

144

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

INTERAGENCY REPORT NASA-154

GEOGRAPHIC APPLICATIONS PROGRAM:
REPORTS COMPLETED AND IN PREPARATION

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Washington, D.C.

August 1969

(NASA-CR-125644)
PROGRAM: REPORTS GEOGRAPHIC APPLICATIONS
PREPARATION R.H. Alexander COMPLETED AND IN
Survey) Aug. 1969 16 p (Geological
CSCL 08F
(THRU)
23
N72-18351
Unclas
G3/13 19047

Prepared by the Geological Survey for the National
Aeronautics and Space Administration (NASA) under
Contract No. W-12570, Task No. 160-75-01-30-10.

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16

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August 1969

Table of Contents

	<u>Page</u>
Preface.....	i
Breakdown - Program Organization	ii
Land Use Analysis	1
Urban and Metropolitan Studies	6
Environmental Impact Studies	8
Geographic Information Systems	8
Geographic Analysis and Program Planning	9

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U.S. GEOLOGICAL SURVEY
GEOGRAPHIC APPLICATIONS PROGRAM
REPORTS COMPLETED AND IN PREPARATION

August 1969

PREFACE

One product of the NASA/USGS Geographic Applications Program, the one that is perhaps the most tangible, is the collection of reports written by the various principal investigators. Since the effort has been largely one of contract research at a number of research institutions, the reports are widely scattered and often not obviously identifiable as resulting from the sponsorship of the NASA Earth Resources Program.

The purpose of the present compilation is to bring together for ready reference a list of all reports, both completed and in preparation, resulting from NASA sponsorship of the geography program. Wherever possible, complete bibliographic citations are given. Since some of the reports listed are not yet completed, citations can not all be in complete form. The reason for including incomplete citations is the sponsor's need for rather rapid feed-back of information so that it can have a bearing on on-going program planning. This should, therefore, be considered a working bibliography.

The first transfer of funds from NASA to support a remote sensing program in geography was in fiscal year 1964 to the Office of Naval Research. The Geographic Applications Program of the USGS began in fiscal year 1966 when the program was transferred from ONR to USGS, maintaining the continuity of the earlier research. Reports listed in this bibliography include those from both ONR and USGS phases of the program.

Many of the reports listed have not yet reached normal publication outlets for scientific literature. The reader is invited to inquire at the Geographic Applications Program, Office of the Chief Geographer (15), U.S. Geological Survey, Washington, D.C. 20242, for information on the location and availability of any report listed herein.

Report citations have been assembled in five groups which serve as the basis of program organization. The breakdown within each project group is alphabetical by contractors or organizations performing the research.

1. LAND USE ANALYSIS

(NASA Task No. 160-75-01-32-10)

Objectives: To develop a land use information capability for applying remote sensor data to national, regional, and local assessments of the status of human utilization of land surface, as a basis for policy decisions by Government agencies and administrators in business and industry; to identify various categories of land use types; to determine interpretation keys for using data from space-craft for synoptic land use mapping; to define areas of future migration and settlement potentials; and to monitor the status of cultural and natural resources.

2. URBAN AND METROPOLITAN STUDIES

(NASA Task Nos. 160-75-01-34-10 and 160-75-01-35-10)

Objectives: To develop the capability to provide remote sensing data inputs for improvement of urban land use, for better planning and utilization of transportation systems, for urban and regional development planning, and for more efficient utilization of urban space and essential resources.

3. ENVIRONMENTAL IMPACT STUDIES

(NASA Task No. 160-75-01-16-10)

Objectives: To develop a capability for remote monitoring of energy exchanges at the Earth's surface, and other processes and the effects which result from man's modification of his environment.

4. GEOGRAPHIC INFORMATION SYSTEMS

(NASA Task No. 160-75-01-31-10)

Objectives: To improve the processing, analysis, and display of the large quantities of geographic information (information keyed to specific locations on the Earth's surface) obtainable from orbital sensors, through studies of the flow of geographic information from sensors to ultimate users, with emphasis on the development of automatic techniques for data extraction, storage and display wherever they are most appropriate.

5. GEOGRAPHIC ANALYSIS AND PROGRAM PLANNING
(NASA Task No. 160-75-01-30-10)

Objectives: To integrate various elements of the Geographic Applications Program; to plan for orderly progress of research, coordinate with other discipline and agency programs, analyze multi-sensor imagery for geographic content, investigate geographic applications of remote sensor data to resource management and inventory, and plan experiments for future NASA programs such as the Earth Resources Technology Satellite.

U.S. GEOLOGICAL SURVEY
GEOGRAPHIC APPLICATIONS PROGRAM
REPORTS COMPLETED AND IN PREPARATION

August 1969

LAND USE ANALYSIS
(NASA Task No. 160-75-01-32-10)

Association of American Geographers - Robert W. Peplies, Project Director

AAG Commission on Geographic Applications of Remote Sensing, "The Final Report for May 1967 - May 1968."

____, "The Final Report for May 1968 - May 1969." Included in this report are the following:

Thrower, Norman J.W., L.W. Senger, and R.H. Mullens, "Report on Southwestern United States Land Use Mapping from Gemini Satellite Photography"

Rudd, R.D., "Report on the Use of Air Photo Mosaics as Simulators of Spacecraft"

Holz, Robert K., David L. Huff, and Robert C. Mayfield, "A Study of Urban Spatial Structure Based on Remote Sensing Imagery"

Nunnally, Nelson R., "Introduction to Remote Sensing - The Physics of Electromagnetic Radiation"

Nunnally, Nelson R., and Richard E. Witmer, 1968, "A Strategy for Developing Classification of Land Use as Interpreted from Remote Sensor Imagery," Tech. Report No. 1.

University of California, Riverside - Leonard W. Bowden, Principal Investigator

*Bahre, Conrad and Steven Sandalin, (no date), "Apollo VI and VII Imagery: An Evaluation of its Geographic Information Value for Southwestern U.S. and Northern Mexico."

Bowden, Leonard W., Norman J. Thrower, and Clifford Tiedemann, 1967, "Status Report on Remote Sensing of Southern California and Related Environments." Included in this report are the following:

Babcock, K. and John Estes, "Annotation of Thermal Infrared Imagery of the Salton Sea Region."

*In preparation

Bowden, L., "Remote Sensing of the World's Arid Lands"

Francaviglia, Richard V., "Land Use Mapping of the Coachella and Imperial Valleys from Gemini Imagery"

_____, "Land Use and Vegetation Mapping in Indio"

Minnich, R., "Identification of San Bernardino Mountain's Vegetation on High Altitude Ektachrome Color Infrared"

Paige, L., Jr., "Malibu Site: Preliminary Studies on Vegetation Association"

Pease, R., and J. Geissmann, "Preliminary Experiments with Filters for Color Infrared"

Wilson, J. Ellen, John Estes, and Leonard Bowden, "ALOTS: Its Relation to Landscape Analysis"

Bowden, Leonard W., 1968, "Southern California Regional Resources Studies" Presented at the NASA/MSC Earth Resources Program Mission Review, Geography Session, Sept. 16, 1968.

_____, 1968, "Imaging the Variable Environment: Selected Samples from the United States," Status Report II, Tech. Report 3.

_____, 1968, "Multi-Sensor Signatures of Urban Morphology, Function, and Evolution," Status Report II, Tech. Report 3.

*Frederick, James, Claude Johnson, and Gary Harris, "A Computer Program for Land Use Analysis in Remote Sensing of the Imperial Valley"

Johnson, Claude W., Leonard Bowden, and Robert Pease, "Evaluation of Apollo IX - SO-65 Experiment (Imperial Valley) with map"

Minnich, Richard A., Leonard Bowden, and Robert Pease, 1969, "Mapping Vegetation in Southern California from Color Infrared Imagery." Interagency Report NASA-152, April.

Pease, Robert W. and Leonard Bowden, 1968, "Making Color Infrared Film a More Effective High Altitude Sensor." Interagency Report NASA-117.

Pease, Robert W., 1969, "Predicting the Relative Dye Layer Densities of Color Infrared Transparencies." Interagency Report NASA-146.

_____, 1969, "Plant Tissue and the Color Infrared Record". Interagency Report NASA-147.

*Van Curran, Anthony, "Land Use Mapping of the Coachella Valley Using Aero Ektachrome Infrared Photography"

University of Georgia - Merle C. Prunty, Principal Investigator

Mealor, W.T., Jr., and Merle C. Prunty, Jr., 1969, "Vegetative Changes Caused by Fire in the Florida Flatwoods as Observed by Remote Sensing" Interagency Report NASA-148.

Prunty, Merle C., 1968, "Fire Phenomena in Savanna Areas" Presented at NASA/MSR Earth Resources Program Mission Review, Geography Session, Sept. 16, 1968.

_____, 1968, "Remote Sensing of Fire Phenomena in Tropical Grasslands: The Florida Test Sites, 1967-68"

University of Kansas - David S. Simonett, Principal Investigator

Cochrane, G. Ross, 1968, "False-Color Film Fails in Practice," Photogrammetric Engineering, Vol. XXXIV, No. 11, Nov. 1968, pp. 1142-1146.

Haralick, R.M., R. Caspall, R.K. Moore, and D.S. Simonett, "A Conditional Probability and Statistical Study of Crop Discrimination Using Radar Images."

Henderson, F.M. and D.S. Simonett, "On the Use of Space Photography for Identifying Transportation Routes: A Summary of Problems"

Lewis, Anthony J., 1968, "Evaluation of Multiple Polarized Radar Imagery for the Detection of Selected Cultural Features." Interagency Report NASA-130.

Moore, Richard K. and D.S. Simonett, 1967, "Potential Research and Earth Resources Studies with Orbiting Radars: Results of Recent Studies." Presented at the 4th Annual Meeting, American Institute of Aeronautics and Astronautics, Anaheim, California, Oct. 23-27, 1967. AIAA Paper 67-767.

_____, 1967, "Radar Remote Sensing in Biology" Bioscience, Vol. 17, No. 6, June 1967, pp. 384-94.

Peterson, R.M., G.R. Cochrane, S.A. Morain, and D.S. Simonett, 1969, "A Multi-Sensor Study of Plant Community Densities and Boundaries at Horsefly Mountain, Oregon." Submitted for publication in Remote Sensing in Biology (in press), University of Georgia Press.

Schwarz, David E. and Fred Caspall, 1968, "The Use of Radar in the Discrimination and Identification of Agricultural Land Use." Proceedings, Fifth Symposium on Remote Sensing of Environment, Ann Arbor, Michigan, 1968.

Simonett, David S., 1968, "Land Evaluation Studies with Remote Sensors in the Infrared and Radar Regions." Interagency Report NASA-126. Also published in Proceedings, CSIRO (Australia) - UNESCO International Symposium on Land Evaluation, Canberra, Australia, Aug. 25-30, 1968.

Simonett, David S., 1968, "The Utility of Radar and Other Remote Sensors in Thematic Land Use Mapping from Spacecraft - First Annual Report." Interagency Report NASA-140. Included in this report are the following:

Simonett, David S., "Questions on Thematic Mapping: Some Preliminary Observations - The Question of Resolution in Thematic Mapping."

Schwarz, David E., and Roland D. Mower, "The Potential for Deriving Landform Regions from Radar Imagery: A Puerto Rican Example."

Sabol, Joseph, "The Relationship between Population and Radar-Derived Area of Urban Places."

Peterson, Rex M., "Observations on the Geomorphology and Land Use of Part of the Wasatch Range, Utah."

Peterson, Florence, "An Urban Land Use Study of Lawrence, Kansas, Using K-Band Radar."

_____, 1969, "The Complementary Roles of Aerial Photography and Radar Imaging Related to Weather Conditions."

_____, 1968, "Potential of Radar Sensors as Tools in Reconnaissance of Geomorphic, Vegetation and Soil Mapping." Interagency Report NASA-125 Also in Proceedings, 9th Congress, International Soil Science Society, Adelaide, Australia, August 6-16, 1968.

_____, 1967, Eagleman, J.E., A.B. Erhard, D.C. Rhodes, and D.E. Schwarz, "The Potential of Radar as a Remote Sensor in Agriculture: A Study with K-Band Imagery in Western Kansas." CRES Report No. 61-21.

Walters, Robert L., 1968, "Radar Bibliography for Geoscientists." CRES Report No. 61-30.

Office of Naval Research - East Tennessee State University, Robert W. Peplies, Principal Investigator

Crawford, Nicholas C., 1967, "The Detection of Past Landscapes from Remote Sensor Data." Tech. Report 2.

_____, 1967, "The Applications of Remote Sensor Data to Historical Geography - A Case Study of the Asheville Basin." Tech. Report 3.

Ellison, James H. and Lyman O. Williams, 1969, "Measurement of Radar Images of Number of Valleys per Unit Area as a Discriminant of Sedimentary Rock Types in the Physiographic Regions of Tennessee." Tech. Report 7.

- Harrell, David, Nicholas C. Crawford, and Robert W. Peplies, 1966, "Remote Sensor Return as Historical Documents." Proceedings, Fourth Symposium on Remote Sensing of Environment, University of Michigan, Ann Arbor, pp. 599-604.
- Honea, Robert B., 1969, "Determination of Land Form Texture from Side-Looking Radar Imagery." Tech. Report 16.
- _____. 1969, "The Derivation of Trade Areas and Traffic Flows from Remote Sensor Imagery." Tech. Report 15.
- Nunnally, Nelson R., 1969, "Radar as a Tool for Regional Investigation." Interagency Report NASA-67.
- Pate, Maynard, 1969, "A Feasibility Study of Remote Sensor Application to Urban and Regional Transportation Planning." Tech. Report 10.
- Peplies, Robert W., 1968, "Land Use and Regional Analysis." NASA/MSC Earth Resources Program Mission Review, Geography Session, Sept. 16, 1968.
- Poole, Donald H., 1969, "Evaluation of the Utility of Available Remote Sensor Returns for a Study of Slope Failure Phenomena." Tech. Report 14.
- _____, 1969, "The Development of Criteria for Recognizing and Identifying Slope Failure Forms as Depicted by Remote Sensor Returns." Tech. Report 12.
- _____, 1969, "The Distribution of Slope Failure Forms as Depicted by Remote Sensor Returns." Tech. Report 13.
- Poole, Donald H. and J. David Samol, 1967, "The Advantages of Ektachrome IR Interpretation as an Aid to the Study of Slope Failure Forms."
- Samol, John David, 1968, "Rural Land Use Analysis via Ektachrome Infrared Photo Interpretation." Tech. Report 4.
- Williams, Lyman O., 1969, "Radar: An Aid to Geologic Mapping of Crystalline Rocks at Test Site 46, North Carolina." Tech. Report 5.
- _____, 1969, "Interpretation of Linear Elements on the Radar Image of the Hot Springs-Asheville-Hendersonville Area, North Carolina." Tech. Report 6.
- _____, 1969, "Preliminary Study of Colors on Selected Remote Sensor Images of Water Bodies in the Asheville, North Carolina Test Area." Tech. Report 8.
- Williams, Lyman O., and John David Samol, 1969, "Effects on Photographs of Water by Variation of Sediment and Algal Content Under Controlled Conditions." Tech. Report 9.

Office of Naval Research - Texas Instruments, Inc.

Ludlum, Roger, 1966, "Ground Truth Research for an Airborne Multisensor Survey Program."

U.S. Geological Survey - Geographic Applications Program

Llewelyn, Robert and John E. Wilson, 1968, "Letter Report: Urban Land Use from Multiband Photography."

Ross, Donald. (Philco-Ford) and John E. Wilson, 1968, "Spectral Slicing of an Apollo Image of Dallas-Ft. Worth, Texas."

Wilson, John E., 1968, "Ground Truth Procedures for Aiding Interpretation of Remote Sensor Data." Presented at annual meeting of the American Society of Photogrammetry, March 10-15, 1968, and published in the Papers of the 34th Annual Meeting, pp. 365-73.

_____, 1968, "Sensor Detection Capabilities Study." To be published as Geological Survey Circular 616, and Interagency Report NASA-143.

URBAN AND METROPOLITAN STUDIES (NASA Task No. 160-75-01-35-10)

Autometric/Raytheon

Pascucci, Richard F., Edward T. Huffman, and Charles Bay, 1968, "Analysis of Multi-Sensor Data for Office of Emergency Preparedness Purposes."

Barringer Research Ltd.

MacDowall, Joseph, 1968, "Results of Airborne Survey of NO₂ and SO₂ Over Los Angeles Basin."

University of California, Riverside - L.W. Bowden, Principal Investigator

Mullens, Robert H., Jr., and addendum by Leslie W. Senger, 1969, "Analysis of Urban Residential Environments Using Color Infrared Aerial Photography: An Examination of Socioeconomic Variables and Physical Characteristics of Selected Areas in the Los Angeles Basin." Addendum, "An Application of the Concepts of the Los Angeles Residential Environment Study to the Ontario-Upland Region of California." Interagency Report NASA-153.

Dartmouth College - R.B. Simpson, Principal Investigator

Simpson, Robert B., 1969, "Geographic Evaluation of Radar Imagery of New England." Interagency Report NASA-163.

University of Michigan

Tobler, Waldo R., 1968, "Satellite Confirmation of Settlement Size Coefficient." Interagency Report NASA-151.

Northwestern University - Duane F. Marble, Principal Investigator

Betak, John F., 1967, "Object Identification in Aerial Photographs: A Preliminary Report."

_____, 1969, "Two Dimensional Syntax and Visual Cues in Aerial Photographs."

- Betak, J.F., 1969, "Some More Observations on Visual Cues in Aerial Photographs."
- Binsell, Ronald, 1967, "Dwelling Estimation from Aerial Photography."
- Dacey, Michael F., 1966, "A Model for the Areal Pattern of Retail and Service Establishments Within an Urban Area." Tech. Report 2.
- Dueker, Kenneth J., 1966, "Spatial Data Systems: Organization of Spatial Data." Tech. Report 4.
- _____, 1966, "Spatial Data Systems: Special Topics." Tech. Report 6.
- _____, 1966, "Spatial Data Systems: Systems Considerations." Tech. Report 5.
- Garrison, W. L., A. Rosenfeld, R.H. Alexander, E. N. Thomas, D.F. Marble, and M. Thompson, 1965, "Five Papers on Remote Sensing and Urban Information Systems."
- *Horton, F. and J. Campbell, 1969, "Alternative Strategies for the Definition of Urban Hierarchies from Radar Imagery."
- Manji, Ashraf S., 1968, "Uses of Conventional Aerial Photography in Urban Areas: Review and Bibliography." Interagency Report NASA-131.
- Manji, Ashraf S. and Eric Moore, 1969, "A Method of Evaluating the Cost Effectiveness of Remote Sensing Systems for Urban Data Collection."
- Marble, Duane F. and Edwin N. Thomas, 1966, "Some Observations on the Utility of Multispectral Photography for Urban Research." Proceedings, Fourth Symposium on Remote Sensing of Environment, University of Michigan, Ann Arbor, pp. 135-44.
- Moore, Eric C., 1968, "Side-Looking Radar in Urban Research: A Case Study." Interagency Report NASA-138.
- Moore, Eric C. and Barry S. Wellar, 1967, "Remote Sensor Imagery in Urban Research: Some Potentialities and Problems." Interagency Report NASA-118.
- _____, 1968, "Experimental Applications of Multiband Photography in Urban Research." Transactions, Illinois State Academy of Science, Vol. 61, No. 1, pp. 80-88.
- _____, 1969, "Urban Data Collection by Airborne Sensor." Journal, American Institute of Planners, Vol. XXXV, No. 1.
- *Moore, E.C., 1969, "Collection of Housing Quality Data by Remote Sensor: The Los Angeles Experiment."
- Schneider, Clarke, H.P., 1967, "Material Identification in Urban Areas from Gray Tone Variations in Multispectral Photography."
- Thomas, Edwin N. and D.F. Marble, 1966, "The Use of Remote Sensors in Urban Information Systems."

Wellar, Barry S., 1968, "Generation of Housing Quality Data from Multi-band Aerial Photographs." Interagency Report NASA-119.

_____, 1968, "Thermal Infrared Imagery in Urban Studies." Interagency Report NASA-135.

_____, 1968, "Utilization of Multiband Aerial Photographs in Urban Housing Quality Studies." Proceedings, Fifth Symposium on Remote Sensing of Environment, Univ. of Michigan, Apr. 1968, pp. 913-926 Interagency Report NASA-120.

_____, 1969, "Hyperaltitude Photography as a Data Base in Urban and Transportation Research."

U.S. Geological Survey - Geographic Applications Program

Alexander, Robert H., L.W. Bowden, D.F. Marble, and E.C. Moore, 1968, "Remote Sensing of Urban Environments." Proceedings, Fifth Symposium on Remote Sensing of Environment, University of Michigan, pp. 889-911.

ENVIRONMENTAL IMPACT STUDIES (NASA Task No. 160-75-01-16-10)

Aerojet-General Corporation - Alvin T. Edgerton, Principal Investigator

Edgerton, A.T., D. Trexler, S. Sakamoto, and J.E. Jenkins, 1969, "Microwave Radiometric Studies and Ground Truth Measurements of the NASA-USGS Southern California Test Site." Interagency Report NASA-149.

U.S. Geological Survey - Geographic Applications Program

Meier, M.F., R.H. Alexander, and W.J. Campbell, 1966, "Multispectral Sensing Tests at South Cascade Glacier, Washington." Proceedings, Fourth Symposium on Remote Sensing of Environment, University of Michigan, Ann Arbor, 1966, pp. 145-159.

GEOGRAPHIC INFORMATION SYSTEMS (NASA Task No. 160-75-01-31-10)

Florida Atlantic University - James P. Latham, Principal Investigator

*Berlin, G. Lennis, 1969, "Waveform and Computer Analysis of Geographic Patterns Recorded on Aerial Color and Color Infrared Multisensor Imagery."

Latham, James P., 1968, "Instrumentation of Image Analysis and TV Simulation Techniques." NASA/MSC Earth Resources Program Mission Review, Geography Session, Sept. 16, 1968.

*_____, 1969, "A System for Simulating Orbital TV Observation of Geographic Patterns."

*_____, 1969, "Significance of Scale and Scan Line Role for Interpreting Geographic Patterns in Simulated Orbital TV Imagery."

Northwestern University - D.F. Marble, Principal Investigator

Dacey, Michael F., 1965, "A Probability Law Obtained by Compounding the Poisson and Half-Normal Probability Laws." Tech. Report 4.

_____, 1965, "Four Properties of Two-Dimensional Random Point Patterns." Tech. Report 6.

_____, 1965, "Measures of Distance from a Randomly Located Point to Neighboring Lattice Points for Rectangular and Hexagonal Point Lattices." Tech. Report 3.

_____, 1965, "Numerical Measures of Random Sets." Tech. Report 5.

_____, 1965, "Some Observations on a Two-Dimensional Language." Tech. Report 7.

Dacey, M.F., and D.F. Marble, 1965, "Some Comments on Certain Technical Aspects of Geographic Information Systems." Tech. Report 2.

Garrison, W.L., R.H. Alexander, W. Bailey, M.F. Dacey, and D.F. Marble, 1965, "Data Systems Requirements for Geographic Research." Tech. Report 11, American Astronautical Society Science and Technology, Vol. 4, pp. 139-151.

Ohio State University - Richard H. Rapp, Principal Investigator

Rapp, Richard H. and William H. Sprinsky, 1968, "Gridding of Near Vertical Unrectified Space Photographs." Interagency Report NASA-122.

University of Toronto - Leslie Curry, Principal Investigator

Curry, Leslie, and E. Bruce MacDougall, 1968, "The Statistical Information Content of Remotely Sensed Imagery." Presented at the Avionics and Natural Resources Symposium of the Canadian Aeronautics and Space Institute, Ottawa, 1968.

MacDougall, E.B., 1968, "A Note on a Possible Automated Image Interpretation System." Tech. Report 2.

_____, 1968, "Coherent Optical Data Processing and Remotely Sensed Imagery." Interagency Report NASA-145.

GEOGRAPHIC ANALYSIS AND PROGRAM PLANNING
(NASA Task No. 160-75-01-30-10)

Autometric Operation/Raytheon Co. - Richard Pascucci, Principal Investigator

Autometric/Raytheon Co., 1968, "Analysis of Multisensor Data," IRI 3311. Interagency Report NASA-142.

Pascucci, Richard F. and Gary W. North, 1968, "Mission 73: Summary and Data Catalog." Interagency Report NASA-132.

Pascucci, R.F., G.W. North, R.A. Albrizio, and B. Shelkin, 1969, "Geographic Analysis of Multi-Sensor Data from NASA/USGS Earth Resources Program." Report No. FR 3311. And Supplement I.

U.S. Geological Survey and Autometric, 1968, "USGS/NASA Southern California Remote Sensing Test Program."

National Academy of Sciences-National Research Council

NAS/NRC, 1966, Spacecraft in Geographic Research.

U.S. Geological Survey - Geographic Applications Program

Alexander, Robert H., Leonard Bowden, Duane Marble, David Simonett, and Jack Wilson, 1968, "Report on the Apollo VI Imagery," Revised Dec. 5, 1968.

Alexander, Robert H., Leonard W. Bowden, Duane F. Marble, David S. Simonett, and John E. Wilson, 1968, "Report on the Apollo VII Imagery." NASA/MSA Apollo VII Science Screening, Geography Group.

Alexander, Robert H., 1964, "Geographic Data from Space," The Professional Geographer, Vol. 16, No. 6, 1964, pp. 1-5.

_____, 1965, "Geographic Research Potential of Earth Satellites." Proceedings, Third Symposium on Remote Sensing of Environment, University of Michigan, Ann Arbor, pp. 453-467.

_____, 1967, "Man's New Views of the Earth: The Potential of Remote Sensing," Problems and Trends in American Geography, Chapter 16.

_____, 1968, "Mission 73 and Associated Tests," NASA/MSA Earth Resources Program Mission Review, Geography Session, Sept. 16, 1968.

_____, 1967, "Preliminary Studies for a Geographic Satellite," Presented at the annual meeting of the Association of American Geographers, St. Louis, Missouri, 1967.

Bowden, Leonard, and Robert Alexander, 1968, "Geographic Remote Sensing Tests in Southern California, Spring 1968."

Gerlach, Arch C., 1969, "The Geographic Applications Program of the U.S. Geological Survey," Photogrammetric Engineering, Jan. 1969, pp. 58-60.

_____, 1968, "A Decade of Spacecraft and Remote Sensor Development for Peaceful, Scientific Purposes." Presented at the 1968 Summer Institute on Geographic Applications of Remote Sensing, University of Michigan, Ann Arbor.

_____, 1968, "Advances in Geographic and Thematic Mapping Applications of Remote Sensor Data." Proceedings, Fifth Symposium on Remote Sensing of Environment, University of Michigan, pp. 191-196.

_____, 1968, "Geography Summary for Trainees in Remote Sensing." Presented on June 13, 1968, to a group of trainees from Mexico and Brazil.

Gerlach, Arch C., 1968, "Spacecraft and Remote Sensor Development for Peaceful, Scientific Purposes." Presented at the XIth Directing Council of the Pan American Institute of Geography and History, Mexico City, Aug. 1968.

_____, 1968, "The Geographic Applications Program." NASA/MSC Earth Resources Program Mission Review, Geography Session, Sept. 16, 1968.

_____, 1968, "Use of Space Photographs and Imagery in Geographic Education." Presented at the 54th Annual Meeting of the National Council for Geographic Education, Kansas City, Missouri, Nov. 1968.

_____, 1967, "Utilization of Orbital Data through International and National Organizations." Panel Presentation on the "Use of Orbiting Sensors in Geographic Research." Annual meeting of the Association of American Geographers, St. Louis, Missouri, April 1967.

_____, 1966, "Geographic Applications of Remote Sensor Data from Aircraft and Spacecraft." Presented at the Regional Conference, International Geographical Union, Mexico City, 1966.

Horton, Frank E., Claude W. Johnson, Duane F. Marble, Robert Pease, Leslie W. Senger, David S. Simonett, and John E. Wilson, 1969, "Apollo IX Screening Review."

U.S. Geological Survey/National Aeronautics and Space Administration, 1969, "Earth Resources: Mission 73." 16 mm, sound, color film, 20 min.

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