p0037 N78-14452* p0037 N78-14452*
NASA CR-150423 NASA CR-150466 NASA CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151554 NASA CR-151552 NASA CR-151553 NASA CR-151553 NASA CR-151551 NASA CR-151561 NASA CR-151561 NASA-CR-151563 NASA-CR-151563 NASA-CR-151576	p0037 N78-12506* # p0038 N78 11454* # p0036 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0082 N78-13500* # p0083 N78-12504* # p0083 N78-12504* # p0083 N78-12508* # p0099 N78-11453* # p0097 N78-12498* # p0097 N78-12498* # p0097 N78-12498* # p0097 N78-12498* # p0097 N78-12485* # p0097 N78-12486* # p0097 N78-12486* # p0097 N78-12486* # p0097 N78-14457* # p0097 N78-14457* # p0097 N78-14456* # p0097 N78-1445	NOAA-TM-ERL-GLERL-13 NOAA-77052503 NOAA-77062709 NOAA-77082710 NOAA-77072206 NOAA-77082507 NOO-RP-17(76)-SUPPL-1 NRL 8131 NSF/RA 770167	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-11647 # p0098 N78-10549 # p0051 N78-12632 # p0069 N78-11491 # p0099 N78-12268 # p0111 N78-14612 #	T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-CLASS 324-58 5B	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529*
NASA CR-150423 NASA CR-150465 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151536 NASA-CR-151548 NASA-CR-151549 NASA CR-151552 NASA CR-151553 NASA CR-151553 NASA CR-151561 NASA-CR-151561	p0037 N78-12506* # p0038 N78 10436* # p0038 N78 11454* # p0064 N78 13509* # p0007 N78-10538* # p0008 N78-13500* # p0083 N78-12504* # p0082 N78 12497* # p0082 N78 12497* # p0099 N78-11453* # p0108 N78-12508* # p0007 N78-12436* # p0008 N78-13499* # p0009 N78-14462* # p0099 N78-14463* # p0099 N78-14469* # p0099 N78-144	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77062709  NOAA-77062710  NOAA-77072206  NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA-770173  NSWC/DL TR-3668	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-12632 # p0050 N78-11491 # p0099 N78-12268 # p0111 N78-14612 # p0037 N78-13622 # p0050 N78-10675 #	T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0099 N78-14615 # p0098 N78 10529* p0007 N78 10529* p0007 N78 14452* p0007 N78 14452* p0007 N78 14452* p0007 N78 14452* p0007 N78 10529*
NASA CR-150423 NASA CR-150465 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151530 NASA-CR-151532 NASA CR-151537 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151552 NASA CR-151551 NASA CR-151561 NASA CR-151561 NASA CR-151561 NASA-CR-151563 NASA CR-1515675 NASA-CR-151576 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609	p0037 N78-12506* # p0038 N78 10436* # p0036 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0082 N78-13500* # p0082 N78-13500* # p0082 N78-12504* # p0083 N78-12504* # p0093 N78-11453* # p0108 N78-12508* # p0090 N78-13496* # p0090 N78-13499* # p0090 N78-134460* # p0087-N78-14460* # p0087-N78-144	NOAA-TM-ERL-GLERL-13 NOAA-77052503 NOAA-77062709 NOAA-77062710 NOAA-77072206 NOAA-77082507 NOO-RP-17(76)-SUPPL-1 NRL 8131 NSF/RA 770167 NSF/RA-770173	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-11647 # p0098 N78-10549 # p0051 N78-12632 # p0069 N78-11491 # p0099 N78-12268 # p0111 N78-14612 # p0037 N78-13622 #	T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-CLASS 324-58 5B	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78-10529* p0007 N78-14452* p0007 N78-14452* p0007 N78-14452* p0007 N78-14452* p0007 N78-14452* p0007 N78-10529* p0007 N78-10529*
NASA CR-150423 NASA CR 150446 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151536 NASA-CR-151536 NASA-CR-151548 NASA-CR-151549 NASA CR-151552 NASA CR-151553 NASA CR-151561 NASA-CR-151561 NASA-CR-151563 NASA-CR-151663 NASA-CR-151667 NASA-CR-151676	p0037 N78-12506* # p0038 N78 10436* # p0036 N78 11454* # p0064 N78 13509* # p0007 N78-10538* # p0008 N78-13500* # p0083 N78-12504* # p0083 N78-12504* # p0082 N78-12497* # p0083 N78-12497* # p0099 N78-11453* # p0108 N78-12508* # p0008 N78-13499* # p0008 N78-13499* # p0099 N78-14462* # p0099 N78-14463* # p0099 N78-14463* # p0099 N78-14463* # p0099 N78-14463* # p0097 N78-144640* # p0097 N78-144640* # p0097 N78-14469* # p0097 N78-1	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77062709  NOAA-77062710  NOAA-77072206  NOAA-77072206  NOA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/138-009  NTISUB/C/138-009  NTISUB/C/138-009  NTISUB/C/138-009  NTISUB/C/138-010	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-11647 # p0098 N78-10649 # p0051 N78-12632 # p0050 N78-11491 # p0099 N78-11268 # p0111 N78-14612 # p0037 N78-13622 # p0050 N78-10675 # p0094 N78-15556* # p0094 N78-15556* # p0093 N78-15566* #	T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-D-32-77	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78-14615 # p0098 N78-14615 # p0007 N78-10529* p0037 N78-14452* p0037 N78-14452* p0037 N78-1452* p0007 N78-10529* p0007 N78-10529* p0007 N78-14452* p0037 N78-14452* p0038-14452* p0038-14
NASA CR-150423 NASA CR-150465 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151530 NASA-CR-151532 NASA CR-151537 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151552 NASA CR-151551 NASA CR-151561 NASA CR-151561 NASA CR-151561 NASA-CR-151563 NASA CR-1515675 NASA-CR-151576 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609	p0037 N78-12506* # p0038 N78 10436* # p0036 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0082 N78-13500* # p0082 N78-13500* # p0082 N78-12504* # p0083 N78-12504* # p0093 N78-11453* # p0108 N78-12508* # p0090 N78-13496* # p0090 N78-13499* # p0090 N78-134460* # p0087-N78-14460* # p0087-N78-144	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77052709  NOAA-77062710  NOAA-77072206  NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/138-009  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0098 N78-10549 # p0051 N78-12632 # p0050 N78-13660 # p0050 N78-11491 # p0099 N78-12268 # p0111 N78-14612 # p0037 N78-13622 # p0050 N78-15554* # p0094 N78-15556* # p0093 N78-155545* # p0093 N78-155545* # p0093 N78-15556* #	T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78-14615 # p0007 N78-10529* p0037 N78-14452* p0037 N78-14452* p0037 N78-14452* p0007 N78-10529* p0007 N78-10529
NASA CR-150423 NASA CR-150465 NASA CR-150467 NASA-CR-150467 NASA-CR-151525 NASA-CR-151532 NASA-CR-151532 NASA-CR-151537 NASA-CR-1515348 NASA-CR-151548 NASA CR-151552 NASA CR-151552 NASA CR-151554 NASA CR-151557 NASA-CR-151561 NASA-CR-151561 NASA-CR-1515661 NASA-CR-1515661 NASA-CR-151661 NASA-CR-151661 NASA-CR-151661 NASA-CR-151661 NASA-CR-151661 NASA-CR-151655 NASA-CR-151655 NASA-CR-151655 NASA-CR-151655 NASA-CR-1516561 NASA-CR-15451610 NASA-CR-15451610 NASA-CR-15451610 NASA-CR-1545516 NASA-CR-1545516 NASA-CR-1545516 NASA-CR-1545516 NASA-CR-155505	p0037 N78-12506* # p0038 N78 11454* # p0038 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0087 N78-15538* # p0087 N78-15538* # p0087 N78-15504* # p0087 N78-12508* # p0099 N78-11453* # p0099 N78-11453* # p0097 N78-12486* # p0097 N78-12486* # p0097 N78-12486* # p0097 N78-12486* # p0097 N78-14457* # p0097 N78-14450* # p0087 N78-13503* # p0064 N78-13503* # p0064 N78-13503* # p0064 N78-13503*	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77052709  NOAA-77062710  NOAA-770702206  NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/138-009  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-009  NTISUB/C/138-009  NTISUB/C/138-009	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0098 N78-10649 # p0051 N78-12632 # p0050 N78-1268 # p0050 N78-1268 # p0111 N78-14612 # p0037 N78-13622 # p0050 N78-10675 # p0094 N78-15554* # p0093 N78-15554* # p0093 N78-15555* # p0093 N78-15555* # p0093 N78-15558* # p0093 N78-15558* # p0093 N78-15558* #	T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-D-32-77	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78-14615 # p0098 N78-14615 # p0007 N78-10529* p0037 N78-14452* p0037 N78-14452* p0037 N78-1452* p0007 N78-10529* p0007 N78-10529* p0007 N78-14452* p0037 N78-14452* p0038-14452* p0038-14
NASA CR-150423 NASA CR-150465 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151552 NASA CR-151561 NASA CR-151561 NASA CR-151561 NASA-CR-151567 NASA-CR-151567 NASA-CR-151567 NASA-CR-151569 NASA-CR-151609 NASA-CR-151609 NASA-CR-151635 NASA-CR-1516305	p0037 N78-12506* # p0038 N78 10436* # p0036 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0080 N78-13500* # p0080 N78-13500* # p0080 N78-13500* # p0080 N78-13500* # p0080 N78-13508* # p0090 N78-1453* # p0090 N78-1453* # p0090 N78-14450* # p0090 N78-14450* # p0090 N78-14465* # p0090 N78-14465* # p0090 N78-14460* # p0080 N78-14500* # p0080 N78-13503* # p0064 N78-13503* # p0062 N78-114470* # p0081 N78-13503* # p0061 N78-114470* # p0081 N78-13503* # p0061 N78-114470* # p0081 N78-13503* # p0061 N78-114470* # p0081 N78-13503* # p0081 N78-10530* # p0081 N78-10	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77062709  NOAA-77062710  NOAA-77072206  NOA-77072206  NOA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/138-009  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/139-008  NTISUB/C/139-009  NTISUB/C/139-009  NTISUB/C/139-009  NTISUB/C/139-009  NTISUB/C/139-009  NTISUB/C/139-009  NTISUB/C/139-010	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-15660 # p0050 N78-11491 # p0099 N78-12268 # p0111 N78-14612 # p0037 N78-13622 # p0050 N78-15554* # p0093 N78-15545* # p0093 N78-15545* # p0093 N78-155545 # p0093 N78-155545 # p0093 N78-155545 # p0093 N78-155545 # p0093 N78-155554 # p0093 N78-15555 #	T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-D-32-77 WES-TR M-77 2-2 WMO-427	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78-10539* # p0007 N78-10529* p0037 N78-14452* p0037 N78-14452* p0037 N78-10529* p0007 N78-10529* p0007 N78-10529* p0007 N78-10529* p0003 N78-10529* p0003 N78-10529* p0003 N78-10569* p0003 N78-10569* p0009 N78-10559* p0009 N78-10569 # p0009 N78-10569 # p0009 N78-11455 # p0009 N7
NASA CR-150423 NASA CR-150465 NASA CR-150467 NASA-CR-150467 NASA-CR-151525 NASA-CR-151532 NASA-CR-151532 NASA-CR-151537 NASA-CR-1515348 NASA-CR-151548 NASA CR-151552 NASA CR-151552 NASA CR-151554 NASA CR-151557 NASA-CR-151561 NASA-CR-151561 NASA-CR-1515661 NASA-CR-1515661 NASA-CR-151661 NASA-CR-151661 NASA-CR-151661 NASA-CR-151661 NASA-CR-151661 NASA-CR-151655 NASA-CR-151655 NASA-CR-151655 NASA-CR-151655 NASA-CR-1516561 NASA-CR-15451610 NASA-CR-15451610 NASA-CR-15451610 NASA-CR-1545516 NASA-CR-1545516 NASA-CR-1545516 NASA-CR-1545516 NASA-CR-155505	p0037 N78-12506* # p0038 N78 11454* # p0038 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0087 N78-15538* # p0087 N78-15538* # p0087 N78-15504* # p0087 N78-12508* # p0099 N78-11453* # p0099 N78-11453* # p0097 N78-12486* # p0097 N78-12486* # p0097 N78-12486* # p0097 N78-12486* # p0097 N78-14457* # p0097 N78-14450* # p0087 N78-13503* # p0064 N78-13503* # p0064 N78-13503* # p0064 N78-13503*	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77052709  NOAA-77062710  NOAA-770702206  NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/138-009  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-009  NTISUB/C/138-009  NTISUB/C/138-009	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0098 N78-10549 # p0051 N78-12632 # p0069 N78-15660 # p0050 N78-11491 # p0099 N78-12268 # p0111 N78-14612 # p0037 N78-13622 # p0050 N78-10675 # p0094 N78-15556* # p0093 N78-15554* # p0093 N78-15555* #	T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 051 190 USCG-D-32-77 WES-TR M-77 2-2 WMO-427 W77-10175	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78-14615 # p0098 N78-14615 # p0098 N78-14652* p0037 N78-14452* p0037 N78-14452* p0037 N78-14452* p0037 N78-14452* p0037 N78-14529* p0007 N78-10529* p0007 N78-10529* p0033 N78-13668 # p0033 N78-13516 # p0062 N78-11455 # p0065 N78-13522 #
NASA CR-150423 NASA CR 150446 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151536 NASA-CR-151536 NASA-CR-151548 NASA CR-151548 NASA CR-151548 NASA CR-151552 NASA CR-151561 NASA-CR-151561 NASA-CR-151563 NASA-CR-151567 NASA-CR-151576 NASA-CR-151576 NASA-CR-151576 NASA-CR-151576 NASA-CR-151609 NASA-CR-151635 NASA-CR-151635 NASA-CR-151635 NASA-CR-154510 NASA CR-154510 NASA CR-154510 NASA CR-154510 NASA CR-154506 NASA CR-155206 NASA CR-155206 NASA CR-155207 NASA CR-155207 NASA CR-155208	p0037 N78-12506* # p0036 N78 11454* # p0064 N78 13503* # p0064 N78 13503* # p008 N78-12504* # p008 N78-12504* # p0082 N78-12504* # p0082 N78-12508* # p0099 N78-11453* # p0108 N78-12508* # p0099 N78-12498* # p0099 N78-13499* # p0099 N78-13499* # p0099 N78-13499* # p0099 N78-14462* # p0099 N78-14463* # p0099 N78-14463* # p0099 N78-14463* # p0099 N78-14464* # p0099 N78-14464* # p008 N78-14464* # p0087 N78-14461* # p0087 N78-14461* # p0087 N78-14453* # p0087 N78-1447* # p0087 N78-1447* # p0087 N78-12493* # p0082 N78-12493* #	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77062709  NOAA-77062710  NOAA-77072206  NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA 770173  NSWC/DL TR-3668  NTISUB/C/138-009  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/139-013A  NTISUB/C/139-009  NTISUB/C/139-010  NTISUB/C/139-010  NTISUB/C/139-010  NTISUB/C/139-010  NTISUB/C/139-010	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-15660 # p0050 N78-11491 # p0099 N78-12268 # p0111 N78-14612 # p0031 N78-15556* # p0094 N78-15556* # p0093 N78-15548* # p0093 N78-15558* # p0093 N78-15548* #	T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-D-32-77 WES-TR M-77 2-2 WMO-427	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78-14615 # p0098 N78-14615 # p0007 N78-14652* p0037 N78-14452* p0037 N78-14452* p0037 N78-14452* p0007 N78-10529* p0007 N78-10529* p0007 N78-10529* p0003 N78-14652* p0003 N78-14652* p0003 N78-14652* p0008-178-14652* p0008-178-14654 # p0065-N78-13516 # p0065-N78-13516 # p0065-N78-13512 # p0068-N78-13522 # p0
NASA CR-150423 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151532 NASA-CR-151537 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151554 NASA CR-151552 NASA CR-151561 NASA-CR-151561 NASA-CR-151567 NASA-CR-151567 NASA-CR-151567 NASA-CR-151567 NASA-CR-151576 NASA-CR-151692 NASA-CR-151699 NASA-CR-151699 NASA-CR-151699 NASA-CR-151690 NASA-CR-151690 NASA-CR-151690 NASA-CR-151690 NASA-CR-151690 NASA-CR-151690 NASA-CR-151690 NASA-CR-151690 NASA-CR-1565006 NASA-CR-1565006 NASA-CR-1565006 NASA-CR-1552006 NASA-CR-1552006 NASA-CR-1552008	p0037 N78-12506* # p0038 N78 11454* # p0068 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0087 N78-10538* # p0087 N78-10538* # p0087 N78-12504* # p0087 N78-12508* # p0097 N78-12498* # p0097 N78-12486* # p0097 N78-12486* # p0097 N78-12486* # p0097 N78-12457* # p0097 N78-12458* # p0087 N78-12530* # p0062 N78-12429* # p0089 N78-10530* # p0082 N78-12492* # p0089 N78-12493* # p0099 N78-1249	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77062709  NOAA-77062710  NOAA-770702206  NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/138-009  NTISUB/C/138-019  NTISUB/C/138-010  NTISUB/C/138-013A  NTISUB/C/138-009  NTISUB/C/139-008  NTISUB/C/139-009  NTISUB/C/139-009  NTISUB/C/139-013A  NTISUB/C/139-010  NTISUB/C/139-013A	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10678 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-15660 # p0050 N78-11491 # p0099 N78-12268 # p0111 N78-14612 # p0037 N78-13622 # p0050 N78-10675 # p0094 N78-15556* # p0093 N78-15548* #	T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-CAPPL-SN-763753 US-PATENT-CLASS 166-249 US-PATENT-CLASS 366-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-D-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-11867 X 903-77-49	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78-14615 # p0098 N78-10529* p0007 N78-14452* p0007 N78-14452* p0007 N78-14452* p0007 N78-14452* p0007 N78-1452* p0008 N78-13516 # p0068 N78-13516 # p0065 N78-13522 # p0068 N78-13510* # p0108-N78-13510* # p0108-N78-13510* # p0108-N78-13510* # p0108-N78-13510* # p0008-N78-13510* # p0008-N78-1
NASA CR-150423 NASA CR-150465 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151548 NASA CR-151553 NASA CR-151552 NASA CR-151561 NASA-CR-151561 NASA-CR-151563 NASA-CR-151563 NASA-CR-151567 NASA-CR-151567 NASA-CR-151609 NASA-CR-155206 NASA-CR-155206 NASA-CR-155206 NASA-CR-155208 NASA-CR-155209 NASA-CR-155209 NASA-CR-155209 NASA-CR-155209 NASA-CR-155209 NASA-CR-155210	p0037 N78-12506* # p0036 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0080 N78-13500* # p0090 N78-13508* # p0090 N78-13508* # p0090 N78-13498* # p0090 N78-13499* # p0090 N78-13508* # p0090 N78-13508* # p0090 N78-13508* # p0090 N78-13503* # p0090 N78-13503* # p0080 N78-12492* # p0080 N78-12493* # p0080 N78-12493* # p0080 N78-15294* # p0080 N78-15294* # p0080 N78-15303* # p0080 N78-12493* # p0080 N78-15303* # p0080 N78-12493* # p0080 N78-15303* # p0080 N78-12493* # p0080 N78-15303* # p0080 N78-15300* # p0080 N78-15300* # p0080 N78-1530	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77062709  NOAA-77062710  NOAA-77072206  NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA 770173  NSWC/DL TR-3668  NTISUB/C/138-009  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/139-013A  NTISUB/C/139-009  NTISUB/C/139-010  NTISUB/C/139-010  NTISUB/C/139-010  NTISUB/C/139-010  NTISUB/C/139-010	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-15660 # p0050 N78-11491 # p0099 N78-12268 # p0111 N78-14612 # p0031 N78-15556* # p0094 N78-15556* # p0093 N78-15548* # p0093 N78-15558* # p0093 N78-15548* #	T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-CLASS 324-58 5B US-PATENT-4 061 190 USCG-0-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-10175 X 903-77-49 X 903-77-49 X 922-77-260	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0098 N78-14461* # p0098 N78-14615 # p0098 N78-10539* # p0007 N78-10529* p0037 N78-14452* p0037 N78-14452* p0037 N78-10529* p0007 N78-10529* p0007 N78-10529* p0007 N78-10529* p0007 N78-10529* p0007 N78-10529* p0007 N78-10529* p0008-178-11455 # p0068-178-11455 # p0068-178-13510* # p0068-178-13510* # p0088-178-13510*
NASA CR-150423 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151537 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151548 NASA CR-151553 NASA CR-151553 NASA CR-151551 NASA CR-151561 NASA-CR-151561 NASA-CR-151567 NASA-CR-151567 NASA-CR-151567 NASA-CR-151692 NASA-CR-151695 NASA-CR-151695 NASA-CR-151695 NASA-CR-151695 NASA-CR-155206 NASA CR-155206 NASA CR-155206 NASA CR-155207 NASA CR-155208 NASA CR-155208 NASA CR-155208 NASA CR-155210 NASA-CR-155210 NASA-CR-155211	p0037 N78-12506* # p0038 N78 11454* # p0068 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0080 N78-13500* # p0080 N78-13500* # p0080 N78-13500* # p0080 N78-13500* # p0080 N78-13508* # p0090 N78-11453* # p0090 N78-12498* # p0090 N78-13499* # p0090 N78-13499* # p0090 N78-13465* # p0090 N78-13465* # p0090 N78-13465* # p0090 N78-13465* # p0090 N78-13508* # p0087 N78-14461* # p0087 N78-13503* # p0060 N78-13503* # p0060 N78-12492* # p0080 N78-10530* # p0060 N78-12492* # p0080 N78-10530* # p0060 N78-12492* # p0070 N78-12492* # p0070 N78-12492* # p0070 N78-12492* # p0070 N78-10530* # p0097 N78-1053	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77052709  NOAA-77062710  NOAA-770702206  NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA 770167  NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/138-009  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-009  NTISUB/C/138-010  NTISUB/C/139-008  NTISUB/C/139-009  NTISUB/C/139-010  NTISUB/C/139-013A  NYSERDA 75/22  ONERA TP NO 1977 154	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-1268 # p0050 N78-11491 # p0099 N78-12268 # p0111 N78-14612 # p0037 N78-13622 # p0050 N78-10675 # p0094 N78-15556* # p0093 N78-15548* # p0094 N78-15548* # p0094 N78-15548* #	T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-CAPPL-SN-763753 US-PATENT-CLASS 166-249 US-PATENT-CLASS 366-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-D-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-11867 X 903-77-49	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78-10529* p0007 N78-1452* p0037 N78-1452* p0037 N78-1452* p0007 N78-1452* p0008-178-1556- # p0065-178-13522 # p0065-178-13510* # p0065-178-13522 # p008-178-13522 # p008-178-13542* # p0032-178-13542* # p0032-178-13540* # p008-178-13540* # p0
NASA CR-150423 NASA CR-150465 NASA CR-150465 NASA CR-150465 NASA CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151536 NASA-CR-151536 NASA-CR-151548 NASA CR-151548 NASA CR-151548 NASA CR-151552 NASA CR-151553 NASA CR-151561 NASA-CR-151563 NASA-CR-151563 NASA-CR-151563 NASA-CR-151663 NASA-CR-151663 NASA-CR-151676 NASA-CR-151576 NASA-CR-151676 NASA-CR-151576 NASA-CR-155206 NASA-CR-155206 NASA-CR-155207 NASA-CR-155210 NASA-CR-155212 NASA-CR-155211	p0037 N78-12506* # p0036 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p008 N78-12508* # p009 N78-11453* # p009 N78-12508* # p008 N78-12492* # p008 N78-12492* # p008 N78-12492* # p009 N78-12493* # p008 N78-12493* # p008 N78-10538* # p009 N78-10538* # p009 N78-10538* # p009 N78-10538* # p009 N78-10538* # p006 N78-	NOAA-TM-ERL-GLERL-13  NOAA-77052503 NOAA-77062709 NOAA-77062710 NOAA-77062710 NOA-77072206 NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167 NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/138-009 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/139-009 NTISUB/C/139-009 NTISUB/C/139-010 NTISUB/C/139-010 NTISUB/C/139-010 NTISUB/C/139-010 NTISUB/C/139-010 NTISUB/C/139-0154  NYSERDA 75/22  ONERA TP NO 1977 154  ORNL/SUB-75/87988	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10678 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-15660 # p0050 N78-11491 # p0099 N78-12268 # p0111 N78-14612 # p0037 N78-13622 # p0050 N78-10675 # p0094 N78-15556* # p0093 N78-15548* #	T-1314/4 T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-0-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-10175 W77-11867 X 903-77-49 X 922-77-260 X-923-77-245 X 931 77-38 X 933-77-38	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0037 N78 10529* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529* p0003 N78 10545* # p0062 N78 11455 # p0068 N78 13516 # p0068 N78 13512 # p0081 N78 13512 # p0093 N78 13510* # p0093 N78 10540* # p0091 N78 10542* # p0091 N78 10542* # p0091 N78 11451* # p0091 N78 11451*
NASA CR-150423 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151537 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151548 NASA CR-151553 NASA CR-151553 NASA CR-151551 NASA CR-151561 NASA-CR-151561 NASA-CR-151567 NASA-CR-151567 NASA-CR-151567 NASA-CR-151692 NASA-CR-151695 NASA-CR-151695 NASA-CR-151695 NASA-CR-151695 NASA-CR-155206 NASA CR-155206 NASA CR-155206 NASA CR-155207 NASA CR-155208 NASA CR-155208 NASA CR-155208 NASA CR-155210 NASA-CR-155210 NASA-CR-155211	p0037 N78-12506* # p0038 N78 11454* # p0068 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0080 N78-13500* # p0080 N78-13500* # p0080 N78-13500* # p0080 N78-13500* # p0080 N78-13508* # p0090 N78-11453* # p0090 N78-12498* # p0090 N78-13499* # p0090 N78-13499* # p0090 N78-13465* # p0090 N78-13465* # p0090 N78-13465* # p0090 N78-13465* # p0090 N78-13508* # p0087 N78-14461* # p0087 N78-13503* # p0060 N78-13503* # p0060 N78-12492* # p0080 N78-10530* # p0060 N78-12492* # p0080 N78-10530* # p0060 N78-12492* # p0070 N78-12492* # p0070 N78-12492* # p0070 N78-12492* # p0070 N78-10530* # p0097 N78-1053	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77052709  NOAA-77062710  NOAA-770702206  NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA 770167  NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/138-009  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-009  NTISUB/C/138-010  NTISUB/C/139-008  NTISUB/C/139-009  NTISUB/C/139-010  NTISUB/C/139-013A  NYSERDA 75/22  ONERA TP NO 1977 154	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-1268 # p0050 N78-11491 # p0099 N78-12268 # p0111 N78-14612 # p0037 N78-13622 # p0050 N78-10675 # p0094 N78-15556* # p0093 N78-15548* # p0094 N78-15548* # p0094 N78-15548* #	T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-D-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-11867 X 903-77-49 X 922-77-280 X-923-77-245 X 931 77-38	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78-10529* p0007 N78-1452* p0037 N78-1452* p0037 N78-1452* p0007 N78-1452* p0008-178-1556- # p0065-178-13522 # p0065-178-13510* # p0065-178-13522 # p008-178-13522 # p008-178-13542* # p0032-178-13542* # p0032-178-13540* # p008-178-13540* # p0
NASA CR-150423 NASA CR 150446 NASA CR-150467 NASA-CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151532 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151554 NASA CR-151552 NASA CR-1515561 NASA-CR-151561 NASA-CR-1515661 NASA-CR-1515675 NASA-CR-1515675 NASA-CR-151576 NASA-CR-155206 NASA-CR-155206 NASA-CR-155206 NASA-CR-155207 NASA-CR-155207 NASA-CR-155210 NASA-CR-155211 NASA-CR-155211 NASA-CR-155211 NASA-CR-155215 NASA-CR-155215 NASA-CR-155215 NASA-CR-155216 NASA-CR-155217	p0037 N78-12506* # p0038 N78 11454* # p0068 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0087 N78-10538* # p0087 N78-10538* # p0087 N78-12504* # p0087 N78-12508* # p0098 N78-11453* # p0098 N78-12508* # p0098 N78-12508* # p0098 N78-14457* # p0098 N78-14458* # p0087 N78-14457* # p0087 N78-14458* # p0087 N78-14458* # p0087 N78-1457* # p0087 N78-1457* # p0087 N78-14458* # p0087 N78-14458* # p0087 N78-14458* # p0087 N78-14458* # p0098 N78-14458* # p0098 N78-14458* # p0098 N78-16530* # p0062 N78-12432* # p0053 N78-12434* # p0056 N78-12434* # p0056 N78-12434* # p0056 N78-12538* # p0061 N78-10538* # p0068 N78-10537* # p0068 N78-10537* # p0068 N78-10537* # p0068 N78-10537* # p0098 N78-11449* # p0099 N78-11449* # p00999	NOAA-TM-ERL-GLERL-13  NOAA-77052503 NOAA-77062709 NOAA-77062710 NOAA-77062710 NOA-77072206 NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167 NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/138-009 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/139-009 NTISUB/C/139-009 NTISUB/C/139-010 NTISUB/C/139-010 NTISUB/C/139-010 NTISUB/C/139-010 NTISUB/C/139-010 NTISUB/C/139-0154  NYSERDA 75/22  ONERA TP NO 1977 154  ORNL/SUB-75/87988	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-12268 # p0050 N78-12268 # p0111 N78-1268 # p0037 N78-13622 # p0050 N78-10675 # p0094 N78-15556* # p0093 N78-15548* # p0093 N78-15555* # p0093 N78-15554* # p0093 N78-15555* # p0093 N78-15555* # p0093 N78-15555* #	T-1314/4 T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-0-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-10175 W77-11867 X 903-77-49 X 922-77-260 X-923-77-245 X 931 77-38 X 933-77-38	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0037 N78 10529* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529* p0003 N78 10545* # p0062 N78 11455 # p0068 N78 13516 # p0068 N78 13512 # p0081 N78 13512 # p0093 N78 13510* # p0093 N78 10540* # p0091 N78 10542* # p0091 N78 10542* # p0091 N78 11451* # p0091 N78 11451*
NASA CR-150423 NASA CR-150465 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151537 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151548 NASA CR-151553 NASA CR-151553 NASA CR-151551 NASA-CR-151561 NASA-CR-151563 NASA-CR-151567 NASA-CR-151576 NASA-CR-151576 NASA-CR-151692 NASA-CR-151699 NASA-CR-151699 NASA-CR-151699 NASA-CR-155206 NASA-CR-155206 NASA-CR-155206 NASA-CR-155206 NASA-CR-155207 NASA-CR-155207 NASA-CR-155208 NASA-CR-155210 NASA-CR-155210 NASA-CR-155210 NASA-CR-155211 NASA-CR-155211 NASA-CR-155211 NASA-CR-155216 NASA-CR-155216 NASA-CR-155216 NASA-CR-155217	p0037 N78-12506* # p0038 N78 11454* # p0068 N78 11454* # p0068 N78 11454* # p0069 N78 115038* # p007 N78-10538* # p0089 N78-13500* # p0089 N78-13500* # p0089 N78-13500* # p0089 N78-13508* # p0099 N78-11453* # p0099 N78-11453* # p0099 N78-13486* # p0099 N78-13498* # p0099 N78-13499* # p0099 N78-13465* # p0087 N78-14461* # p0087 N78-14461* # p0087 N78-14461* # p0087 N78-13503* # p0068 N78-13503* # p0069 N78-13533* # p0069 N78-12492* # p0079 N78-12492* # p0079 N78-12492* # p0079 N78-12493* # p0079 N78-12493* # p0079 N78-12493* # p0079 N78-12493* # p0079 N78-10530* # p0079 N78-11449* # p0079 N78-114	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77052709  NOAA-77062710  NOAA-770702206  NOAA-770702206  NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA 770167  NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/138-009  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/139-013A  NTISUB/C/139-010	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-15660 # p0050 N78-12268 # p0111 N78-12632 # p0050 N78-12268 # p0111 N78-14612 # p0050 N78-15556* # p0094 N78-15556* # p0094 N78-15556* # p0093 N78-15569 # p0093 N78-16518 # p0065 N78-10619 # p0020 N78-10619 # p0050 N78-10678 #	T-1314/4 T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-0-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-10175 W77-11867 X 903-77-49 X 922-77-260 X-923-77-245 X 931 77-38 X 933-77-38	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0037 N78 10529* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529* p0003 N78 10545* # p0062 N78 11455 # p0068 N78 13516 # p0068 N78 13512 # p0081 N78 13512 # p0093 N78 13510* # p0093 N78 10540* # p0091 N78 10542* # p0091 N78 10542* # p0091 N78 11451* # p0091 N78 11451*
NASA CR-150423 NASA CR 150446 NASA CR-150467 NASA-CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151532 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151554 NASA CR-151552 NASA CR-1515561 NASA-CR-151561 NASA-CR-1515661 NASA-CR-1515675 NASA-CR-1515675 NASA-CR-151576 NASA-CR-155206 NASA-CR-155206 NASA-CR-155206 NASA-CR-155207 NASA-CR-155207 NASA-CR-155210 NASA-CR-155211 NASA-CR-155211 NASA-CR-155211 NASA-CR-155215 NASA-CR-155215 NASA-CR-155215 NASA-CR-155216 NASA-CR-155217	p0037 N78-12506* # p0036 N78 11454* # p0064 N78 13503* # p0060 N78-13503* # p0080 N78-13503* # p0090 N78-14453* # p0090 N78-13503* # p0091 N78-10538* # p0091 N78-10538* # p0091 N78-10538* # p0091 N78-10538* # p0099 N78-11449* # p0099 N78-13500* # p0099 N78-135	NOAA-TM-ERL-GLERL-13  NOAA-77052503 NOAA-77062709 NOAA-77062710 NOAA-77062710 NOAA-77062710 NOA-77072206 NOA-77072206 NOA-77072206 NOA-77072206 NOO-RP-17(76)-SUPPL-1 NRL 8131  NSF/RA 770167 NSF/RA-770173 NSWC/DL TR-3668 NTISUB/C/138-009 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/139-010 NTISUB/C/139-010 NTISUB/C/139-010 NTISUB/C/139-010 NTISUB/C/139-010 NTISUB/C/139-010 NTISUB/C/139-015A NYSERDA 75/22 ONERA TP NO 1977 154 ORNL/SUB-75/87988 OWRT-A-045-IDA(3) PB-267784/7 PB-268875/6 PB-268875/6	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-12632 # p0050 N78-12268 # p0111 N78-1268 # p0111 N78-13622 # p0050 N78-13622 # p0050 N78-15556* # p0094 N78-15556* # p0093 N78-15556* # p0093 N78-15554* # p0093 N78-15554* # p0093 N78-15556* # p0093 N78-15555* # p0093 N78-15555* # p0093 N78-15555* # p0093 N78-15555* # p0094 N78-15555* # p0093 N78-15555* # p0093 N78-15555* # p0093 N78-15555* # p0094 N78-15555* # p0093 N78-15646* # p0095 N78-10630 # p0020 A78-10630 # p0020 A78-10630 # p0020 N78-10630 # p0050 N78-10619 # p0050 N78-10678 # p0021 N78-10678 # p0023 N78-10678	T-1314/4 T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-0-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-10175 W77-11867 X 903-77-49 X 922-77-260 X-923-77-245 X 931 77-38 X 933-77-38	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0037 N78 10529* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529* p0003 N78 10545* # p0062 N78 11455 # p0068 N78 13516 # p0068 N78 13512 # p0081 N78 13512 # p0093 N78 13510* # p0093 N78 10540* # p0091 N78 10542* # p0091 N78 10542* # p0091 N78 11451* # p0091 N78 11451*
NASA CR-150423 NASA CR-150465 NASA CR-150465 NASA CR-150465 NASA CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151536 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151548 NASA CR-151553 NASA CR-151551 NASA-CR-151561 NASA-CR-151563 NASA-CR-151563 NASA-CR-151563 NASA-CR-151567 NASA-CR-151576 NASA-CR-151576 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-155206 NASA-CR-155206 NASA-CR-155206 NASA-CR-155207 NASA-CR-155207 NASA-CR-155207 NASA-CR-155210 NASA-CR-155210 NASA-CR-155211 NASA-CR-155211 NASA-CR-155211 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155247 NASA-CR-155247 NASA-CR-155247 NASA-CR-155250 NASA-CR-155247 NASA-CR-155250 NASA-CR-155247 NASA-CR-155250 NASA-CR-155250 NASA-CR-155250	p0037 N78-12506* # p0036 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0082 N78-13500* # p0082 N78-13508* # p0099 N78-11453* # p0099 N78-11453* # p0099 N78-13498* # p0099 N78-13498* # p0099 N78-13498* # p0099 N78-13499* # p0099 N78-13499* # p0099 N78-13499* # p0099 N78-13499* # p0098 N78-13502* # p0087 N78-14465* # p0087 N78-14465* # p0087 N78-14461* # p0088 N78-13503* # p0088 N78-13503* # p0088 N78-13503* # p0089 N78-13503* # p0089 N78-13503* # p0089 N78-13530* # p0089 N78-13530* # p0089 N78-13530* # p0099 N78-13530* # p0082 N78-13530* # p0082 N78-13530* # p0082 N78-13530* # p0088-13530* # p0088-13530* # p0089 N78-13530* # p0099 N78-11449* # p0099 N78-13500* # p0099 N78-11449* # p0099 N78-13500* # p0099 N78-12500* # p0099 N78-11813* # p0089 N78-13500* # p0099 N78-12500* # p0099 N78-12500* # p0099 N78-11813* # p0089 N78-13500* # p0099 N78-12500* # p0099 N78-11813* * p0088-12500* # p0099 N78-11813* * p0088-12500* # p0099 N78-12500* # p0099 N78-1	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77062709  NOAA-77062710  NOAA-770702206  NOAA-770702206  NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA 770167  NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/138-009  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/139-013A  NTISUB/C/139-010	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-15660 # p0050 N78-11491 # p0099 N78-12268 # p0111 N78-12632 # p0050 N78-13622 # p0050 N78-13622 # p0094 N78-15556* # p0094 N78-15556* # p0093 N78-15546* # p0094 N78-15556* # p0095 N78-15546* # p0095 N78-15547* # p0061 N78-10630 # p0020 A78-16214 p0065 N78-10545 # p0065 N78-10545 # p0065 N78-10619 # p0050 N78-10678 # p0023 N78-10678 # p0023 N78-10621 # p0023 N78-10621 # p0023 N78-10621 #	T-1314/4 T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-0-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-10175 W77-11867 X 903-77-49 X 922-77-260 X-923-77-245 X 931 77-38 X 933-77-38	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0037 N78 10529* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529* p0003 N78 10545* # p0062 N78 11455 # p0068 N78 13516 # p0068 N78 13512 # p0081 N78 13512 # p0093 N78 13510* # p0093 N78 10540* # p0091 N78 10542* # p0091 N78 10542* # p0091 N78 11451* # p0091 N78 11451*
NASA CR-150423 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151532 NASA-CR-151537 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151552 NASA CR-1515561 NASA-CR-151561 NASA-CR-151561 NASA-CR-151567 NASA-CR-151567 NASA-CR-151576 NASA-CR-155207 NASA-CR-155207 NASA-CR-155207 NASA-CR-155207 NASA-CR-155207 NASA-CR-155207 NASA-CR-155207 NASA-CR-155210 NASA-CR-155211 NASA-CR-155211 NASA-CR-155212 NASA-CR-155214 NASA-CR-155215 NASA-CR-155216 NASA-CR-155216 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155218 NASA-CR-1552248 NASA-CR-155252	p0037 N78-12506* # p0038 N78 11454* # p0064 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0089 N78-13500* # p0089 N78-13500* # p0089 N78-13500* # p0089 N78-13508* # p0089 N78-13485* # p0099 N78-13459* # p0099 N78-13459* # p0099 N78-13508* # p0099 N78-13508* # p0099 N78-13508* # p0099 N78-13503* # p0080 N78-13503* # p0080 N78-13503* # p0099 N78-13502* # p0099 N78-13503* # p0099 N78-1350	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77062709  NOAA-77062710  NOAA-770702206  NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA 770167  NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/ 138-009  NTISUB/C/ 138-010  NTISUB/C/ 138-010  NTISUB/C/ 138-010  NTISUB/C/ 138-010  NTISUB/C/ 138-010  NTISUB/C/ 139-008  NTISUB/C/ 139-009  NTISUB/C/ 139-013A  NYSERDA 75/22  ONERA TP NO 1977 154  ORNL/SUB-75/87988  OWRT-A-045-IDA(3)  PB-268675/6  PB-268985/0  PB-268996/6  PB-268996/6  PB-268996/6  PB-268996/6  PB-269451/9	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-12632 # p0050 N78-12268 # p0111 N78-1268 # p0111 N78-13622 # p0050 N78-13622 # p0050 N78-15556* # p0094 N78-15556* # p0093 N78-15556* # p0093 N78-15554* # p0093 N78-15554* # p0093 N78-15556* # p0093 N78-15555* # p0093 N78-15555* # p0093 N78-15555* # p0093 N78-15555* # p0094 N78-15555* # p0093 N78-15555* # p0093 N78-15555* # p0093 N78-15555* # p0094 N78-15555* # p0093 N78-15646* # p0095 N78-10630 # p0020 A78-10630 # p0020 A78-10630 # p0020 N78-10630 # p0050 N78-10619 # p0050 N78-10678 # p0021 N78-10678 # p0023 N78-10678	T-1314/4 T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-0-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-10175 W77-11867 X 903-77-49 X 922-77-260 X-923-77-245 X 931 77-38 X 933-77-38	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0037 N78 10529* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529* p0003 N78 10545* # p0062 N78 11455 # p0068 N78 13516 # p0068 N78 13512 # p0081 N78 13512 # p0093 N78 13510* # p0093 N78 10540* # p0091 N78 10542* # p0091 N78 10542* # p0091 N78 11451* # p0091 N78 11451*
NASA CR-150423 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151548 NASA CR-151553 NASA CR-151553 NASA CR-151561 NASA-CR-151561 NASA-CR-151563 NASA-CR-151563 NASA-CR-151567 NASA-CR-151567 NASA-CR-151692 NASA-CR-151695 NASA-CR-151695 NASA-CR-151695 NASA-CR-151695 NASA-CR-151695 NASA-CR-151695 NASA-CR-151695 NASA-CR-155206 NASA-CR-155206 NASA CR-156206 NASA CR-156206 NASA CR-156207 NASA CR-155210 NASA-CR-155210 NASA-CR-155210 NASA-CR-155210 NASA-CR-155216 NASA-CR-155217 NASA-CR-1552217 NASA-CR-1552217 NASA-CR-1552217 NASA-CR-155250 NASA-CR-155250 NASA-CR-155250 NASA-CR-155251 NASA-CR-155251 NASA-CR-1552551 NASA-CR-1552551 NASA-CR-1552551 NASA-CR-1552551 NASA-CR-1552551 NASA-CR-1552551	p0037 N78-12506* # p0036 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0080 N78-13500* # p0080 N78-13508* # p0090 N78-1453* # p0090 N78-1453* # p0090 N78-1453* # p0090 N78-14450* # p0090 N78-1450* # p0090 N78-1450* # p0090 N78-145030* # p0090 N78-12492* # p0090 N78-12494* # p0090 N78-12503* # p0090 N78-12503* # p0090 N78-12503* # p0090 N78-11449* # p0090 N78-11413* # p0090 N78-12500* # p0090 N78-11500* # p0090 N78-115000* # p0090 N78-115000* # p0090 N78-115000* # p0090 N78-11500	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77052709  NOAA-77062710  NOAA-770702206  NOAA-770702206  NOAA-770702206  NOA-770702206  NOA-77082507  NOC-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/ 138-009  NTISUB/C/ 138-009  NTISUB/C/ 138-010  NTISUB/C/ 138-010  NTISUB/C/ 139-013A  NTISUB/C/ 139-010  NTSUB/C/ 139-010  NTSUB/	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-15660 # p0050 N78-12268 # p0050 N78-12268 # p0111 N78-12622 # p0050 N78-13622 # p0050 N78-15556* # p0094 N78-15556* # p0093 N78-15546* # p0093 N78-15546* # p0093 N78-15554* # p0093 N78-15554* # p0093 N78-15545* # p0093 N78-15545* # p0093 N78-15545* # p0093 N78-15545* # p0093 N78-15554* # p0093 N78-15554* # p0093 N78-15554* # p0093 N78-15554* # p0093 N78-15546* # p0093 N78-15648* # p0093 N78-10630 # p0020 A78-10630 # p0023 N78-10648 # p0023 N78-10678 # p0023 N78-10623 # p0023 N78-10623 # p0023 N78-10623 # p0023 N78-10623 # p0061 N78-10668 # p0061 N78-10630 # p0063 N78-10630 #	T-1314/4 T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-0-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-10175 W77-11867 X 903-77-49 X 922-77-260 X-923-77-245 X 931 77-38 X 933-77-38	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0037 N78 10529* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529* p0003 N78 10545* # p0062 N78 11455 # p0068 N78 13516 # p0068 N78 13512 # p0081 N78 13512 # p0093 N78 13510* # p0093 N78 10540* # p0091 N78 10542* # p0091 N78 10542* # p0091 N78 11451* # p0091 N78 11451*
NASA CR-150423 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151532 NASA-CR-151537 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151552 NASA CR-1515561 NASA-CR-151561 NASA-CR-151561 NASA-CR-151567 NASA-CR-151567 NASA-CR-151576 NASA-CR-155207 NASA-CR-155207 NASA-CR-155207 NASA-CR-155207 NASA-CR-155207 NASA-CR-155207 NASA-CR-155207 NASA-CR-155210 NASA-CR-155211 NASA-CR-155211 NASA-CR-155212 NASA-CR-155214 NASA-CR-155215 NASA-CR-155216 NASA-CR-155216 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155218 NASA-CR-1552248 NASA-CR-155252	p0037 N78-12506* # p0038 N78 11454* # p0064 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0089 N78-13500* # p0089 N78-13500* # p0089 N78-13500* # p0089 N78-13508* # p0089 N78-13485* # p0099 N78-13459* # p0099 N78-13459* # p0099 N78-13508* # p0099 N78-13508* # p0099 N78-13508* # p0099 N78-13503* # p0080 N78-13503* # p0080 N78-13503* # p0099 N78-13502* # p0099 N78-13503* # p0099 N78-1350	NOAA-TM-ERL-GLERL-13  NOAA-77052503 NOAA-77052709 NOAA-77062710 NOAA-770702206 NOAA-77082507  NOO-RP-17(76)-SUPPL-1 NRL 8131  NSF/RA 770167 NSF/RA-770173 NSWC/DL TR-3668  NTISUB/C/138-009 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/139-010 NTISUB/C/139-010 NTISUB/C/139-010 NTISUB/C/139-013A NYSERDA 75/22  ONERA TP NO 1977 154  ORNL/SUB-75/87988  OWRT-A-045-IDA(3) PB-268756/6 PB-268995/6 PB-268995/6 PB-268995/6 PB-2689456/0 PB-2699456/0 PB-2699471/9 PB-270299/1 PB-270239/1 PB-270239/1	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-13632 # p0050 N78-12268 # p0111 N78-1268 # p0111 N78-13622 # p0050 N78-13622 # p0050 N78-13622 # p0094 N78-15556* # p0093 N78-15545* # p0093 N78-15548* # p0093 N78-15554* # p0093 N78-15554* # p0093 N78-15548 # p0093 N78-15548 # p0093 N78-15548 # p0094 N78-15555 # p0093 N78-15645 # p0093 N78-15655 # p0093 N78-15648 # p0094 N78-15555 # p0093 N78-15655 # p0093 N78-15648 # p0093 N78-15655 # p0093 N78-16619 # p0065 N78-10619 # p0063 N78-10623 # p0023 N78-10621 # p0023 N78-10623 # p0061 N78-10680 # p0061 N78-10630 # p0061 N78-10630 # p0061 N78-10630 # p0063 N78-10623 # p0061 N78-10620 # p0061 N78-10620 # p0061 N78-10630 # p0061 N78-11498 #	T-1314/4 T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-0-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-10175 W77-11867 X 903-77-49 X 922-77-260 X-923-77-245 X 931 77-38 X 933-77-38	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0037 N78 10529* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529* p0003 N78 10545* # p0062 N78 11455 # p0068 N78 13516 # p0068 N78 13512 # p0081 N78 13512 # p0093 N78 13510* # p0093 N78 10540* # p0091 N78 10542* # p0091 N78 10542* # p0091 N78 11451* # p0091 N78 11451*
NASA CR-150423 NASA CR-150465 NASA CR-150465 NASA CR-150465 NASA CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151536 NASA-CR-151536 NASA-CR-151548 NASA CR-151548 NASA CR-151553 NASA CR-151553 NASA CR-151553 NASA CR-151561 NASA-CR-151561 NASA-CR-151563 NASA-CR-151563 NASA-CR-151563 NASA-CR-151663 NASA-CR-151675 NASA-CR-151675 NASA-CR-151675 NASA-CR-151676 NASA-CR-151676 NASA-CR-151676 NASA-CR-151676 NASA-CR-151676 NASA-CR-151676 NASA-CR-151676 NASA-CR-151676 NASA-CR-155206 NASA CR-155206 NASA CR-155206 NASA CR-155207 NASA CR-155207 NASA CR-155210 NASA-CR-155212 NASA-CR-155212 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155251 NASA-CR-1552521	p0037 N78-12506* # p0036 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0082 N78-12500* # p0083 N78-12500* # p0083 N78-12500* # p0083 N78-12508* # p0084 N78-12508* # p0099 N78-11453* # p0099 N78-11453* # p0099 N78-12508* # p0099 N78-12502* # p0097 N78-12502* # p0080 N78-12502* # p0080 N78-12503* # p0080 N78-12503* # p0080 N78-12503* # p0080 N78-12450* # p0080 N78-12503* # p0080 N78-10538* # p0080 N78-10538* # p0081 N78-10538* # p0081 N78-10538* # p0081 N78-10500* # p0099 N78-11813* # p0080 N78-12500* # p0099 N78-11813* # p0084 N78-13500* # p0084 N78-1350	NOAA-TM-ERL-GLERL-13 NOAA-77052503 NOAA-77052709 NOAA-77062710 NOAA-77062710 NOAA-77082507 NOO-RP-17(76)-SUPPL-1 NRL 8131 NSF/RA 770167 NSF/RA-770173 NSWC/DL TR-3668 NTISUB/C/138-009 NTISUB/C/138-009 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/139-013A NTISUB/C/139-010 NTISUB/C/	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-15660 # p0050 N78-12268 # p0050 N78-12268 # p0111 N78-12622 # p0050 N78-13622 # p0050 N78-15556* # p0094 N78-15556* # p0093 N78-15546* # p0093 N78-15546* # p0093 N78-15554* # p0093 N78-15554* # p0093 N78-15545* # p0093 N78-15545* # p0093 N78-15545* # p0093 N78-15545* # p0093 N78-15554* # p0093 N78-15554* # p0093 N78-15554* # p0093 N78-15554* # p0093 N78-15546* # p0093 N78-15648* # p0093 N78-10630 # p0020 A78-10630 # p0023 N78-10648 # p0023 N78-10678 # p0023 N78-10623 # p0023 N78-10623 # p0023 N78-10623 # p0023 N78-10623 # p0061 N78-10668 # p0061 N78-10630 # p0063 N78-10630 #	T-1314/4 T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-0-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-10175 W77-11867 X 903-77-49 X 922-77-260 X-923-77-245 X 931 77-38 X 933-77-38	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0037 N78 10529* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529* p0003 N78 10545* # p0062 N78 11455 # p0068 N78 13516 # p0068 N78 13512 # p0081 N78 13512 # p0093 N78 13510* # p0093 N78 10540* # p0091 N78 10542* # p0091 N78 10542* # p0091 N78 11451* # p0091 N78 11451*
NASA CR-150423 NASA CR-150465 NASA CR-150465 NASA CR-150465 NASA CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151536 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151548 NASA CR-151553 NASA CR-151553 NASA CR-151561 NASA-CR-151563 NASA-CR-151563 NASA-CR-151563 NASA-CR-151563 NASA-CR-151563 NASA-CR-151663 NASA-CR-151663 NASA-CR-151669 NASA-CR-151692 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-155206 NASA-CR-155206 NASA-CR-155206 NASA-CR-155207 NASA-CR-155207 NASA-CR-155207 NASA-CR-155210 NASA-CR-155210 NASA-CR-155211 NASA-CR-155211 NASA-CR-155211 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155251 NASA-CR-155251 NASA-CR-155251 NASA-CR-155251 NASA-CR-155255	p0037 N78-12506* # p0036 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0082 N78-12504* # p0082 N78-12504* # p0082 N78-12504* # p0083 N78-12504* # p0083 N78-12504* # p0083 N78-12504* # p0099 N78-11453* # p0099 N78-11453* # p0099 N78-11453* # p0099 N78-12498* # p0099 N78-12498* # p0099 N78-14455* # p0099 N78-14455* # p0099 N78-14465* # p0098 N78-14465* # p0098 N78-14461* # p0098 N78-14461* # p0098 N78-14461* # p0098 N78-14461* # p0098 N78-14459* # p0098 N78-14498* # p0099 N78-12492* # p0099 N78-12502* # p0099 N78-12504* # p0099 N78-11813* # p0094 N78-12504* # p0094 N78-1250	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77062709  NOAA-77062710  NOAA-770702206  NOAA-770702206  NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA 770167  NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/138-009  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/139-013A  NTISUB/C/139-013A  NTISUB/C/139-013A  NTISUB/C/139-013A  NTISUB/C/139-013A  NYSERDA 75/22  ONERA TP NO 1977 154  ORNL/SUB-75/87988  OWRT-A-045-IDA(3)  PB-268675/6  PB-26895/0  PB-26895/0  PB-269456/0  PB-269456/0  PB-269456/0  PB-270304/9  PB-270304/9  PB-270323/9  PB-270323/9  PB-270323/9  PB-270543/2  PB-270323/9	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-15660 # p0050 N78-1268 # p0050 N78-12268 # p0111 N78-12682 # p0111 N78-12682 # p0050 N78-13622 # p0050 N78-13622 # p0094 N78-15556* # p0094 N78-15556* # p0093 N78-15545* # p0093 N78-15546* # p0093 N78-15546* # p0093 N78-15546* # p0093 N78-15546* # p0093 N78-15646 # p0093 N78-10630 # p0060 N78-10630 # p0060 N78-10678 # p0050 N78-10678 # p0063 N78-10623 # p0063 N78-10623 # p0063 N78-10623 # p0063 N78-10623 # p0063 N78-10629 # p0098 N78-10629 # p0098 N78-10649 # p0098 N78-10549 # p0097 N78-12521 #	T-1314/4 T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-0-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-10175 W77-11867 X 903-77-49 X 922-77-260 X-923-77-245 X 931 77-38 X 933-77-38	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0037 N78 10529* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529* p0003 N78 10545* # p0062 N78 11455 # p0068 N78 13516 # p0068 N78 13512 # p0081 N78 13512 # p0093 N78 13510* # p0093 N78 10540* # p0091 N78 10542* # p0091 N78 10542* # p0091 N78 11451* # p0091 N78 11451*
NASA CR-150423 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151532 NASA-CR-151537 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151554 NASA CR-151555 NASA-CR-151561 NASA-CR-151563 NASA CR-1515661 NASA-CR-151567 NASA-CR-151567 NASA-CR-151567 NASA-CR-151576 NASA-CR-151576 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-151609 NASA-CR-155206 NASA-CR-155206 NASA-CR-155206 NASA-CR-155207 NASA-CR-155210 NASA-CR-155210 NASA-CR-155211 NASA-CR-155211 NASA-CR-155212 NASA-CR-1552216 NASA-CR-155224 NASA-CR-155252 NASA-CR-155252 NASA-CR-155252 NASA-CR-155255	p0037 N78-12506* # p0038 N78 11454* # p0064 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0087 N78-10538* # p0087 N78-10538* # p0087 N78-12504* # p0087 N78-12508* # p0098 N78-11453* # p0099 N78-11453* # p0099 N78-11453* # p0099 N78-14457* # p0099 N78-14457* # p0099 N78-14457* # p0097 N78-12486* # p0097 N78-12486* # p0097 N78-12486* # p0097 N78-12486* # p0097 N78-14457* # p0097 N78-1450* # p0097 N78-1530* # p0099 N78-11499 P0099 N78-11813* # p0099 N78-1181	NOAA-TM-ERL-GLERL-13  NOAA-77052503 NOAA-77052709 NOAA-77062710 NOAA-770702206 NOAA-770702206 NOAA-770702206 NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167 NSF/RA-770173  NSWC/DL TR-3668  NTISUB/C/ 138-009 NTISUB/C/ 138-009 NTISUB/C/ 138-010 NTISUB/C/ 138-010 NTISUB/C/ 139-013A NTISUB/C/ 139-010 NTISUB	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-11647 # p0098 N78-10649 # p0051 N78-12632 # p0050 N78-15660 #  p0050 N78-12268 # p0111 N78-12632 # p0011 N78-1262 # p0050 N78-13622 # p0050 N78-15554* # p0094 N78-15555* # p0093 N78-15545* # p0093 N78-15545* # p0093 N78-15554* # p0093 N78-15545* # p0093 N78-15555* # p0093 N78-15545* # p0093 N78-15545* # p0093 N78-15648 # p0093 N78-10630 # p0061 N78-10630 # p0065 N78-10678 # p0023 N78-10621 # p0024 N78-12521 # p0065 N78-12521 # p0065 N78-12521 # p0065 N78-13522 # p0065 N78-13522 # p0065 N78-13522 #	T-1314/4 T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-0-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-10175 W77-11867 X 903-77-49 X 922-77-260 X-923-77-245 X 931 77-38 X 933-77-38	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0037 N78 10529* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529* p0003 N78 10545* # p0062 N78 11455 # p0068 N78 13516 # p0068 N78 13512 # p0081 N78 13512 # p0093 N78 13510* # p0093 N78 10540* # p0091 N78 10542* # p0091 N78 10542* # p0091 N78 11451* # p0091 N78 11451*
NASA CR-150423 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151537 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151548 NASA CR-151553 NASA CR-151551 NASA-CR-151561 NASA-CR-151561 NASA-CR-151563 NASA-CR-151563 NASA-CR-151567 NASA-CR-151567 NASA-CR-151567 NASA-CR-151692 NASA-CR-151692 NASA-CR-151695 NASA-CR-151695 NASA-CR-151695 NASA-CR-151695 NASA-CR-155206 NASA-CR-155206 NASA-CR-155206 NASA-CR-155210 NASA-CR-155210 NASA-CR-155210 NASA-CR-155211 NASA-CR-155211 NASA-CR-155216 NASA-CR-155216 NASA-CR-155216 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155218 NASA-CR-155218 NASA-CR-155217 NASA-CR-155217 NASA-CR-155218 NASA-CR-155218 NASA-CR-155217 NASA-CR-155217 NASA-CR-155251 NASA-CR-155257 NASA-CR-155257 NASA-CR-155257 NASA-CR-155257 NASA-CR-155258 NASA-CR-155258 NASA-CR-155259 NASA-CR-155250 NASA-CR-155259 NASA-CR-155250 NASA-CR-155260 NASA-CR-155260 NASA-CR-155260 NASA-CR-155260	p0037 N78-12506* # p0038 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0080 N78-13500* # p0080 N78-13500* # p0080 N78-13500* # p0080 N78-13500* # p0080 N78-13508* # p0090 N78-1453* # p0090 N78-1453* # p0090 N78-1453* # p0090 N78-14457* # p0090 N78-14457* # p0090 N78-14457* # p0090 N78-14450* # p0090 N78-14450* # p0090 N78-14450* # p0087 N78-1450* # p0087 N78-1530* # p0098 N78-15500* # p0099 N78-11499* # p0098 N78-13500* # p0098 N78-13500* # p0098 N78-13500* # p0098 N78-13500* # p0099 N78-11499 # p0098 N78-13500* # p0099 N78-135000* # p0099 N78-13500* # p0099 N78-13500* # p0099 N78-13500* # p0099 N78-13500*	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77052709  NOAA-77062710  NOAA-770702206  NOAA-770702206  NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA 770173  NSWC/DL TR-3668  NTISUB/C/138-009  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/139-010  NTISUB/C/139-010	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-15660 # p0050 N78-12268 # p0111 N78-12632 # p0111 N78-12632 # p0111 N78-12632 # p0090 N78-1556* # p0091 N78-1556* # p0094 N78-15556* # p0093 N78-15556* # p0093 N78-15556* # p0093 N78-15548* # p0093 N78-15649 # p0065 N78-10678 # p0023 N78-10621 # p0023 N78-10621 # p0023 N78-10621 # p0023 N78-10621 # p0030 N78-10641 # p0031 N78-10641 # p0031 N78-10641 # p0032 N78-10641 # p0033 N78-10641 # p0033 N78-10641 # p0031 N78-10641 # p0045 N78-10648 # p0065 N78-13522 # p0047 N78-12621 # p0050 N78-12621 # p0065 N78-13621 # p0065 N78-13622 # p0098 N78-10649 # p0098 N78-10649 # p0098 N78-13636 # p0098 N78-13636 # p0095 N78-13636 # p0051 N78-13632 #	T-1314/4 T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-0-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-10175 W77-11867 X 903-77-49 X 922-77-260 X-923-77-245 X 931 77-38 X 933-77-38	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0037 N78 10529* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529* p0003 N78 13516 # p0062 N78 11455 # p0068 N78 13512 # p0068 N78 13510* # p0081 N78 13510* # p0033 N78 13510* # p0033 N78 13510* # p0033 N78 13510* # p0032 N78 11452* # p0033 N78 10540* # p0031 N78 10540* # p0081 N78 10542* # p0081 N78 11451* #
NASA CR-150423 NASA CR-150465 NASA CR-150465 NASA CR-150465 NASA CR-151525 NASA-CR-151525 NASA-CR-151532 NASA CR-151536 NASA-CR-151537 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151548 NASA CR-151553 NASA CR-151551 NASA CR-151561 NASA-CR-151563 NASA CR-151563 NASA CR-151563 NASA-CR-151563 NASA-CR-151576 NASA-CR-151576 NASA-CR-151609 NASA CR-151609 NASA CR-155206 NASA CR-155206 NASA CR-155206 NASA CR-155207 NASA CR-155207 NASA CR-155207 NASA CR-155207 NASA CR-155210 NASA CR-155210 NASA CR-155210 NASA-CR-155211 NASA-CR-155211 NASA-CR-155212 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155251 NASA-CR-155251 NASA-CR-1552521 NASA-CR-1552521 NASA-CR-1552521 NASA-CR-155253 NASA-CR-155255 NASA-CR-155255 NASA-CR-155255 NASA-CR-155255 NASA-CR-155255 NASA-CR-155255 NASA-CR-155255 NASA-CR-155255 NASA-CR-155256 NASA-CR-155266	p0037 N78-12506* # p0036 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0080 N78-13500* # p0080 N78-13508* # p0090 N78-1453* # p0090 N78-1453* # p0090 N78-14450* # p0090 N78-14500* # p0080 N78-13503* # p0080 N78-10530* # p0080 N78-10530* # p0080 N78-10530* # p0090 N78-11449* # p0080 N78-10530* # p0090 N78-11830* # p0090 N78-11830* # p0090 N78-11830* # p0090 N78-11830* # p0090 N78-12500* # p0090 N78-12500* # p0090 N78-12500* # p0090 N78-13500* # p0004 N78-13500* # p0004 N78-13500* # p0008 N78-13500* # p0008 N78-13500* # p0004 N78-13500*	NOAA-TM-ERL-GLERL-13 NOAA-77052503 NOAA-77052709 NOAA-77062710 NOAA-77062710 NOAA-77082507 NOO-RP-17(76)-SUPPL-1 NRL 8131 NSF/RA 770167 NSF/RA-770173 NSWC/DL TR-3668 NTISUB/C/138-009 NTISUB/C/138-009 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/138-010 NTISUB/C/139-013A NTISUB/C/139-013A NTISUB/C/139-010 NTISUB/C	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-13632 # p0050 N78-13680 # p0050 N78-12268 # p0111 N78-14612 # p0037 N78-13622 # p0050 N78-13622 # p0050 N78-10675 # p0093 N78-15554* # p0093 N78-15555* # p0093 N78-15555* # p0093 N78-15555* # p0093 N78-15554* # p0093 N78-15554* # p0093 N78-15554* # p0093 N78-15554* # p0093 N78-15545 # p0093 N78-15554 # p0093 N78-15554 # p0093 N78-15552 # p0093 N78-1564 # p0093 N78-1564 # p0093 N78-10630 # p0050 N78-10678 # p0060 N78-10678 # p0020 N78-10621 # p0020 N78-10621 # p0021 N78-10623 # p0051 N78-10623 # p0063 N78-10623 # p0065 N78-10630 # p0065 N78-11632 # p0051 N78-12632 # p0051 N78-12632 # p0051 N78-12632 # p0051 N78-14612 # p0050 N78-14612 # p0030 N78-14612 # p0030 N78-14612 # p0030 N78-14612 # p0030 N78-14612 #	T-1314/4 T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-0-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-10175 W77-11867 X 903-77-49 X 922-77-260 X-923-77-245 X 931 77-38 X 933-77-38	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0037 N78 10529* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529* p0003 N78 10545* # p0062 N78 11455 # p0068 N78 13516 # p0068 N78 13512 # p0081 N78 13512 # p0093 N78 13510* # p0093 N78 10540* # p0091 N78 10542* # p0091 N78 10542* # p0091 N78 11451* # p0091 N78 11451*
NASA CR-150423 NASA CR-150465 NASA CR-150467 NASA-CR-151525 NASA-CR-151525 NASA-CR-151532 NASA-CR-151536 NASA-CR-151537 NASA-CR-151537 NASA-CR-151548 NASA CR-151548 NASA CR-151548 NASA CR-151553 NASA CR-151551 NASA-CR-151561 NASA-CR-151561 NASA-CR-151563 NASA-CR-151563 NASA-CR-151567 NASA-CR-151567 NASA-CR-151567 NASA-CR-151692 NASA-CR-151692 NASA-CR-151695 NASA-CR-151695 NASA-CR-151695 NASA-CR-151695 NASA-CR-155206 NASA-CR-155206 NASA-CR-155206 NASA-CR-155210 NASA-CR-155210 NASA-CR-155210 NASA-CR-155211 NASA-CR-155211 NASA-CR-155216 NASA-CR-155216 NASA-CR-155216 NASA-CR-155217 NASA-CR-155217 NASA-CR-155217 NASA-CR-155218 NASA-CR-155218 NASA-CR-155217 NASA-CR-155217 NASA-CR-155218 NASA-CR-155218 NASA-CR-155217 NASA-CR-155217 NASA-CR-155251 NASA-CR-155257 NASA-CR-155257 NASA-CR-155257 NASA-CR-155257 NASA-CR-155258 NASA-CR-155258 NASA-CR-155259 NASA-CR-155250 NASA-CR-155259 NASA-CR-155250 NASA-CR-155260 NASA-CR-155260 NASA-CR-155260 NASA-CR-155260	p0037 N78-12506* # p0038 N78 11454* # p0064 N78 13509* # p007 N78-10538* # p0080 N78-13500* # p0080 N78-13500* # p0080 N78-13500* # p0080 N78-13500* # p0080 N78-13508* # p0090 N78-1453* # p0090 N78-1453* # p0090 N78-1453* # p0090 N78-14457* # p0090 N78-14457* # p0090 N78-14457* # p0090 N78-14450* # p0090 N78-14450* # p0090 N78-14450* # p0087 N78-1450* # p0087 N78-1530* # p0098 N78-15500* # p0099 N78-11499* # p0098 N78-13500* # p0098 N78-13500* # p0098 N78-13500* # p0098 N78-13500* # p0099 N78-11499 # p0098 N78-13500* # p0099 N78-135000* # p0099 N78-13500* # p0099 N78-13500* # p0099 N78-13500* # p0099 N78-13500*	NOAA-TM-ERL-GLERL-13  NOAA-77052503  NOAA-77052709  NOAA-77062710  NOAA-770702206  NOAA-770702206  NOAA-77082507  NOO-RP-17(76)-SUPPL-1  NRL 8131  NSF/RA 770167  NSF/RA 770173  NSWC/DL TR-3668  NTISUB/C/138-009  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/138-010  NTISUB/C/139-010  NTISUB/C/139-010	p0051 N78-12632 # p0050 N78-10678 # p0063 N78-10649 # p0063 N78-10649 # p0051 N78-12632 # p0050 N78-15660 # p0050 N78-12268 # p0111 N78-12632 # p0111 N78-12632 # p0111 N78-12632 # p0090 N78-1556* # p0091 N78-1556* # p0094 N78-15556* # p0093 N78-15556* # p0093 N78-15556* # p0093 N78-15548* # p0093 N78-15649 # p0065 N78-10678 # p0023 N78-10621 # p0023 N78-10621 # p0023 N78-10621 # p0023 N78-10621 # p0030 N78-10641 # p0031 N78-10641 # p0031 N78-10641 # p0032 N78-10641 # p0033 N78-10641 # p0033 N78-10641 # p0031 N78-10641 # p0045 N78-10648 # p0065 N78-13522 # p0047 N78-12621 # p0050 N78-12621 # p0065 N78-13621 # p0065 N78-13622 # p0098 N78-10649 # p0098 N78-10649 # p0098 N78-13636 # p0098 N78-13636 # p0095 N78-13636 # p0051 N78-13632 #	T-1314/4 T-1314/4 T-1314/4 T-1314/4 T-1314/4 TID-27689 TR 76 C2 US-PATENT-APPL-SN-677352 US-PATENT-APPL-SN-763753 US-PATENT-CLASS 166-248 US-PATENT-CLASS 166-259 US-PATENT-CLASS 324-58 5B US-PATENT-4 052 666 US-PATENT-4 061 190 USCG-0-32-77 WES-TR M-77 2-2 WMO-427 W77-10175 W77-10175 W77-11867 X 903-77-49 X 922-77-260 X-923-77-245 X 931 77-38 X 933-77-38	p0008 N78-14459* # p0087 N78-14460* # p0087 N78-14460* # p0087 N78-14461* # p0098 N78-14615 # p0098 N78 10539* # p0007 N78 10529* p0037 N78 14452* p0037 N78 14452* p0037 N78 10529* p0007 N78 10529* p0007 N78 10529* p0007 N78 10529* p0003 N78 10545* # p0062 N78 11455 # p0068 N78 13516 # p0068 N78 13512 # p0081 N78 13512 # p0093 N78 13510* # p0093 N78 10540* # p0091 N78 10542* # p0091 N78 10542* # p0091 N78 11451* # p0091 N78 11451*

1. Report No NASA SP-7041 (17)	2 Government Access	ion No	3 Recipient's Catalog	No
4 Title and Subtitle EARTH RESOURCES			5. Report Date April 1978	
A Continuing Bibliography (Issue 17)			6 Performing Organiz	ation Code
7 Author(s)			8 Performing Organiza	ation Report No.
9 Performing Organization Name and Address		<del></del>	10 Work Unit No	
National Aeronautics and Space Administration Washington, D. C. 20546			11 Contract or Grant	
12 Sponsoring Agency Name and Address			13 Type of Report an	d Period Covered
			14 Sponsoring Agency	Code
15. Supplementary Notes	·····			
This bibliography lists 775 reports, articles, and other documents introduced into the NASA scientific and technical information system between January 1 and March 31, 1978. Emphasis is placed on the use of remote sensing and geophysical instrumentation in spacecraft and aircraft to survey and inventory natural resources and urban areas. Subject matter is grouped according to agriculture and forestry, environmental changes and cultural resources, geodesy and cartography, geology and mineral resources, hydrology and water management, data processing and distribution systems, instrumentation and sensors, and economic analysis.				
17 Key Words (Suggested by Author(s))  Bibliographies  Earth Resources Program  Remote Sensors		18 Distribution Statement Unclassifi	ed - Unlimit	ed
Nemote Sensors				
19 Security Classif (of this report) Unclassified	20 Security Classif (o Unclassifi		21 No of Pages 186	22. Price* \$9.00 HC

# PUBLIC COLLECTIONS OF NASA DOCUMENTS

### **DOMESTIC**

NASA distributes its technical documents and bibliographic tools to ten special libraries located in the organizations listed below Each library is prepared to furnish the public such services as reference assistance, interlibrary loans, photocopy service, and assistance in obtaining copies of NASA documents for retention

**CALIFORNIA** 

University of California, Berkeley

**COLORADO** 

University of Colorado, Boulder

DISTRICT OF COLUMBIA

Library of Congress

**GEORGIA** 

Georgia Institute of Technology, Atlanta

ILLINOIS

The John Crerar Library, Chicago

**MASSACHUSETTS** 

Massachusetts Institute of Technology. Cambridge

MISSOURI

Linda Hall Library, Kansas City

**NEW YORK** 

Columbia University, New York

**PENNSYLVANIA** 

Carnegie Library of Pittsburgh

WASHINGTON

University of Washington, Seattle

NASA publications (those indicated by an "\*" following the accession number) are also received by the following public and free libraries

**CALIFORNIA** 

Los Angeles Public Library San Diego Public Library

**COLORADO** 

Denver Public Library

CONNECTICUT

Hartford Public Library

**MARYLAND** 

**Enoch Pratt Free Library, Baltimore** 

**MASSACHUSETTS** 

**Boston Public Library** 

MICHIGAN

**Detroit Public Library** 

MINNESOTA

Minneapolis Public Library

MISSOURI

Kansas City Public Library

St Louis Public Library

**NEW JERSEY** 

Trenton Public Library

**NEW YORK** 

**Brooklyn Public Library** 

**Buffalo and Erie County Public Library** 

Rochester Public Library

New York Public Library

OHIO

Akron Public Library

Cincinnati Public Library

Cleveland Public Library

**Dayton Public Library** 

Toledo Public Library

**OKLAHOMA** 

Oklahoma County Libraries, Oklahoma City

**TENNESSEE** 

Memphis Public Library

TEXAS

Dallas Public Library

Fort Worth Public Library

WASHINGTON

Seattle Public Library

**WISCONSIN** 

Milwaukee Public Library

An extensive collection of NASA and NASA-sponsored documents and aerospace publications available to the public for reference purposes is maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 750 Third Avenue, New York, New York, 10017

### **EUROPEAN**

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England By virtue of arrangements other than with NASA, the British Library Lending Division also has available many of the non-NASA publications cited in STAR. European requesters may purchase facsimile copy or microfiche of NASA and NASA-sponsored documents, those identified by both the symbols "#" and "\*", from ESRO/ELDO Space Documentation Service, European Space Research Organization, 114, av Charles de Gaulle, 92-Neuilly-sur-Seine, France

National Aeronautics and Space Administration

Washington, D.C. 20546

Official Business
Penalty for Private Use, \$300

THIRD-CLASS BULK RATE

Postage and Fees Paid National Aeronautics and Space Administration NASA-451



# NASA

POSTMASTER:

If Undeliverable (Section 158 Postal Manual) Do Not Return

# NASA CONTINUING BIBLIOGRAPHY SERIES

	NUMBER	TITLE	FREQUENCY
	NASA SP-7011 **	AEROSPACE MEDICINE AND BIOLOGY	Monthly
•		Aviation medicine, space medicine, and space biology	
<i>(</i> , )	NASA SP47037,	AERONAUTICAL ENGINEERING	Monthly
	and the second	Engineering, design, and operation of aircraft and aircraft components	
	NASA SP-7039	NASA PATENT ABSTRACTS BIBLIOGRAPHY	Semiannually
		NASA patents and applications for patent	
	NASA SP-7041	EARTH RESOURCES	Quarterly
		Remote sensing of earth resources by aircraft and spacecraft	
	NASA SP-7043	ENERGY	Quarterly
		Energy sources, solar energy, energy conversion, transport, and storage	
	NASA SP-7500	MANAGEMENT	Annually
		Program, contract, and personnel management, and management techniques	

Details on the availability of these publications may be obtained from:

SCIENTIFIC AND TECHNICAL INFORMATION OFFICE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Washington, D.C. 20546