NASA Conference Publication 2430

Proceedings of the Second Pilot Climate Data System Workshop

PILOT CLIMATE DATA SYSTEM

PCDS

NASA/GSFC

Proceedings of the Second Pilot Climate Data System (PCDS) Workshop held at the NASA/Goddard Space Flight Center January 29-30, 1986

NASA

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Prepared by
Data Management Systems Facility
Space Data and Computing Division
National Space Science Data Center
Goddard Space Flight Center
Greenbelt, Maryland

National Aeronautics
and Space Administration

Scientific and Technical Information Branch

1986

Preface

This report presents the proceedings of the Second Pilot Climate Data System (PCDS) Workshop held January 29 and 30, 1986, at the NASA/Goddard Space Flight Center. More than 100 scientists, managers, and other interested users attended the workshop. The original agenda was altered somewhat by the unforeseen absence of Dr. Shelby Tilford, Dr. Caldwell McCoy, Jr., and Dr. John Theon of NASA Headquarters. The actual agenda appears on pages xi - xiv.

These proceedings are organized in a manner that reflects the major thrusts of the workshop. The theme and objectives are presented as Section 1, followed by the remarks in absentia (Section 2) of Dr. Caldwell McCoy, manager of the Information Systems Office at NASA Headquarters, on the future of the PCDS. Dr. Paul Smith, acting PCDS project manager, chaired the programmatic session in which he and other members of the PCDS Development Team gave system status presentations. Abstracts and copies of the transparencies used in these presentations appear in Section 3. Section 4 and Section 5 are similarly organized. Section 4 is devoted to the scientific presentations from system users. Technical presentations concerning networking, university participation, and distribution media comprise Section 5.

The importance of user feedback and recommendations was stressed throughout the workshop. Section 6 of the proceedings is devoted to user suggestions and formal recommendations. Sections 7 and 8 contain the workshop summary and Dr. Milton Halem's adjournment message, respectively.

This document was prepared by Lola M. Olsen, with editorial assistance from Jaime Epstein, both of Science Applications Research.

Acknowledgments

I wish to formally express my appreciation to all participants who attended the workshop, especially those who contributed through their suggestions and recommendations. Many pertinent questions were asked and helpful comments expressed.

I commend the speakers for their well-prepared presentations and thank those who are using the system in scientific research for sharing their successes with others in this regard.

Thanks also are extended to NSSDC staff who handled the logistical portions of the workshop, from rearranging computer and communication lines to organizing the reception. Throughout the workshop, a demonstration room was open to participants to experiment with the PCDS or to run demonstrations. Representatives from three private computer companies set up personal computers for "hands-on" experience, and I thank them for their help. Members of the PCDS Development Team were available in the demonstration room to answer questions concerning the system and/or to help those interested in accessing a specific data set.

The names of the PCDS Development Team members are listed in Appendix B of this document, and I thank all the members for their contributions. I would like to offer my special thanks to Ms. Mary Reph for her efforts in making this a successful workshop and for her superior efforts in working with the PCDS throughout the year. Mr. Ernest Daddio and Ms. Charlotte Griner were also instumental in the success of this workshop, and I sincerely appreciate their help.

My gratitude is also extended to our program manager, Ms. Ai Fang, and to Drs. Schiffer, Theon, Tilford, and McCoy. Their support has inspired the growth and development of the PCDS, which is now demonstrating its value to the scientific community.

Paul H. Smith

Dr. Paul H. Smith

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Associate Director
Space and Earth Science Directorate
Goddard Space Flight Center

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Head, Data Management Systems Facility
Goddard Space Flight Center

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Head, Data Management Systems Facility
Goddard Space Flight Center

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Head, Data Management Systems Facility
Goddard Space Flight Center

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Data Management Systems Facility
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Chief, Space Data and Computing Division
Goddard Space Flight Center

WELCOME ADDRESS

Dr. Gerald Soffen
Associate Director, Space and Earth Science Directorate
Goddard Space Flight Center
Greenbelt, Maryland 20771

Dr. Gerald Soffen, associate director of the Space and Earth Sciences Directorate, welcomed the workshop participants to Goddard and to the Second Pilot Climate Data System Workshop with an extensive educational overview of the space flight center. He presented an enlightening session on the historical and organizational aspects of Goddard. This presentation included notes on the major organizations within Goddard--flight projects, engineering, tracking and data network, and the space and Earth sciences. Special emphasis was given to the numerous laboratories within the Space and Earth Sciences organization and to the "glue" that holds them all together--data and computing services. Dr. Soffen expressed his belief that "data is the heart of the whole issue" and that "the waves of endless numbers are useless without the understanding and knowledge of how to treat data." He stressed the importance of appropriately selecting, handling, transferring, graphing, networking, and integrating data.

In addition, he highlighted details of several special projects within the laboratories and conveyed a message from Dr. Shelby Tilford at NASA Headquarters concerning the significance of "Earth system science." Stressing the systems concept in his message, Dr. Tilford recommended studying the influences of the parts and the linkages within. Dr. Soffen added that studying "Earth ecology" for an understanding of the "whole" Earth would prove to be beneficial. In this regard, he noted that the project scientist sacrifices depth for the breadth necessary to pull together the intricate parts of a broad-based project.

1. THEME AND OBJECTIVES OF WORKSHOP

Theme and Objectives of the Workshop

Dr. Paul Smith
Head, Data Management Systems Facility
Goddard Space Flight Center
Greenbelt, Maryland 20771

Emphasizing the workshop theme, which combined university participation, network access, and data distribution concepts, Dr. Paul Smith officially opened the Second Pilot Climate Data System Workshop. Dr. Smith described the organization of the workshop sessions and noted the opportunity for "hands-on" experience with the PCDS in the demonstration room. The regrets expressed by Dr. Tilford, Dr. McCoy, and Dr. Theon of NASA Headquarters in not being able to attend the workshop as previously scheduled were communicated in their absence. The presence and support of Ms. Ai Fang of the Information System Office at Headquarters was recognized. Workshop participants were informed of the role that Headquarters staff members play in funding scientific research.

Dr. Smith then outlined the objectives of the workshop and informed the participants that the entire workshop would be both audio- and videotaped in order to accurately capture the comments, suggestions, and recommendations for modifications and improvements of the PCDS.

PCDS WORKSHOP II

THEME

- UNIVERSITY PARTICIPATION
- NETWORK ACCESS
- DATA DISTRIBUTION

PCDS WORKSHOP II

OBJECTIVES

- ENHANCE INFORMATION EXCHANGE (USERS, DATA PRODUCERS, SYSTEM DEVELOPERS)
- ENCOURAGE UNIVERSITY PARTICIPATION
- UNDERSTAND NETWORK ACCESS POTENTIALS
- CONDUCT DATA AND INFORMATION DISTRIBUTION DISCUSSION
- PROVIDE "HANDS-ON" EXPERIENCE
- DEVELOP SPECIFIC RECOMMENDATIONS

2. PCDS FUTURE

PCDS Future

Dr. Caldwell McCoy, Jr.
Manager, Information Systems Office
NASA Headquarters

Dr. McCoy's thoughts on the future of the PCDS, which he planned to present at the workshop, are included here as part of the Proceedings. Dr. Paul Smith summarized them for the participants.

Thoughts for Headquarters Talk at Second PCDS Workshop

Title: NASA's Support of PCDS

Speaker: Dr. McCoy

Date: Wednesday, January 29, 1986, at 9:30 A.M.

Good Morning Colleagues:

I am pleased to be here with you this morning to participate in the Pilot Climate Data System (PCDS) Workshop. The PCDS project has been supported by the Office of Space Science and Applications (OSSA) to develop an interactive, on-line, generalized scientific data system as a data management tool in support of climate scientists. Based on the PCDS experience, we feel intimate involvement of OSSA discipline programs and the user community will be essential in the successful development and evaluation of the system. The workshop will bring together the discipline managers, system developers, and established and potential users of the PCDS to discuss future PCDS requirements, new data sets, and new capabilities. The workshop will also provide a forum for the discussion of problems and the identification and evaluation of innovative ideas.

Usefulness of the PCDS

As you may know, prior to the advent of the PCDS, climate scientists spent many, many hours determining the availability, location, and quality of climate data sets before beginning their actual research. Additional time was required to obtain the needed data and to place that data into usable formats. In 1980, the Pilot Climate Data System was designed and scoped to address the most urgent problems of data availability and data access using cost effective solutions. Since June 1982, scientists with limited budgets have been able to use the PCDS on-line catalog to access the information on data availability of more than 150 data sets and the on-line inventory to find out which of those data sets were available through PCDS. Climate researchers can take advantage of the PCDS on-line data access capability for their selection of data subsets by time, geographic area, and data type. In addition, data manipulation and display capabilities offered by the PCDS allow users to manipulate, compare, and display climate parameters from diverse data sets. I am glad to be able to tell you that the PCDS is the first data system in this agency to provide direct on-line data access capability to the users. The PCDS team, which consists of a dedicated group of data system experts, has been successful in achieving the required PCDS goals despite a constrained budget.

User Support

The PCDS was originally developed to support the climate program and NASA scientists. Support is now being expanded. The PCDS has been selected by various universities, including the University of Michigan, Iowa State

University, Pennsylvania State University, and the Massachusetts Institute of Technology, to be used for classroom studies and research projects. For instance, researchers at Pennsylvania State University will be able to access the PCDS facility directly over a high-speed data link, migrate data sets to their local facility, and develop their own data analysis and weather modeling software using the data sets and tools of the PCDS. These data sets and tools will be used to support graduate students doing thesis and classroom projects. During 1986, the Earth Science and Applications Division (Code EE) and my office, the Information Systems Office (Code EI), will join together to provide direct user support with communication links between Goddard and several universities. The implementation of several new network nodes at locations to be selected by Code EE is in direct response to the Earth Science and Applications discipline programs' needs. The on-line data catalog, remote data access, data manipulation, and data display capabilities provided by the PCDS have proven to be important and useful to scientific researchers, and these capabilities should be enhanced to meet the needs of the science community in the Space Station era.

The PCDS in the Future

The PCDS is providing valuable insights into the computer technologies that may be used in NASA's future information system developments. The PCDS will continue to evolve and will eventually be an important element of a powerful, fast, responsive information system, such as the planned Science and Applications Information System (SAIS) or OSSA's proposed Earth Observations System (EOS), to support Earth science research in the 1990's and beyond. SAIS will build upon and integrate all of the existing pilot data systems developed by this office, including the PCDS. This office will work jointly with OSSA discipline programs to coordinate and utilize existing data systems and to add new capabilities where needed by discipline programs and program scientists. We believe that the process of making data available and providing data management tools to the scientific community is NASA's prime goal. With PCDS capabilities available, researchers will be better informed of data availability and will be able to use the available data to better meet their research needs.

Final Thoughts

I hope this workshop provides a valuable vehicle for sharing ideas and exchanging views. I am looking forward to hearing your recommendations to help us decide where the PCDS should be headed and how it should be advanced to meet future demand in a shrinking-federal-budget environment.

Thank you for your participation. Your tasks for the next 2 days will be challenging. Good luck!

3. PROGRAMMATIC PRESENTATIONS

Program Status

Dr. Paul Smith
Head, Data Management Systems Facility
Goddard Space Flight Center
Greenbelt, Maryland 20771

The Pilot Climate Data System has a new home within the National Space Science Data Center (NSSDC). The NSSDC has recently reorganized and now incorporates the Data Management Systems Facility (Dr. Paul Smith, Head) as one of two major branches. Dr. Joseph King heads the Central Data Services Facility (the other branch), and Dr. James Green now directs both branches as head of NSSDC. The new structure resulting from the reorganization promises to be extremely effective, with many unique opportunities to incorporate new techniques and technology.

The PCDS has been designed to support a variety of users that have been arbitrarily categorized into four groups: researchers, data producers, occasional users, and management. The expanding capabilities of the system are attracting the attention of both academic and other scientific institutions worldwide. Highlighted by progress in networking capabilities, hardware acquisitions, software developments, data set additions, and tutorial developments, exciting advances have taken place since the First PCDS Workshop.

In the plans for the 1986 fiscal year, recommendations from an ad hoc users' group meeting in May 1985 and from the First PCDS Workshop are apparent. This year's plans are listed, along with comments made at the users' group meeting.

Although the PCDS is presently considered to be in a developmental phase, plans for making the transition to an operational phase are being implemented. The transition at Headquarters affects Dr. Tilford's Code EE, the Earth Science and Applications Division, and Dr. McCoy's Code EI, the Information Systems Office. At the conclusion of the transition period, the PCDS will become the NASA Climate Data System and will henceforth be referred to as the NCDS.

PILOT CLIMATE DATA SYSTEM

PROGRAM STATUS

JANUARY 29, 1986

PAUL H. SMITH

PILOT CLIMATE DATA SYSTEM

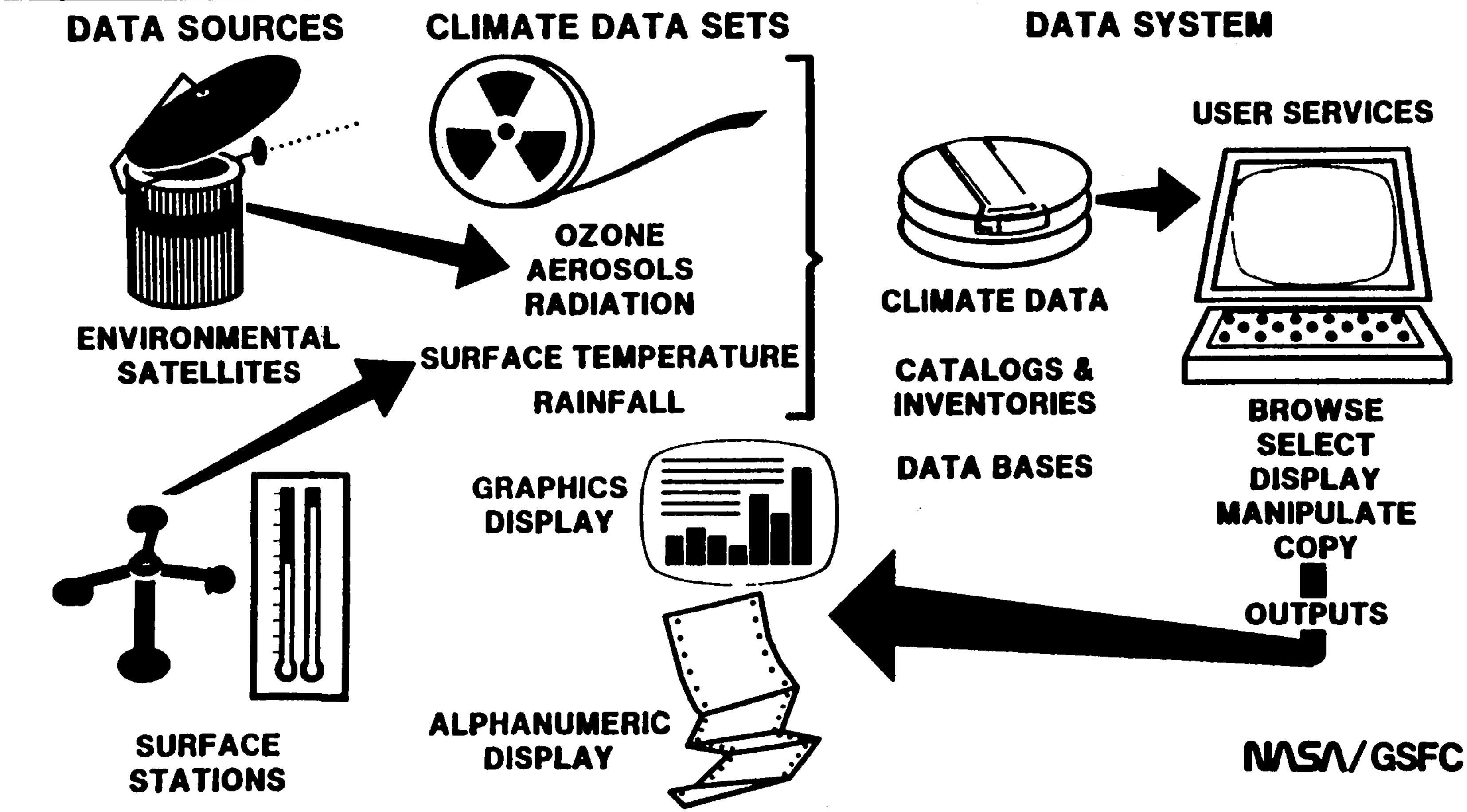
GOAL

DEVELOP SYSTEM FOR LOCATING, OBTAINING, MANIPULATING AND DISPLAYING CLIMATE DATA OF INTEREST TO NASA'S RESEARCH COMMUNITY.

OBJECTIVES

- DEVELOP TECHNICALLY ADVANCED SYSTEM
- OBTAIN AND INCORPORATE MOST IMPORTANT DATA SETS
- SUPPORT BROAD RANGE OF USERS

PILOT CLIMATE DATA SYSTEM (PCDS)



PCDS DESIGNED TO SUPPORT A VARIED GROUP OF USERS

- Researchers
  - Browse Data for Significant Features
  - Graphically Display a Variety of Parameters
  - Determine What Data to Select
  - Intensively Analyze Small Portions of a Data Set
- Data Producers
  - Quality Check/Validation
  - Inventory of Archives
  - Accounting of Processing and Distribution
- Occasional Users
  - Quick Response
  - Remote Access
  - Low Volume University Support
- Management Information for Planning
  - Data Coverage

PCDS MAJOR RECENT ACTIVITIES

- O NETWORKED THROUGHOUT U.S.
  - SPAN TO 32 SITES -
  - DIRECT 9.6K BAUD LINE TO PENN STATE UNIVERSITY
  - LINK TO UNIVERSITY OF MICHIGAN THROUGH SPAN
  - SESNET TO ALL LABS
  - ARPANET
  - TELENET
- O UNIVERSITY SUPPORT AT CLASSROOM AS WELL AS RESEARCH LEVEL
- O UPGRADED AVAILABLE HARDWARE
  - NEW MEMORY (8M BYTES, 2 CONTROLLERS) - INSTALLED
  - OPTICAL DISKS - (TEST & INTEGRATION)
  - DATA BASE MACHINE (IDM 500) - ACCEPTANCE TEST
  - VAX 8600 - ORDERED

PCDS MAJOR RECENT ACTIVITIES (CONT'D)

- O DEVELOPED LEARNING SYSTEM ON IBM-PC
  - FLOPPY DISK DISTRIBUTION

- O SYSTEM SOFTWARE DEVELOPMENT AND IMPROVEMENT
  - DATA SET INDEPENDENT FORMAT
  - DEVICE INDEPENDENT DISPLAY SOFTWARE

- O DATA SET ADDITIONS
  - HIGH INTEREST DATA SETS

PCDS UNIVERSITY AND INTERNATIONAL INTERESTS

- O CULTIVATING UNIDATA AND NSF INTERCONNECTION
  - -PENN STATE UNIVERSITY
  - -UCAR
  - -NSF
- O GROWING UNIVERSITY INTEREST
  - -UCSD
  - -SAN JOSE STATE
  - -CSU
  - -WASHINGTON UNIVERSITY
  - -UNIV OF COLORADO
  - -UNIV OF MARYLAND
  - -OTHERS

PCDS UNIVERSITY AND INTERNATIONAL INTERESTS (CONT'D)

O RECEIVED INTERNATIONAL REQUESTS

- IMPERIAL COLLEGE, LONDON
- RESEARCH INSTITUTION FOR TRANSPORTATION, PERU
- UNIV OF BUENOS AIRES, ARGENTINA
- UNIV OF EAST ANGLIA, GREAT BRITAIN
- AKADEMIE DER WISSENSCHAFTEN, DDR

INTERESTS FROM OTHER INSTITUTIONS

- O JPL
- O LaRC
- O NCAR
- O NOAA
- O USDA
- O USGS
- O INSTITUTE FOR DEFENSE ANALYSIS
- O U.S. ARMY CORP OF ENGINEERS

PCDS FY86 PLANS AND APPROACHES

- ADD ABOUT SIX NEW DATA SETS INCLUDING ISCCP LEVEL C DATA
- CREATE USER SUPPORT OFFICE
- MAINTAIN COMMUNICATIONS LINES WITH UNIVERSITIES AND ESTABLISH ADDITIONAL CONNECTIONS
- CONDUCT PCDS WORKSHOP II IN JANUARY 1986
- HOLD ADDITIONAL DATA USER'S GROUP MEETINGS
- UPDATE AVAILABLE USER DOCUMENTATION (USER'S GUIDE, CATALOG)
- MAINTAIN SOFTWARE AND DATA BASES INCLUDING UPDATING DATA BASES TO REFLECT ADDITIONS TO DATA SETS AND OTHERS UPDATED TO SUPPORT DATA SETS

PCDS FY86 PLANS AND APPROACHES (CONT'D)

- ADD ADDITIONAL DISK DRIVES IN ORDER TO PROVIDE MORE ON-LINE ACCESS TO DATA
- ADD ADDITIONAL INEXPENSIVE GRAPHICS TERMINAL/WORKSTATIONS FOR USERS
- CONTINUE MAINTENANCE AND OPERATIONS OF COMPUTER FACILITY
- CONVERT DATA BASE MANAGEMENT SOFTWARE TO DATA BASE MACHINE

PCDS TRANSITION PLAN

The Transition Plan for the Pilot Climate Data System (PCDS) from the pilot system development phase to the operational research support phase specific:

The PCDS remains in the Information Systems Office, Code EI, and is managed and operated as a NASA institutional capability. The Earth Science and Applications Division, Code EE, supports all science-unique activities. The name is changed to the NASA Climate Data System (NCDS).

It is expected that the transition may be completed by the end of 1987.

DETAILS OF TRANSITION

Code EE is responsible for:

- O Providing resources for all science-unique activities (e.g. data sets acquisition and integration, user institution support including communication links and capabilities for remote user access.

- O Establishing any needed science user or science steering groups

- O Assigning a Program Scientist from Code EE and identifying an appropriate project scientist for guiding the operations of the PCDS.

Code EI is responsible for:

- O Providing resources for all system operations and maintenance.

- O Providing appropriate computer resources, including on-line data set storage.

- O Continuing to provide a Program Manager from Code EI and identif ying, with GSFC's Code 630, an appropriate manager for the NCDS

- O Developing technology for enhancing the usefulness of the NCDS.

SCIENCE USERS' GROUP

COMMENTS (MAY 1985)

- O PCDS CONCEPT IS EXCELLENT. IT IS MATURE AND USEFUL. EVERY EFFORT SHOULD BE MADE TO ATTRACT USERS. "USER HELPER PERSON" SHOULD BE IDENTIFIED AND BETTER DOCUMENTATION PROVIDED.
- O USERS OF PCDS SHOULD REPRESENT AN INTERDISCIPLINARY CROSS-SECTION OF RESEARCH PROJECTS SUPPORTED BY NASA. COMPOSITION OF USER COMMUNITY SHOULD BE OPEN AND LIMITED ONLY BY HARDWARE CONSIDERATIONS.
- O DERIVED SATELLITE DATA SETS SHOULD BE PART OF PCDS. OTHER NEEDED DATA SETS SHOULD BE IDENTIFIED BY THE SCIENCE USERS' GROUP.
- O PRESENT ANALYSIS CAPABILITIES ARE ADEQUATE. NEW ANALYSIS TOOLS SHOULD BE OF GENERAL USE TO ALL USERS AND APPLICABLE TO ALL DATA SETS ON THE PCDS.
- O SYSTEM SHOULD BE EXPANDED AS NECESSARY TO PROVIDE ADEQUATE SUPPORT TO USERS.

PILOT CLIMATE DATA SYSTEM

CANDIDATE DATA USER'S GROUPS

RESEARCH GROUPS	LEAD CONTACT
O ISCCP	ROSSOW
O TOVS DATA SETS	SUSSKIND/CHAHINE
O EARTH RADIATION BUDGET STUDIES	BARKSTROM/VONDER HAAR
O GLOBAL SOLAR DATA BASE	SOFIA
O PRECIPITATION DATA SETS	NORTH/SHORT
O CLASSROOM STUDIES	WEBSTER/ABREU

PCDS PUBLICATIONS (RECENT)

- Reph, M. G., Treinish, L. A., Noll, Carey E., Hunt, Thomas D., Chen, Shue-When, "Pilot Climate Data System User's Guide." NASA TM 86084. NASA/GSFC, Greenbelt, Maryland. January 1986.

- Reph, M. G., Fowler, Rita M., "NASA Climate Data Catalog." NASA TM 86085. NASA/GSFC, Greenbelt, Maryland. December 1985.

- PCDS Team, "Pilot Climate Data System: NSSDC Common Data Format." NASA/GSFC, Greenbelt, Maryland. December 1985.

- Chatterjee, L. C., "Redesign for the Content and Structure of the PCDS Climate Data File." Internal Publication. NASA/GSFC, Greenbelt, Maryland. April 1985.

- Treinish, L. A., Ray, S. N., "An Interactive Information System to Support Climate Research." Proceedings on the International Conference on Interactive Information and Processing Systems for Meteorology, Oceanography, and Hydrology. Los Angeles, California. January 1985.

- Smith, P. H., Treinish, L. A., Reph, M. G., "Advances in Scientific Data Management." Proceedings of the Workshop on Advances in Sensing Retrieval Methods. Williamsburg, Virginia. November 1984.

- Data Management Systems Facility, "Pilot Climate Data System." Internal Publication. NASA/GSFC, Greenbelt, Maryland. October 1984.

- Reph, M. G., Treinish, L. A., Smith, P. H., "Pilot Climate Data System." Proceedings of the Ninth William T. Pecora Memorial Remote Sensing Symposium. Sioux Falls, South Dakota. October 1984.

PCDS USER INSTITUTIONS

- o LABORATORY FOR ATMOSPHERES (610)
- o LABORATORY FOR TERRESTRIAL PHYSICS (620)
- o SPACE DATA AND COMPUTING DIVISION (630)
- o GODDARD INSTITUTE FOR SPACE STUDIES (640
- o LABORATORY FOR OCEANS (670)
- o LAB FOR EXTRATERRESTRIAL PHYSICS (690)

- o CITY COLLEGE OF NEW YORK
- o COLORADO STATE UNIVERSITY
- o IOWA STATE UNIVERSITY
- o MASSACHUSETTS INSTITUTE OF TECHNOLOGY
- o PENNSYLVANIA STATE UNIVERSITY
- o STATE UNIVERSITY OF NEW YORK
- o UNIVERSITY OF MARYLAND
- o UNIVERSITY OF MICHIGAN
- o WASHINGTON UNIVERSITY
- o YALE UNIVERSITY

- o JET PROPULSION LABORATORY
- o LANGLEY RESEARCH CENTER
- o NASA HEADQUARTERS
- o NATIONAL CENTER FOR ATMOSPHERIC RESEARCH
- o NATIONAL SCIENCE FOUNDATION
- o NOAA AGENCIES
- o UNITED STATES GEOLOGICAL SURVEY

PCDS SUMMARY

FY85 HAS BEEN A TRANSITION YEAR FOR PCDS

- o SUPPORT OF MORE USERS
- o SUPPORT OF A WIDER USER COMMUNITY (PCDS IN THE UNIVERSITY CLASSROOM)
- o REDESIGN FROM PROTOTYPE TO OPERATIONAL STAGE

AND IT IS READY FOR OPERATIONAL PHASES

- o MORE USER INVOLVEMENT
- o WIDER AVAILABILITY
- o SUPPORT OF EVEN MORE USERS

PCDS OVERVIEW

Mr. Lloyd Treinish
Data Management Systems Facility
Goddard Space Flight Center
Greenbelt, Maryland 20771

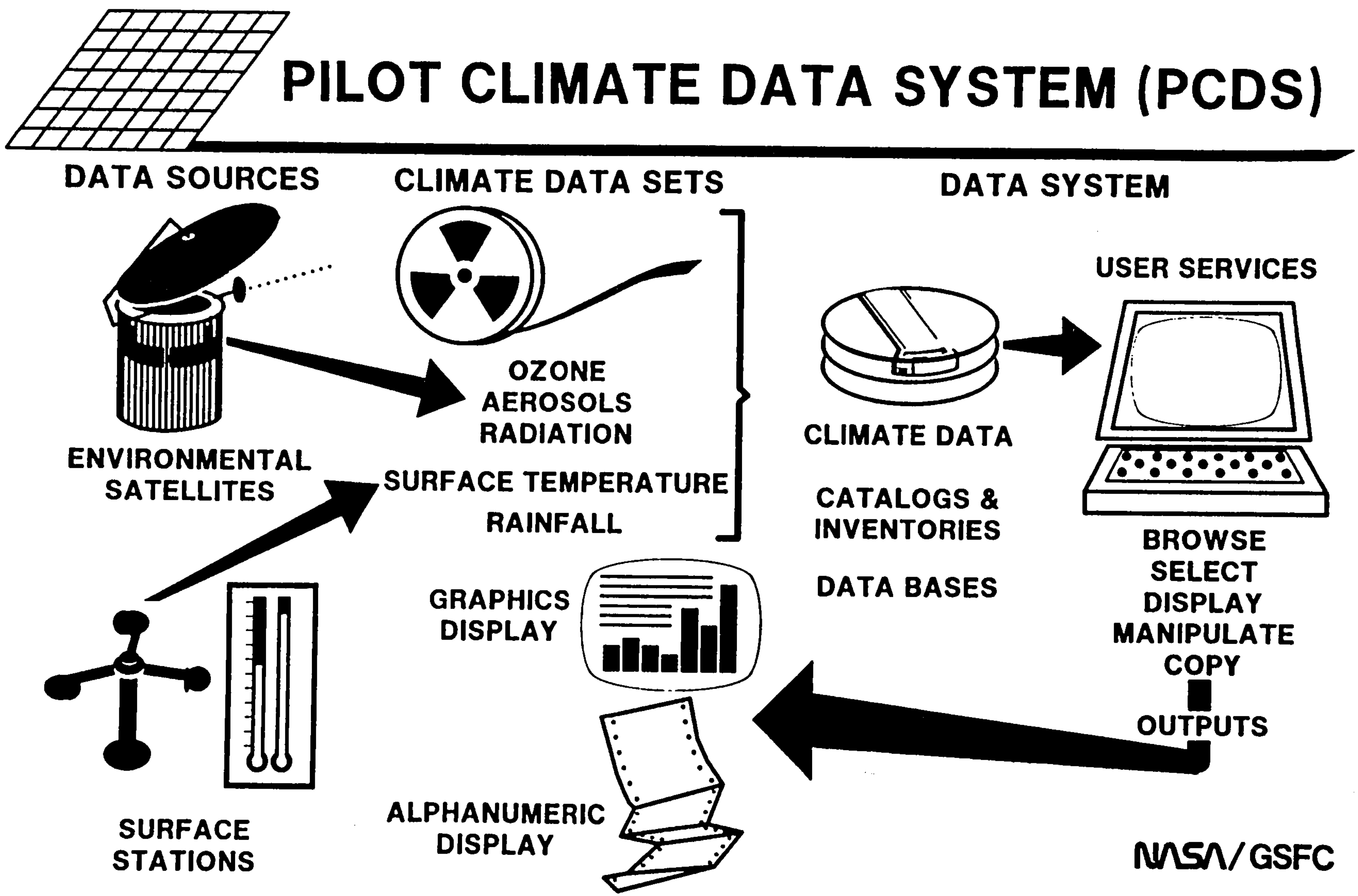
A brief overview of the philosophy, design, and organization of the PCDS was presented. The design has evolved, over time, to deal with numerous data sets, provide appropriate tools for the manipulation and display of such data, and support a wide variety of users.

The user interface to the system is provided by the Transportable Applications Executive (TAE). A user can choose one of the five major subsystems from the root menu display. These subsystems are CATALOG, INVENTORY, DATA ACCESS, DATA MANIPULATION, and GRAPHICS. Each subsystem was discussed and examples were given, demonstrating the flexibility provided by the existing PCDS software, Version 3.3.

Three of these subsystems are presently being redesigned to provide a more flexible and friendly structure, to allow more consistency and facilitate the ability to support new data sets. Ongoing developmental efforts to migrate from the Version 3.3 prototype phase of PCDS to the "operational" Version 4.0 stress increased flexibility and data independence.

PCDS Overview

Lloyd A. Treinish
National Space Science Data Center
NASA/Goddard Space Flight Center

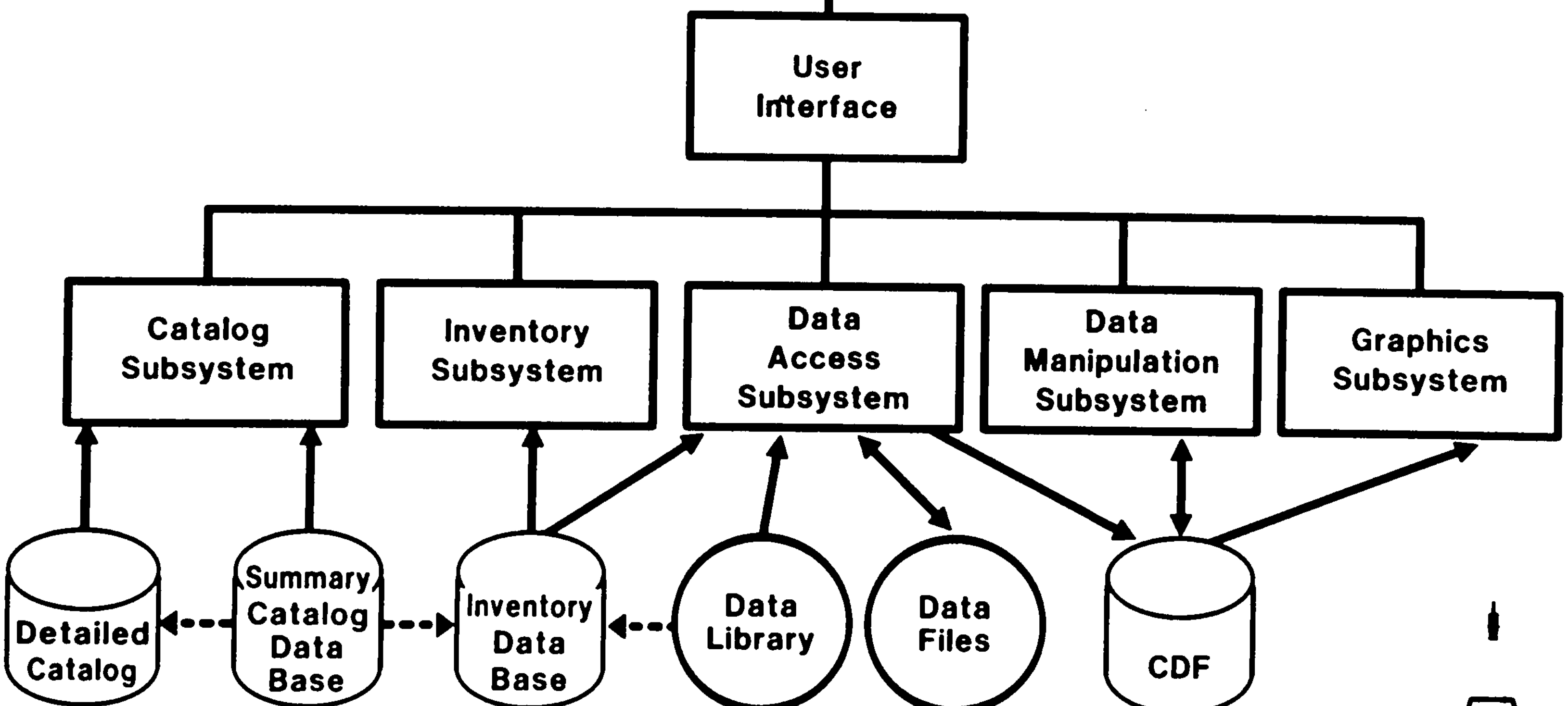

PILOT CLIMATE DATA SYSTEM (PCDS)
DATA SOURCES
CLIMATE DATA SETS
DATA SYSTEM
ENVIRONMENTAL SATELLITES
OZONE
AEROSOLS
RADIATION
SURFACE TEMPERATURE
RAINFALL
SURFACE STATIONS
USER SERVICES
CLIMATE DATA
CATALOGS & INVENTORIES
DATA BASES
BROWSE
SELECT
DISPLAY
MANIPULATE
COPY
OUTPUTS
GRAPHICS DISPLAY
ALPHANUMERIC DISPLAY
NASA/GSFC

PCDS DESIGNED TO SUPPORT A VARIED GROUP OF USERS

- Researchers
  - Browse Data for Significant Features
  - Graphically Display a Variety of Parameters
  - Determine What Data to Select
  - Intensively Analyze Small Portions of a Data Set
- Data Producers
  - Quality Check/Validation
  - Inventory of Archives
  - Accounting of Processing and Distribution
- Occasional Users
  - Quick Response
  - Remote Access
  - Low Volume University Support
- Management Information for Planning
  - Data Coverage

GSFC

PILOT CLIMATE DATA SYSTEM (PCDS)



Data Structure of the PCDS

GSFC

```
Menu: "ROOT", library "PCDS$LIB:"

                PCDS Version 3.3 Subsystems Menu


1)      CATALOG Subsystem Menu                      [ CATALOG ]

2)      INVENTORY Subsystem Menu                    [ INVENTORY ]

3)      DATA ACCESS Subsystem Menu                  [ DACCESS ]

4)      DATA MANIPULATION Subsystem Menu            [ CDFUTIL ]

5)      GRAPHICS Subsystem Menu                     [ GRAPHICS ]


                NEWS last updated on 1/13/86.


Enter: selection number, HELP, BACK, TOP, MENU,
        COMMAND, or LOGOFF.
?
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CATALOG SUBSYSTEM

Provides a Uniform Set of Descriptions for over 200 Climate-Research-Related Data Sets and Keyword Queries of Its Contents

Capabilities:

- Browse an Introduction to the Catalog
- List a Summary of the Cataloged Data Sets
- Browse Descriptions of Climate Parameters
- Browse Descriptions of Climate Sensors

GSFC

INVENTORY SUBSYSTEM

Describes the Data Holdings of the PCDS and Supports Keyword Queries of Its Contents

Capabilities:

- List Available Climate Parameters & Data Types
- List a Summary of the Data Types
- List Tapes/Files by Data Type
- Show the History of the Tape Inventory
- Graphically Summarize the Inventory Contents

GSFC

DATA ACCESS SUBSYSTEM

Provides Uniform Access to PCDS Data for Subset Selection on Spatial or Temporal Criteria and Employs the PCDS Inventory to Locate Data

Capabilities:

- Copy, List or Subset a PCDS Data Set
- Create a Data-Independent Climate Data File

UTILIZATION OF CDF

- Initiated by the PCDS Data Access Subsystem or Non-PCDS Custom Software
- Supports the PCDS Data Manipulation Subsystem, which Can Generate a New CDF from an Extant CDF
- Supports the PCDS Graphics Subsystem, which Provides Visual Representations of a CDF's Contents
- Causes the PCDS Data Manipulation and Graphics Subsystem to Be Fully Data-Independent
- Interfaces in Applications Software Via a Library of Software Tools

GSFC

DATA MANIPULATION SUBSYSTEM

- List a Climate Data File
- Produce a Subset of a Climate Data File
- Merge Two Climate Data Files
- Ungrid a Climate Data File Map
- Grid Data into a Climate Data File Map
- Apply Statistics to Climate Data File Elements
- Combine Climate Data File Elements Algebraically

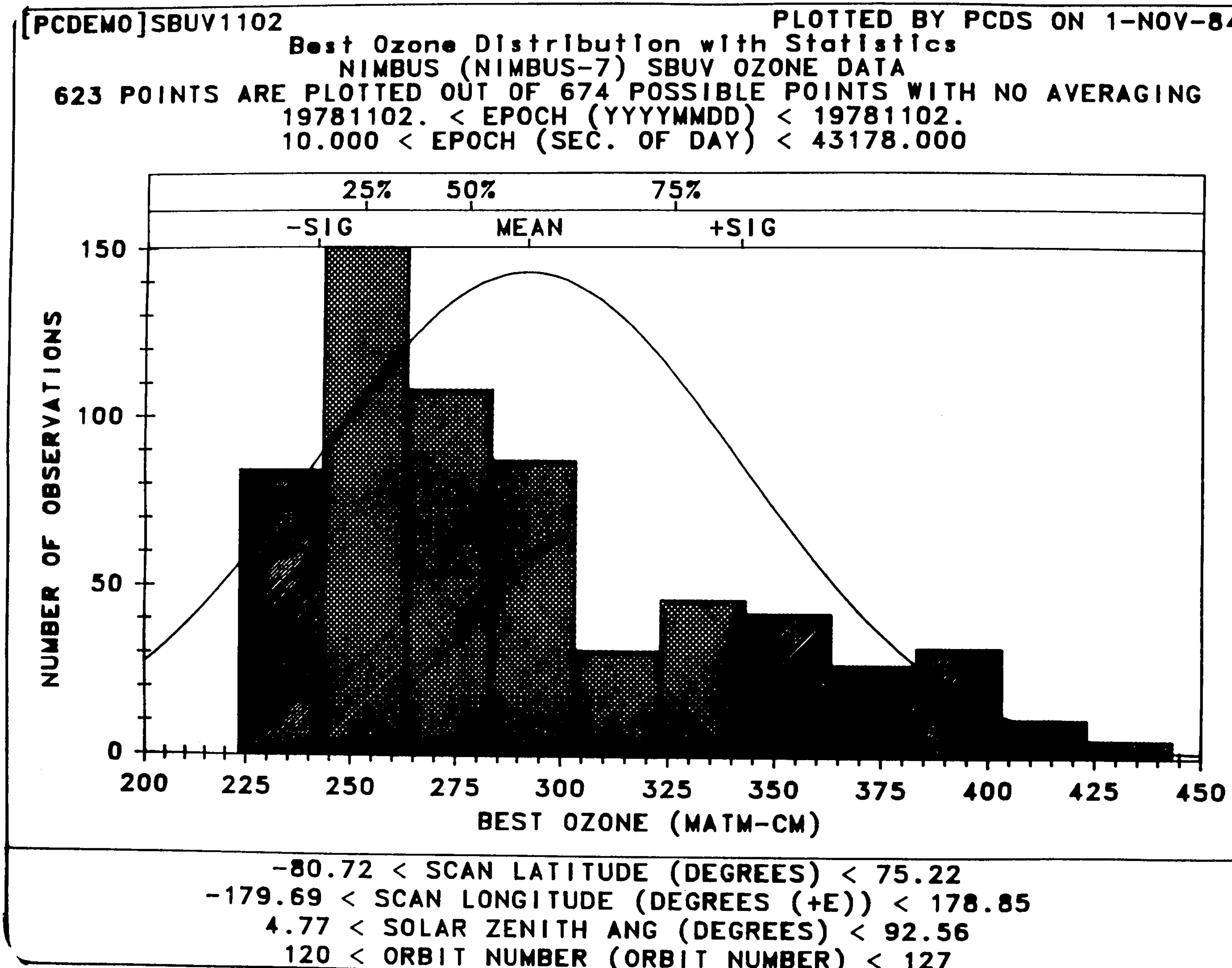
GRAPHICS SUBSYSTEM

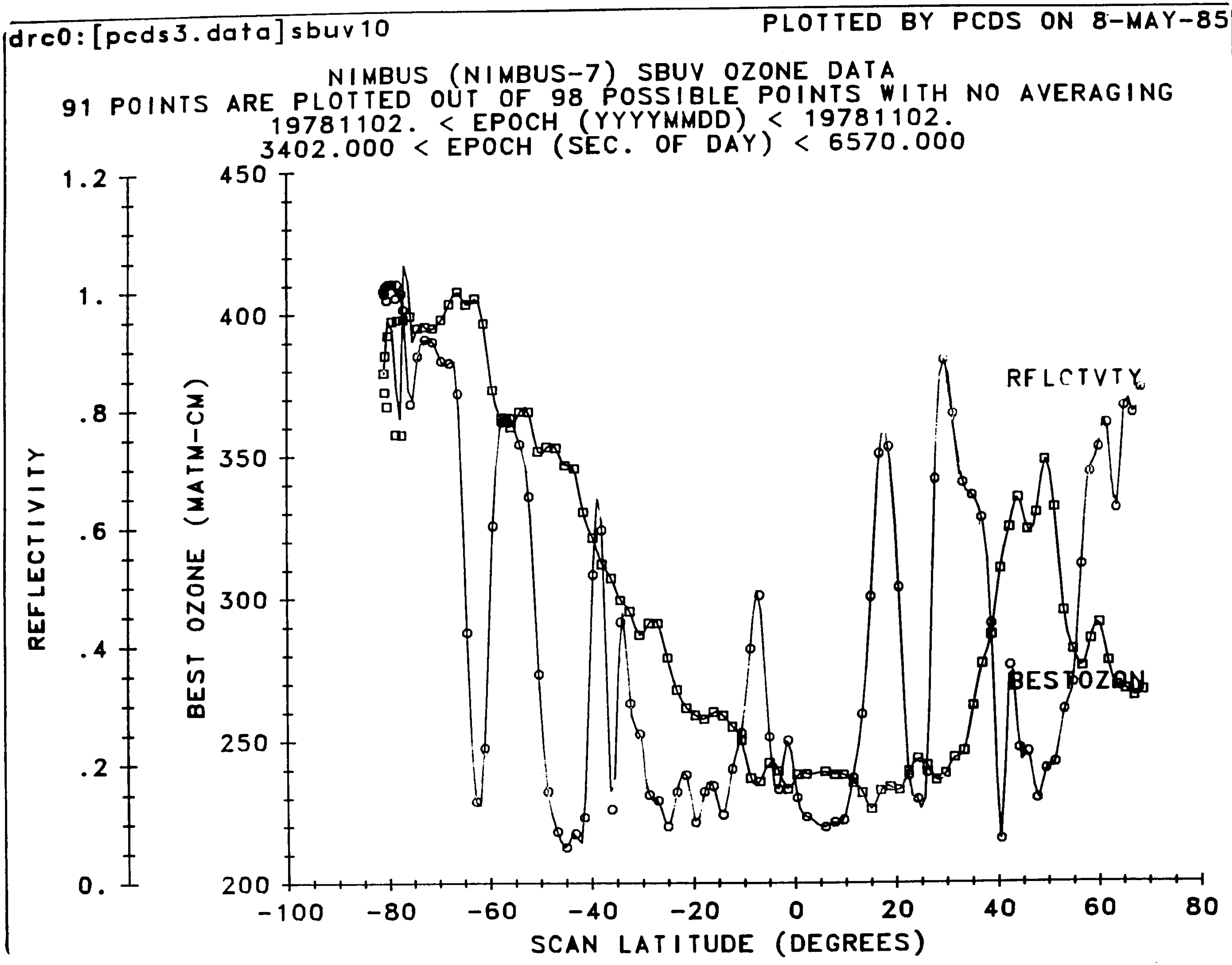
Provides Graphical Representation of ANY Data Stored Within a Data-Independent Climate Data File Including Non-PCDS Data Sets

Capabilities:

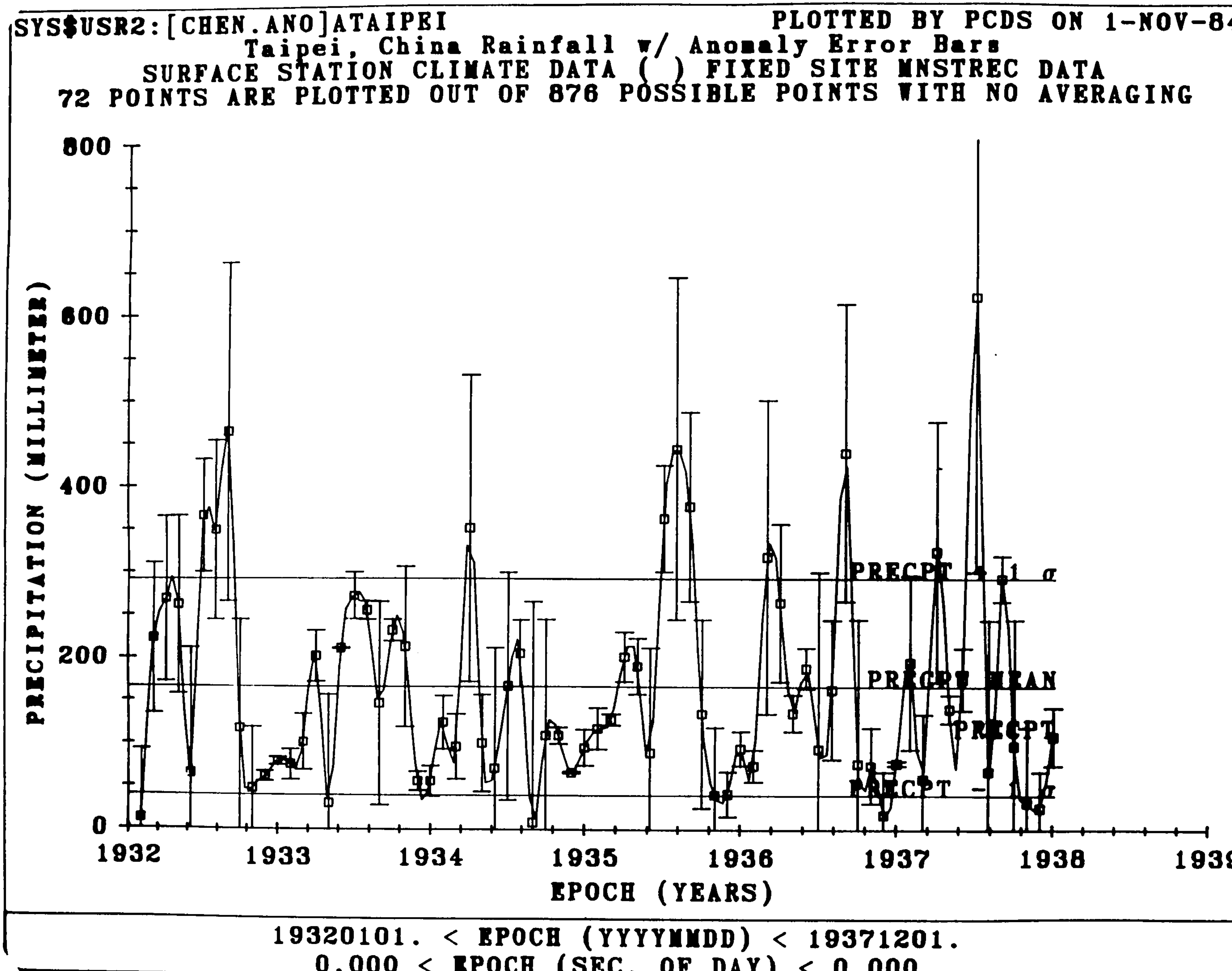
- Create Two-Dimensional Representations of Data
- Create Three-Dimensional Representations of Data
- Create Text Charts
- Provide Post-Processing of Graphical Displays

GSFC


[PCDEMO]SBUV1102
PLOTTED BY PCDS ON 1-NOV-84
Best Ozone Distribution with Statistics
NIMBUS (NIMBUS-7) SBUV OZONE DATA
623 POINTS ARE PLOTTED OUT OF 674 POSSIBLE POINTS WITH NO AVERAGING
19781102. < EPOCH (YYYYMMDD) < 19781102.
10.000 < EPOCH (SEC. OF DAY) < 43178.000
25%
50%
75%
-SIG
MEAN
+SIG
NUMBER OF OBSERVATIONS
150
100
50
0
200
225
250
275
300
325
350
375
400
425
450
BEST OZONE (MATM-CM)
-80.72 < SCAN LATITUDE (DEGREES) < 75.22
-179.69 < SCAN LONGITUDE (DEGREES (+E)) < 178.85
4.77 < SOLAR ZENITH ANG (DEGREES) < 92.56
120 < ORBIT NUMBER (ORBIT NUMBER) < 127



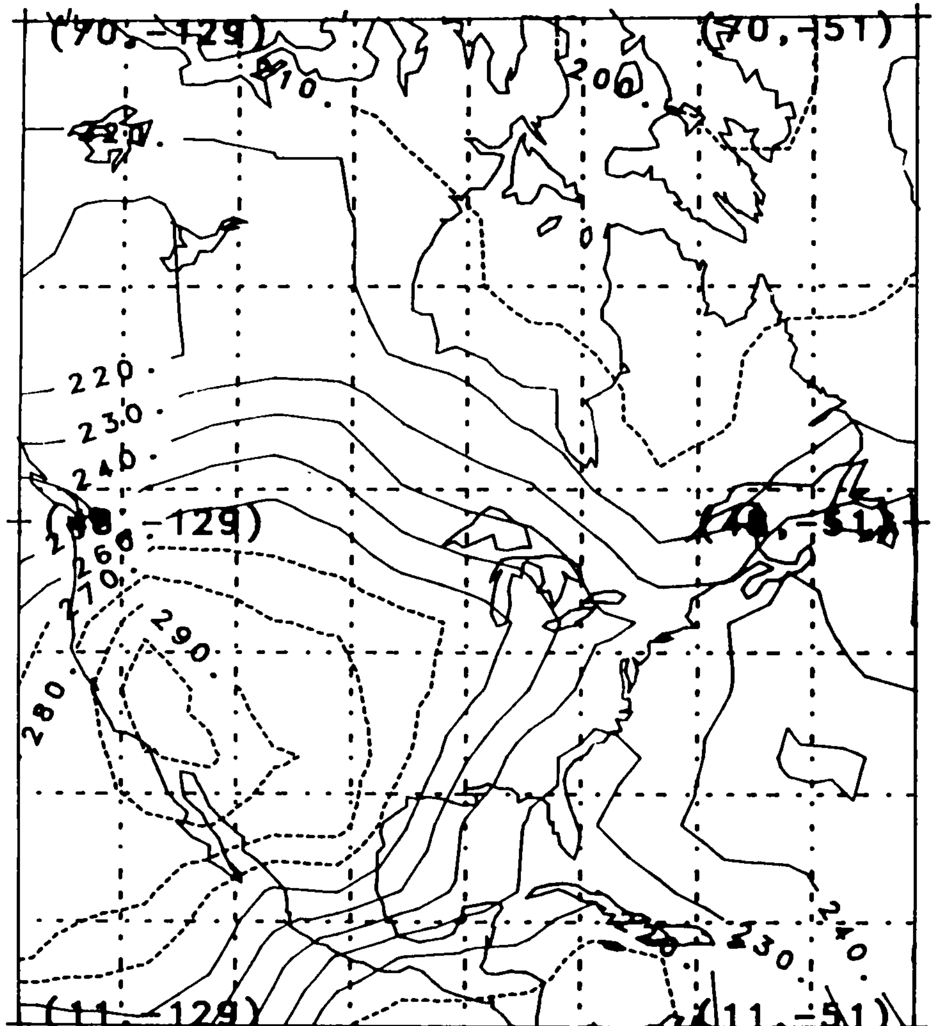
drc0:[pcds3.data]sbuv10
PLOTTED BY PCDS ON 8-MAY-85
NIMBUS (NIMBUS-7) SBUV OZONE DATA
91 POINTS ARE PLOTTED OUT OF 98 POSSIBLE POINTS WITH NO AVERAGING
19781102. < EPOCH (YYYYMMDD) < 19781102.
3402.000 < EPOCH (SEC. OF DAY) < 6570.000
REFLECTIVITY
BEST OZONE (MATM-CM)
RFLCTVTY
BESTOZON
SCAN LATITUDE (DEGREES)
1.2
1.
.8
.6
.4
.2
0.
450
400
350
300
250
200
-100
-80
-60
-40
-20
0
20
40
60
80



SYS$USR2:[CHEN.ANO]ATAIPEI
PLOTTED BY PCDS ON 1-NOV-84
Taipei, China Rainfall w/ Anomaly Error Bars
SURFACE STATION CLIMATE DATA ( ) FIXED SITE MNSTREC DATA
72 POINTS ARE PLOTTED OUT OF 876 POSSIBLE POINTS WITH NO AVERAGING
PRECIPITATION (MILLIMETER)
800
600
400
200
0
PRECPT + 1 σ
PRECPT MEAN
PRECPT
PRECPT - 1 σ
1932
1933
1934
1935
1936
1937
1938
1939
EPOCH (YEARS)
19320101. < EPOCH (YYYYMMDD) < 19371201.
0.000 < EPOCH (SEC. OF DAY) < 0.000

SYS$USR1:[RAY]SEPMON PLOTTED BY PCDS ON 1-NOV-84

ASCENDING NODE NARROW FOV LONGWAVE FLUX
NIMBUS (NIMBUS-7) ERB RBUDG DATA
THERE ARE 185 DATA VALUES USED OUT OF 2070 POSSIBLE VALUES
1979/10/01 00:16:40 < DATE TIME < 1979/10/01 00:16:40



STANDARD DEV. = 28.18438
MEAN VALUE = 241.5735

MERCATOR PLOT OF AN NFOV LW FLUX (W/M**2)

DRCO:[TREINISH]NMCGHT PLOTTED BY PCDS ON 25-JUN-84

SURFACE MAP AS VIEWED FROM THE NORTH POLE

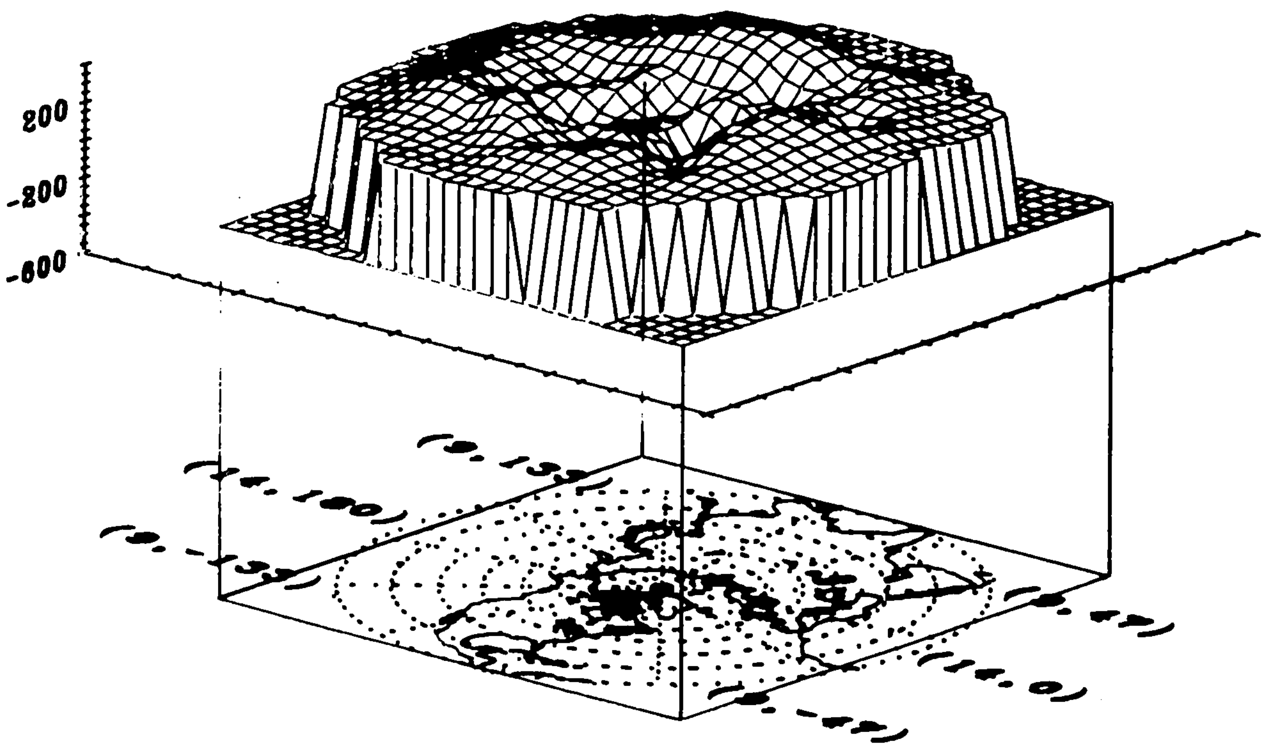
( ) NMC/NCAR ALL DATA

THERE ARE 1977 DATA VALUES USED OUT OF 1977 POSSIBLE VALUES

1975/01/01 00:00:00 < DATE TIME < 1975/01/01 00:00:00

STANDARD DEVIATION = 0.8115E+02

MEAN VALUE = 0.1423E+03



N POLAR STEREOGRAPHIC PLOT OF GEOPOTENTIAL HGT (M)

Current PCDS (System) Software Development Efforts (Version 4.0)

0 Full CDF Implementation – Including Interface Library
0 Subsystem Reorganization for Data Access, Data Manipulation & Graphics
0 Easier–to–use Consistent Interface for All Subsystems
0 Improved Data Access for Faster Data Set Implementation
0 Improved Graphics – Upgraded Mapping, Greater Flexibility & Animation

DATA SET MANAGEMENT

Ms. Mary Reph
Data Management Systems Facility
Goddard Space Flight Center
Greenbelt, Maryland 20771

The data sets currently supported by the PCDS were listed, many of which are Level II and Level III Nimbus-7 data sets. Those data sets planned for future access through the PCDS were also listed, and their current installation status was stated.

The tasks involved in supporting data sets within the PCDS were identified and described. After a data set is approved for implementation into the system and communication with the data producers is established, the information for the detailed catalog entry is gathered. This information then is reviewed with the scientists involved before producing a catalog summary. Once this is done, the catalog information can be provided to users, even before the data set is installed. The next several tasks involve software development and can prove to be the most time-consuming aspect in the data set support. These tasks can be simplified if the data producers provide complete and accurate documentation of their product. Software for reading and interpreting the data sets is developed and the data sets, or portions thereof, that will be made available for use within the PCDS are inventoried. Users can access this information via the INVENTORY Subsystem of the PCDS. For example, users can determine whether additional data have been added to the system by using the Tape History Query, one of several queries of the INVENTORY available to PCDS users. The creation of a data-independent CDF also requires the time and skill of a programmer. In addition, there are maintenance costs that reflect the efforts required in updating or replacing data sets, handling changes in INVENTORY and DATA ACCESS programs, and documenting changes in the CATALOG.

Some data sets and subsets of others are currently available on line. There are plans to include other data sets on line when the more robust Version 4.0 becomes operational.

Numerous questions involving on-line availability, funding, data set support, system use, etc., were addressed during this session.

PCDS

DATA SET

MANAGEMENT

January 29, 1986

PILOT CLIMATE DATA SYSTEM
PCDS
NASA/GSFC

PCDS DATA SETS

- Angell Atmospheric Temperature Deviations
- FGGE II-b and ECMWF III-b Data Sets
- NASA/FGGE II-c SMMR, ERB, and SBUV
- NMC Octagonal Grids
- Nimbus-4 BUV DPFL and DZP
- Nimbus-5 ESMR Three-day Averages
- Nimbus-7 ERB MATRIX, ZMT, SEFDT
- Nimbus-7 LIMS LAMAT
- Nimbus-7 SBUV OZONE-S
- Nimbus-7 SAM II BANAT
- Nimbus-7 THIR CLDT and CLE
- Nimbus-7 TOMS OZONE-T
- NOAA Heat Budget Data
- SAGE Profiles
- World Monthly Surface Station Climatology

FUTURE PCDS DATA SET SUPPORT

- International Satellite Cloud Climatology Project B3 and C
- Middle Atmospheric Electrodynamics Rocket Dat
- Nimbus-4,5 SCR, STIT
- Nimbus-5 ESMR Monthly
- Nimbus-7 ERB ESAT, SAVER
- Nimbus-7 LIMS LAIPAT
- Nimbus-7 SBUV ZMT, CPOZ
- Nimbus-7 SMMR PARM, MAP
- Nimbus-7 THIR CMATRIX, NCLE, BCLT
- Nimbus-7 TOMS-GRIDS, ZMT
- TIROS-N AVHRR Subsets
- ERBE
- Other Global Solar Flux data sets

PCDS DATA SET SUPPORT TASKS

- o Gather information about data set to be supported and prepare detailed entries for the catalog
- o Obtain reviews of the new catalog entries
- o Summarize catalog information for database and integrate changes to allow user access to data descriptions
- o Obtain data set and prepare software for reading and interpreting the native data set format (e.g., tapes)
- o Create a data-independent model of the contents of the data set and update inventory appropriately
- o Define a CDF for the data
- o Prepare software to extract user-selected portions of the data set and output to a CDF, subset tape, or listings and integrate with existing software
- o Start maintenance cycle, updating catalog, inventory, data library, or software as necessary

PCDS Catalog Descriptions (1 of 3)

1. TYPE OF DATA

   1.1 Parameter/Measurement
   1.2 Unit of Measurement
   1.3 Data Source
   1.4 Data Set Identification

2. SPATIAL CHARACTERISTICS

   2.1 Spatial Coverage
   2.2 Spatial Resolution

3. TEMPORAL CHARACTERISTICS

   3.1 Temporal Coverage
   3.2 Temporal Resolution

4. INSTRUMENT DESCRIPTION

   4.1 Mission Objectives
   4.2 Key Satellite Flight Parameters
   4.3 Principles of Operation
   4.4 Instrument Measurement Geometry

PCDS Catalog Descriptions (2 of 3)

5. DATA PROCESSING SEQUENCE

    5.1 Processing Steps and Data Sets
    5.2 Derivation Techniques/Algorithms
    5.3 Special Corrections/Adjustments
    5.4 Processing Changes

6. QUALITY ASSESSMENT

    6.1 Data Validation by Producer
    6.2 Confidence Level/Accuracy Judgment
    6.3 Usage Guidance

7. CONTACTS FOR DATA PRODUCTION INFORMATION

8. OUTPUT PRODUCTS AND AVAILABILITY

    8.1 Tape Products
    8.2 Film Products
    8.3 Other Products

PCDS Catalog Descriptions (3 of 3)

9. DATA ACCESS

   9.1 Archive Identification
   9.2 Procedures for Obtaining Data
   9.3 PCDS Status/Plans

10. CONTACTS FOR ARCHIVE/DATA ACCESS INFORMATION

11. REFERENCES

   11.1 Satellite/Instrument/Data Processing Documentation
   11.2 Journal Articles and Study Reports
   11.3 Archive/DBMS Usage Documentation

12. RELATED DATA SETS

13. SUMMARY/SAMPLE

14. NOTES

PARAMETER: OZONE
(Total Ozone Content and Ozone Profiles)

LEVEL: II SENSOR: SBUV MISSION: NIMBUS-7

SPATIAL COVERAGE AND RESOLUTION: Global, 40 mb - 0.4 mb; Horizontal: 200 km x 200 km, Vertical: 2.5 km

TEMPORAL COVERAGE AND RESOLUTION: START TIME: 11/1978
6 days for global coverage, power on 3 days of 4, daylight only; 32 sec/1 observation

TAPE PRODUCTS: Total ozone, reflectivity, mixing ratios, & layer ozone amounts, scan by scan and orbit by orbit (HDSBUV or OZONE-S): approximately 4 6250-bpi tapes/1 year; Compressed profile ozone tape (CPOZ): 4 1600-bpi tapes/1 year

ARCHIVE: NSSDC/PCDS CATALOG REFERENCE: OZ/BN

ARCHIVE STATUS: 5 yrs of HDSBUV in NSSDC/PCDS, 3 yrs of CPOZ in NSSDC only

CATALOG PARAMETERS

Albedo
Chlorophyll Concentration
Cultivation Intensity
Forest Cover
Humidity
Nitrogen Dioxide
Precipitation
Sea Ice Concentration
Sea Surface Temperature
Solar Flux
Surface Pressure
Vegetation Type
Wind Speed
Carbon Dioxide
Cloud Cover
Electron Precipitation
Geopotential Height
Ice Sheet Nitric Acid
Ozone
Radiation Budget
Sea Surface Elevation
Snow Coverage Boundary
Stratospheric Aerosols
Temperature Profiles
Wave Height

CATALOG SOURCES

AEM-2 SAGE
GEOS-3 Altimeter
GOES-1 through 6 VISSR
ITOS-1 SR
MAE
Nimbus-4 BUV, SCR
Nimbus-6 ERB, ESMR
Nimbus-7 CZCS, ERB, LIMS, SAM II, SBUV, SMMR, THIR, TOMS
NOAA-6 through 9 AVHRR
OSTA-1 OCE
Seasat-A Altimeter, SAR, Scatterometer
SMS-1,2 VISSR
FGGE
GMS VISSR
GOES-4 through 6 VAS
LANDSAT MSS
METEOSAT-2 MIR
Nimbus-5 ESMR, SCR
NOAA-1 through 5 SR
TIROS-N AVHRR, TOVS

****************************** DTYPE = OZONE-S ******************************

ITEM	PARM	PARAMETER	MISSION & SENSOR
SCAN	OZONE	OZONE	NIMBUS-7 SBUV

TAPEID	ORBIT RANGE	--TAPE TIME RANGE-- START/END	# OF FILES	-GENERATION TIME-	-INVENTORY TIME-
P0692	102	1978/10/31 16:22:02	1001	83/04/16 14:06:00	84/08/01 15:27:49
	1323	1979/01/27 23:42:36			
P0693	1324	1979/01/28 00:34:36	1051	82/09/30 09:04:11	84/08/01 17:21:20
	2580	1979/04/28 22:01:36			
P0694	2582	1979/04/29 00:44:00	972	82/09/26 05:37:33	84/08/01 18:14:44
	3922	1979/08/04 00:45:25			
P0695	3937	1979/08/05 01:56:21	888	82/09/26 06:13:36	84/08/01 19:15:53
	5193	1979/11/04 00:06:49			
P0697	6452	1980/02/03 01:52:28	883	84/04/13 13:25:52	84/10/05 14:00:58
	7708	1980/05/04 00:16:33			
P0698	7709	1980/05/04 01:08:49	889	84/04/13 13:42:03	84/10/09 16:44:11
	8966	1980/08/03 00:57:57			

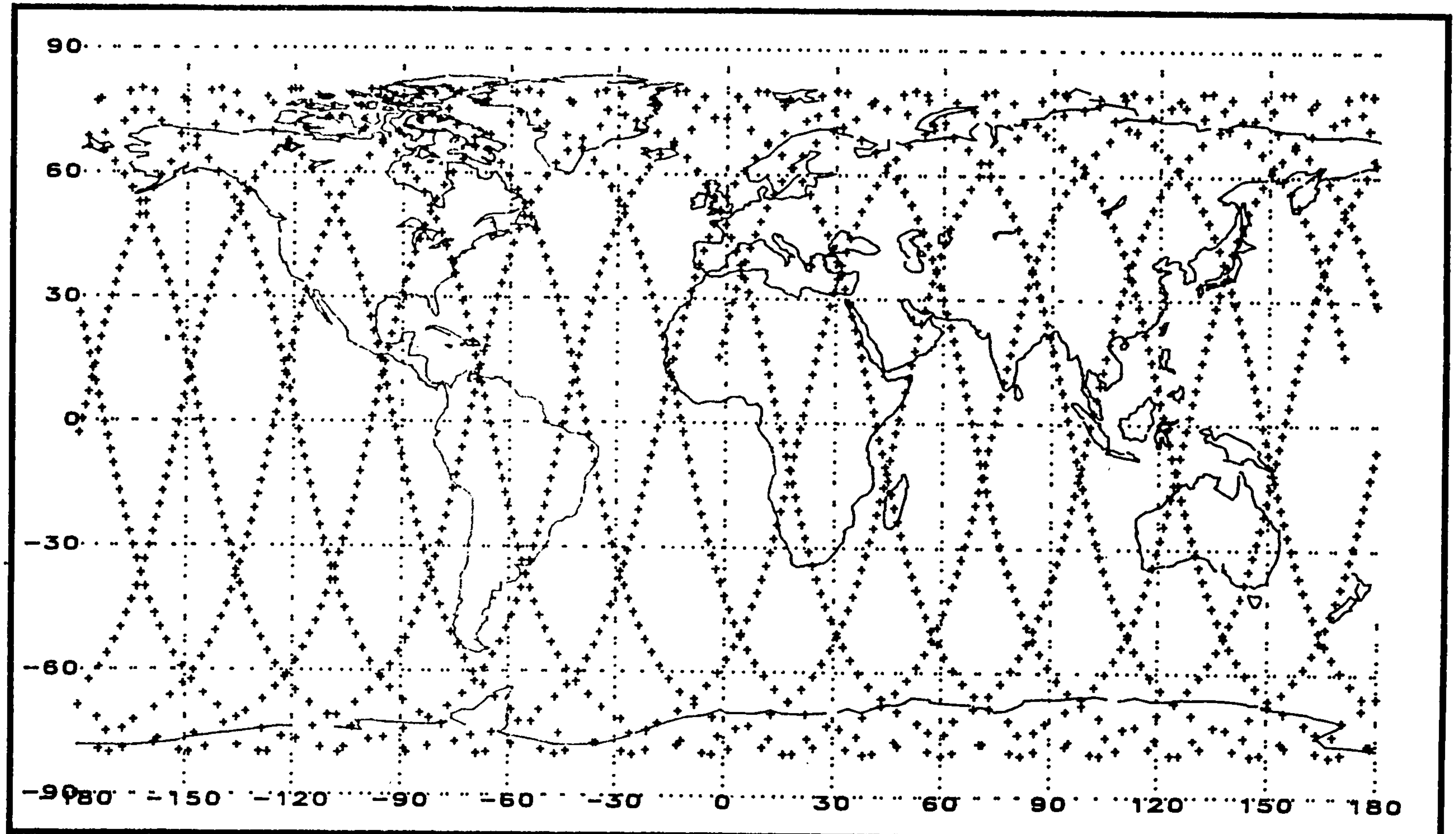
NUMBER OF TAPES = 6 NUMBER OF FILES = 5684

PLOTTED BY PCDS ON 22-JAN-86

PCDS INVENTORY STATISTICS

SUBSATELLITE TRACK FROM 72/01/01 00:00:00 TO 72/01/02 00:00:00

WHERE 0.0 < SOLAR ZENITH ANGLE < 180.0



DPFL-SCAN DATA LOCATION

CYLINDRICAL EQUIDISTANT PROJECTION

PCDS INVENTORY CONTENTS

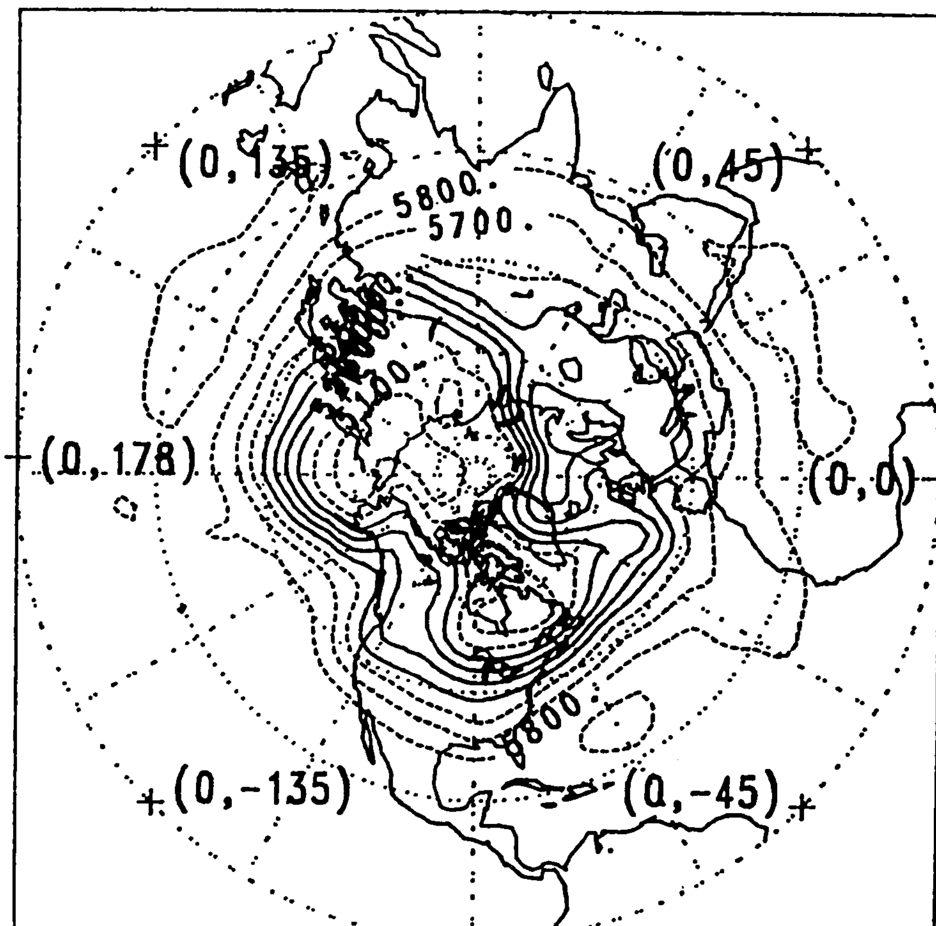
DATA TYPE	TAPE COUNT	START TIME	END TIME
BANAT	58	1978/11/01	1983/10/31
CLDT	16	1978/12/02	1978/12/11
CLE	14	1978/12/02	1978/12/09
DPFL	34	1970/06/01	1977/05/06
DZP	1	1970/04/10	1977/05/06
DZPM	1	1970/04/10	1977/12/31
ERB-MATRIX	38	1978/11/16	1983/01/03
ERB-SEFDT	1	1979/01/01	1979/01/31
ERB-ZMT	4	1978/12/01	1980/11/02
ERBM/FGGE	2	1978/12/02	1979/11/30
ERBZ/FGGE	1	1978/12/02	1979/11/29
FGGE2B	85	1978/12/04	1979/12/01
FGGE3B	80	1978/12/01	1979/11/30
ISCCP-B3	64	1983/06/30	1984/07/31
LIMS-LAMAT	9	1978/10/25	1979/05/29
LIMS/FGGE	8	1978/12/01	1979/05/30
NMCGRD	18	1973/01/01	1981/12/31
NOAA-HB	26	1974/06/01	1982/02/28
OZONE-S	17	1978/10/31	1983/05/08
OZONE-T	89	1978/10/31	1983/11/05
SAGE-PROF	33	1979/02/21	1981/11/18
SBUV/FGGE	12	1978/11/30	1979/11/30
SMMR/FGGE	11	1978/12/01	1979/11/30
SSCLIMATE	3	1738/01/01	1982/12/31

DPCO:[PCDS3.DATA.FGGE3B]ZC011250 PLOTTED BY PCDS ON 21-JAN-86

FGGE3B ( ) ECMWF HGT DATA

THERE ARE 9408 DATA VALUES USED OUT OF 18624 POSSIBLE VALUES

1978/12/01 12:00:00 < DATE TIME < 1978/12/01 12:00:00



N POLAR STEREOGRAPHIC PLOT OF GEOPOT HEIGHT (GPM) AT 500 MB

EXAMPLE OF INVENTORY TAPE HISTORY QUERY

TAPEID	DATA TYPE	-INVENTORY TIME-	ARCHIVER	--TAPE TIME RANGE--	FILES
P1514	ISCCP-B3	85/12/11 16:53:17	REPH	1983/07/08 22:44:11	108
				1983/07/16 22:52:21	
P1526	ISCCP-B3	85/12/23 17:34:51	RAMEY	1983/10/01 00:06:49	115
				1983/10/09 00:14:42	
P1527	ISCCP-B3	85/12/23 17:35:29	RAMEY	1983/10/09 00:09:49	109
				1983/10/16 22:35:02	
P1528	ISCCP-B3	85/12/23 17:36:00	RAMEY	1983/10/16 22:31:42	115
				1983/10/24 22:36:54	
P1529	ISCCP-B3	85/12/23 17:36:36	RAMEY	1983/10/24 22:32:17	98
				1983/10/31 22:53:12	
P1530	ISCCP-B3	85/12/23 17:37:06	RAMEY	1983/10/31 22:48:21	111
				1983/11/08 22:56:01	
P1531	ISCCP-B3	85/12/23 17:38:00	RAMEY	1983/11/08 22:51:21	114
				1983/11/16 22:59:13	
P1532	ISCCP-B3	85/12/23 17:38:51	RAMEY	1983/11/16 22:54:31	116
				1983/11/24 23:01:23	

1985/86 ADDITIONS TO PCDS INVENTORY

DATA TYPE	TAPE COUNT	START TIME	END TIME
BANAT	16	1978/11/01	1983/10/31
DZP	1	1970/04/10	1977/05/06
DZPM	1	1970/04/10	1977/12/31
ERB-MATRIX	23	1980/01/02	1983/01/03
ERB-ZMT	2	1979/12/01	1980/11/02
FGGE2B	6	1978/12/24	1979/04/27
FGGE3B	2	1978/12/21	1979/10/18
ISCCP-B3	64	1983/06/30	1984/07/31
LIMS-LAMAT	6	1978/11/23	1979/05/29
NOAA-HB	18	1975/09/01	1982/02/28
OZONE-S	7	1981/05/03	1983/05/08
OZONE-T	30	1979/04/15	1983/11/05
SAGE-PROF	33	1979/02/21	1981/11/18

DEMONSTRATION OF NEW PCDS CAPABILITIES

Mr. Michael Gough
Science Applications Research
4400 Forbes Blvd.
Lanham, Maryland 20706

The new, more flexible and more friendly graphics capabilities to be available in later releases of the PCDS were demonstrated. The LIMS-LAMAT data set was chosen to illustrate these new capabilities. Pseudocolor and animation were used to represent the third and fourth dimensions, expanding the analytical capabilities available through the traditional two-dimensional x-y plot. In the new version, variables for the axes are chosen by scrolling through viable selections. This scrolling feature is a function of the new user interface customization.

The new graphics are extremely user friendly and should "free the scientist to look at data and converse with it," without doing any programming. The system is designed to rapidly plot any variable versus any other variable and animate by any variable. Any one plot in itself is not extraordinary; however, the fact that a user can generate the plots instead of a programmer distinguishes the graphics capabilities of the PCDS from other software packages. In addition, with the new CDF design, the system will become more generic, and the new graphics will become much more rigorous in the area of correlative studies.

DEMONSTRATION OF NEW PCDS CAPABILITIES

Michael Gough
SAR

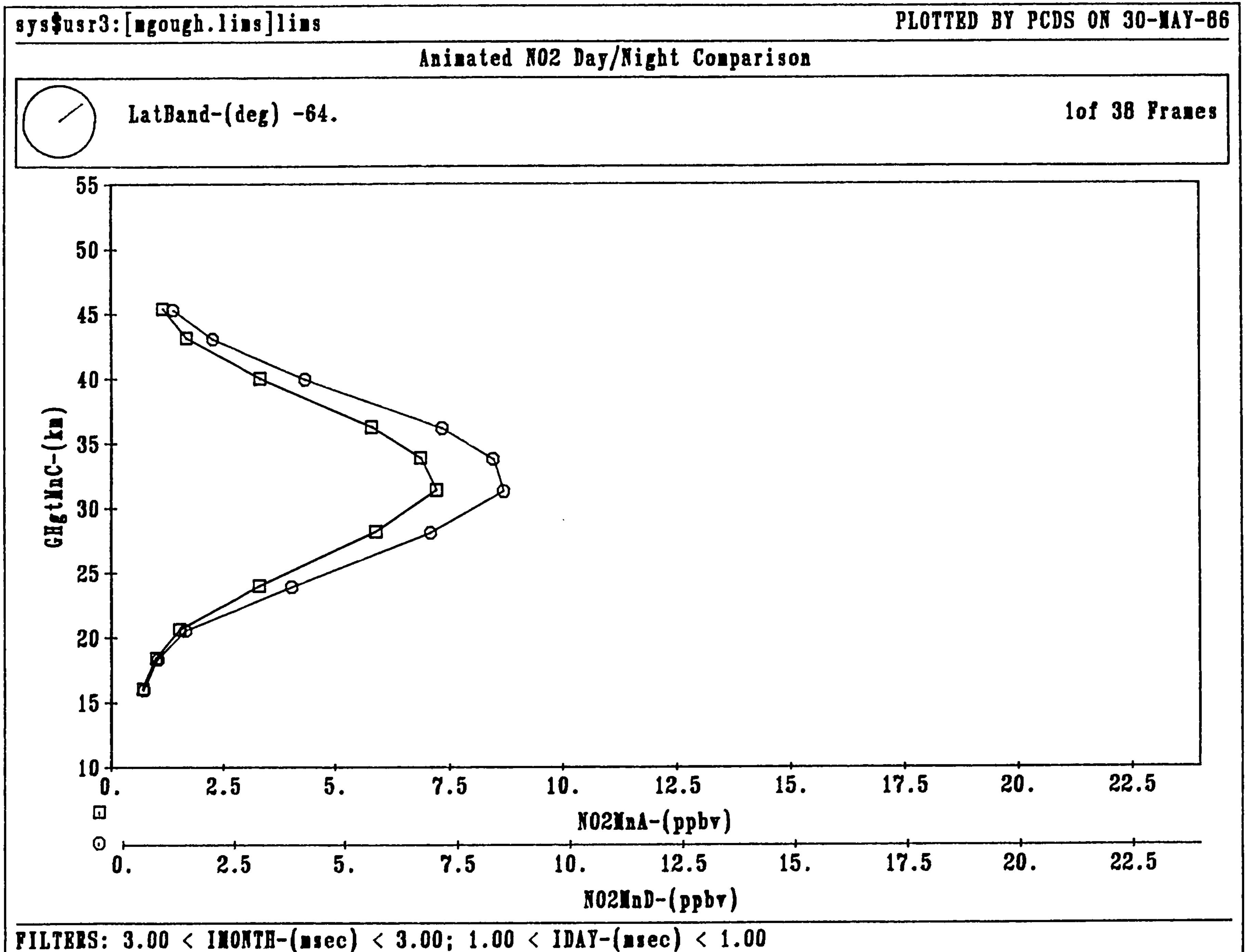
PCDS VERSION 4 GRAPHICS

0 "Customized" User Interface

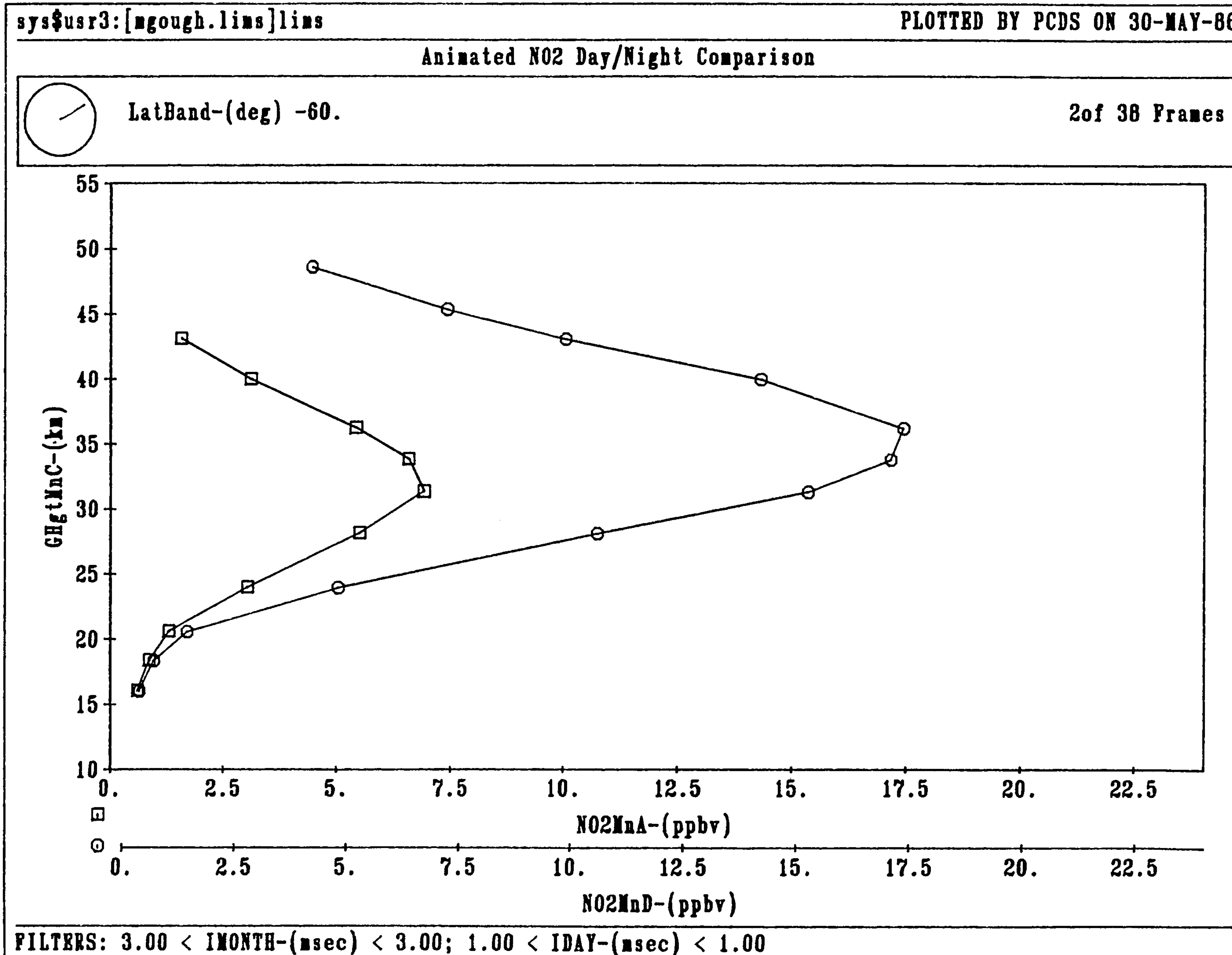
0 Minimal User Interaction

0 Highly Flexible for Correlative Studies

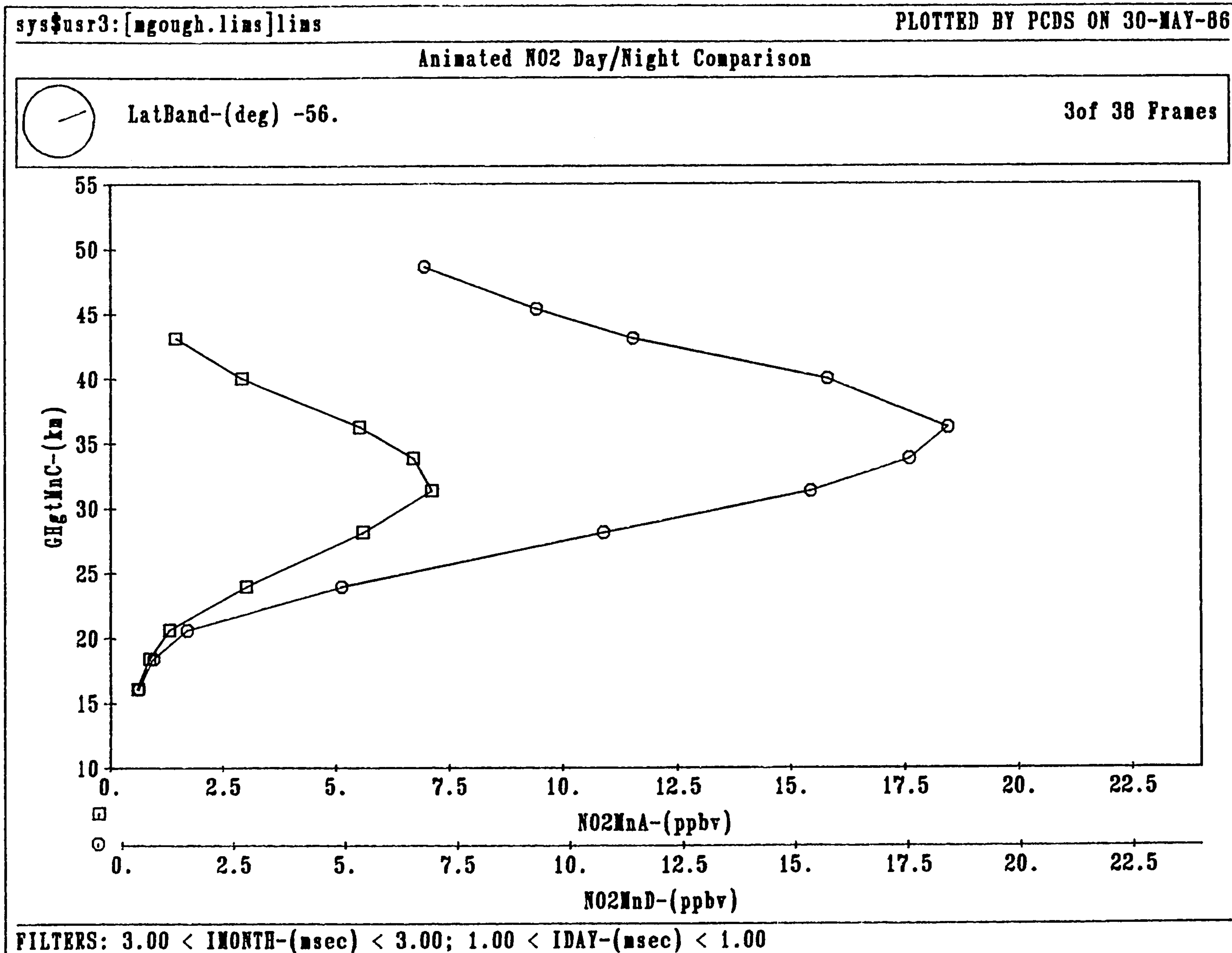
0 Enhancements: Pseudocolor & Animation

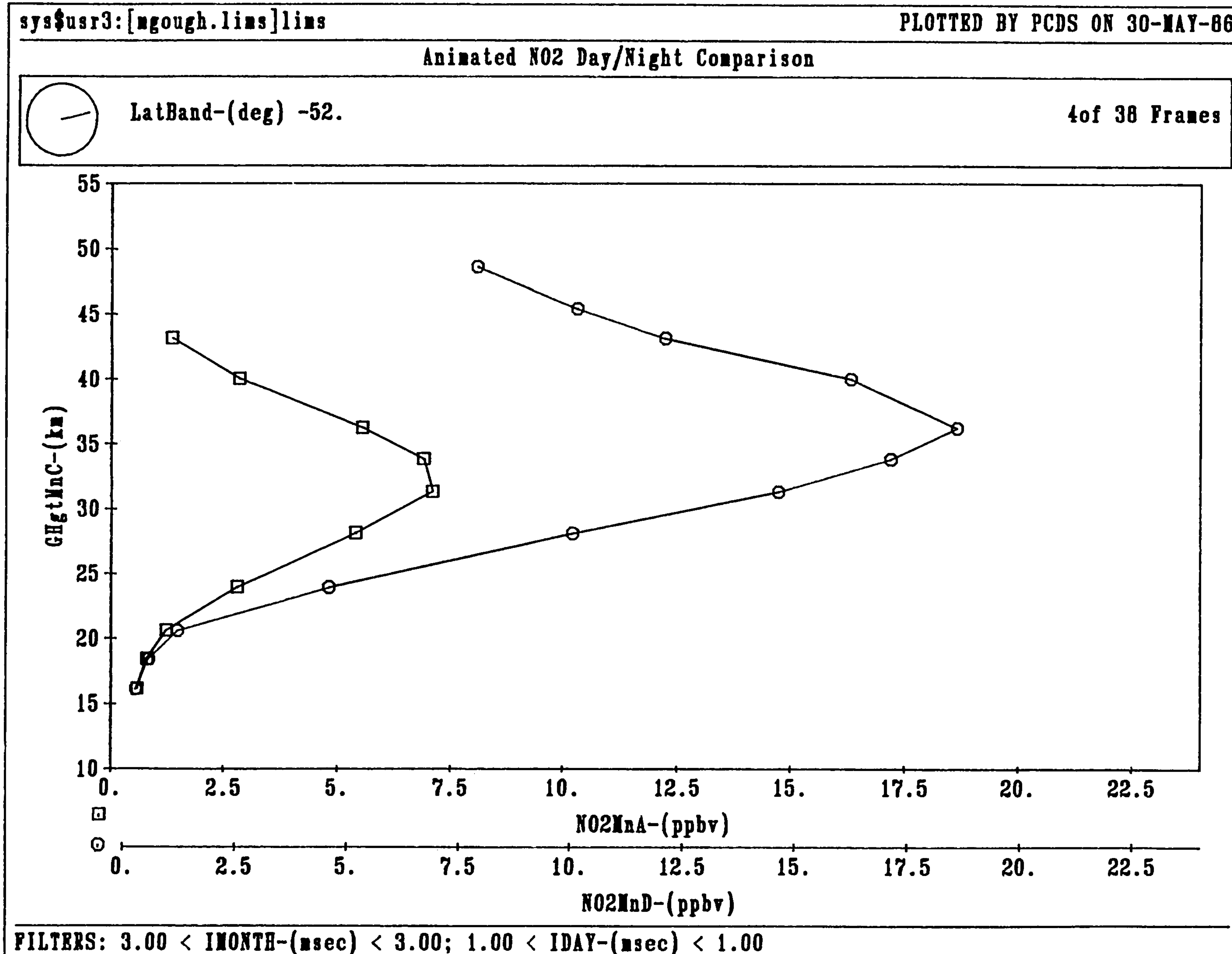


sys$usr3:[mgough.lims]lims
PLOTTED BY PCDS ON 30-MAY-86
Animated NO2 Day/Night Comparison
LatBand-(deg) -64.
1of 38 Frames
GHgtMnC-(km)
55
50
45
40
35
30
25
20
15
10
0.
2.5
5.
7.5
10.
12.5
15.
17.5
20.
22.5
NO2MnA-(ppbv)
NO2MnD-(ppbv)
FILTERS: 3.00 < IMONTH-(msec) < 3.00; 1.00 < IDAY-(msec) < 1.00



sys$usr3:[mgough.lims]lims
PLOTTED BY PCDS ON 30-MAY-86
Animated NO2 Day/Night Comparison
LatBand-(deg) -60.
2of 38 Frames
GHgtMnC-(km)
55
50
45
40
35
30
25
20
15
10
0.
2.5
5.
7.5
10.
12.5
15.
17.5
20.
22.5
NO2MnA-(ppbv)
NO2MnD-(ppbv)
FILTERS: 3.00 < IMONTH-(msec) < 3.00; 1.00 < IDAY-(msec) < 1.00


sys$usr3:[mgough.lims]lims
PLOTTED BY PCDS ON 30-MAY-86
Animated NO2 Day/Night Comparison
LatBand-(deg) -56.
3of 38 Frames
GHgtMnC-(km)
55
50
45
40
35
30
25
20
15
10
0.
2.5
5.
7.5
10.
12.5
15.
17.5
20.
22.5
NO2MnA-(ppbv)
NO2MnD-(ppbv)
FILTERS: 3.00 < IMONTH-(msec) < 3.00; 1.00 < IDAY-(msec) < 1.00


sys$usr3:[mgough.lims]lims
PLOTTED BY PCDS ON 30-MAY-86
Animated NO2 Day/Night Comparison
LatBand-(deg) -52.
4of 38 Frames
GHgtMnC-(km)
55
50
45
40
35
30
25
20
15
10
0.
2.5
5.
7.5
10.
12.5
15.
17.5
20.
22.5
NO2MnA-(ppbv)
NO2MnD-(ppbv)
FILTERS: 3.00 < IMONTH-(msec) < 3.00; 1.00 < IDAY-(msec) < 1.00

4. SCIENTIFIC PRESENTATIONS

ISCCP REDUCED RESOLUTION SATELLITE RADIANCE DATA

Dr. William Rossow
Goddard Institute for Space Studies
2880 Broadway
New York, New York 10025

The International Satellite Cloud Climatology Project (ISCCP) is the first active project of the World Climate Research Program. It is a multinational data collection project focused on collecting a data set that will improve the ability to predict and/or simulate the radiative effects of clouds on climate. For specified cloud parameters, the goals are to archive values for 3-hour periods over the whole globe for 5 years at 30 km resolution.

The task of collecting and processing radiance data from both geosynchronous and polar orbiting satellites began in July 1983. A diagram was shown illustrating the flow of data from the transmitting satellites to the various receiving institutions that handle it. The various stages of processing were then explained in detail, emphasizing Level B3-normalized, reformatted, reduced raw satellite data. The reduction of data by sampling is an essential step in the flow. By the time the ISCCP data reaches the Global Processing Center at GISS, the volume has been reduced by a factor of 1000.

The PCDS will provide access to the ISCCP data set. It should prove to be one of the "cleanest satellite data sets" because it will have been through three filters--that of the operational agency, the Global Processing Center, and the PCDS. The ISCCP data set also includes other correlative data sets delivered in compatible format. It also provides complete documentation for the archiver and important documentation of tape formats for the scientist or programmer.

The Level B3 ISCCP data are now standard products being produced and delivered to the official archive and to the PCDS. The algorithms involved in the analysis of the Level C cloud products continue to undergo scrutiny and improvement. The ISCCP data have many potential applications, such as their use in GCM validation studies, cloud algorithm improvements, and Earth and ocean applications during cloudless conditions.

PCDS WORKSHOP 2

ISCCP REDUCED RESOLUTION SATELLITE RADIANCE DATA

William B. Rossow

NASA Goddard Space Flight Center

Institute for Space Studies

Table 1

Data Specification for the International
Satellite Cloud Climatology

Parameters--Spatial and temporal averages and variances (or another statistical measure of the shape of the temporal distribution) are required for each of the following parameters.

Amounts	Precision (30-day averages)
Total cloud amount (fraction)*	±0.03
Cirrus cloud amount (fraction)*	±0.05
Middle cloud amount (fraction)	±0.05
Low cloud amount (fraction)*	±0.05
Deep convective cloud amount (fraction)	±0.05
Heights	
Cirrus cloud-top height (km)*	±1.00
Middle level cloud-top height (km)	±1.00
Low-level cloud-top height (km)	±0.50
Deep convective cloud-top height (km)	±1.00
Cloud Top Temperature (°K) for each cloud catagory*	±1.00

Cloud Optical Depth
Cloud Size Distribution
Average Narrow Band Radiances (VIS and IR)*

Spatial Averaging--The information is to be averaged over approximately 250-km by 250-km boxes

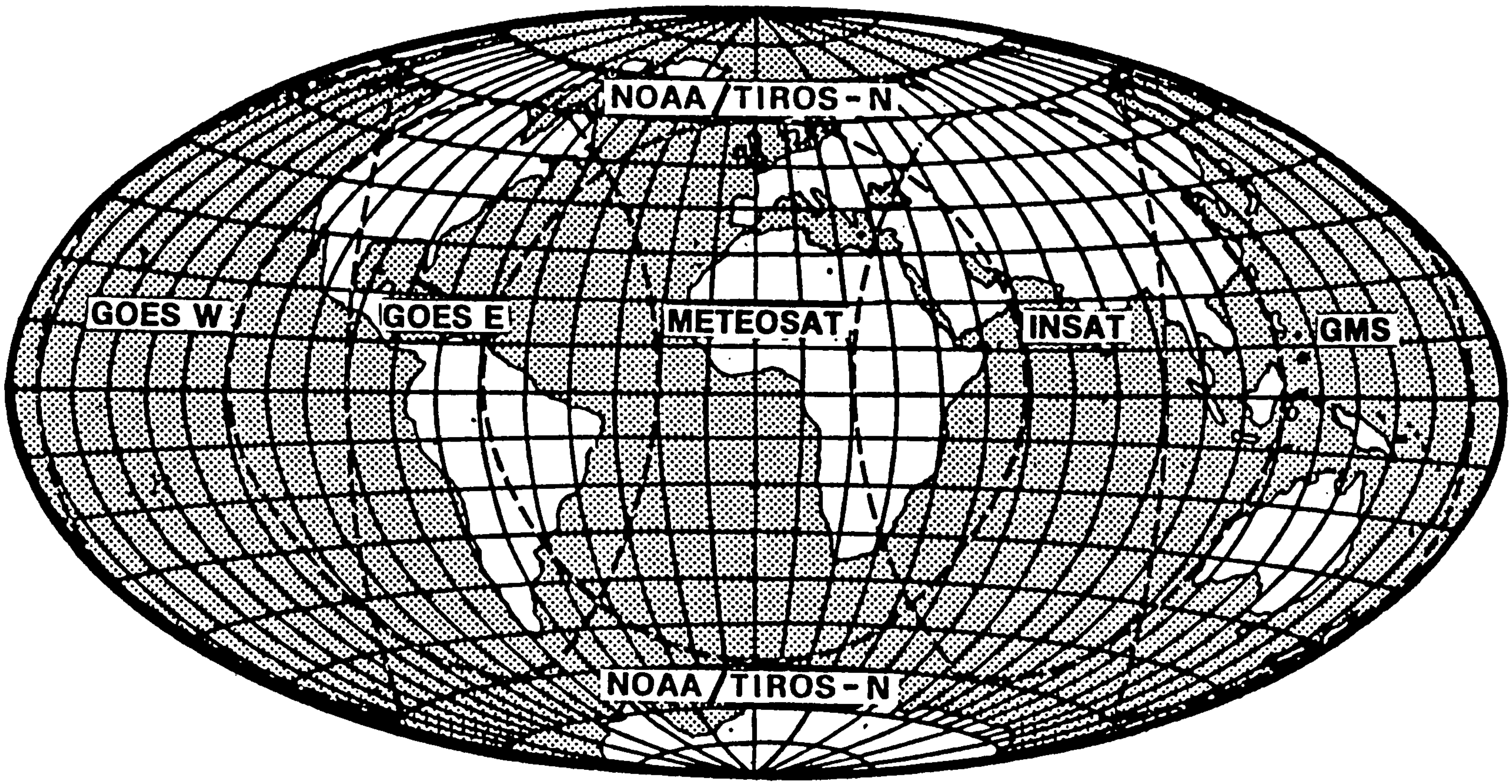
Time Sampling--Every 3 hours, i.e., 8 times a day, centered around the synoptic observation times

Time Averaging--The global cloud climatology will consist of 30-day averages for each of the 8 observing times per day

Length of Time Series--5 years

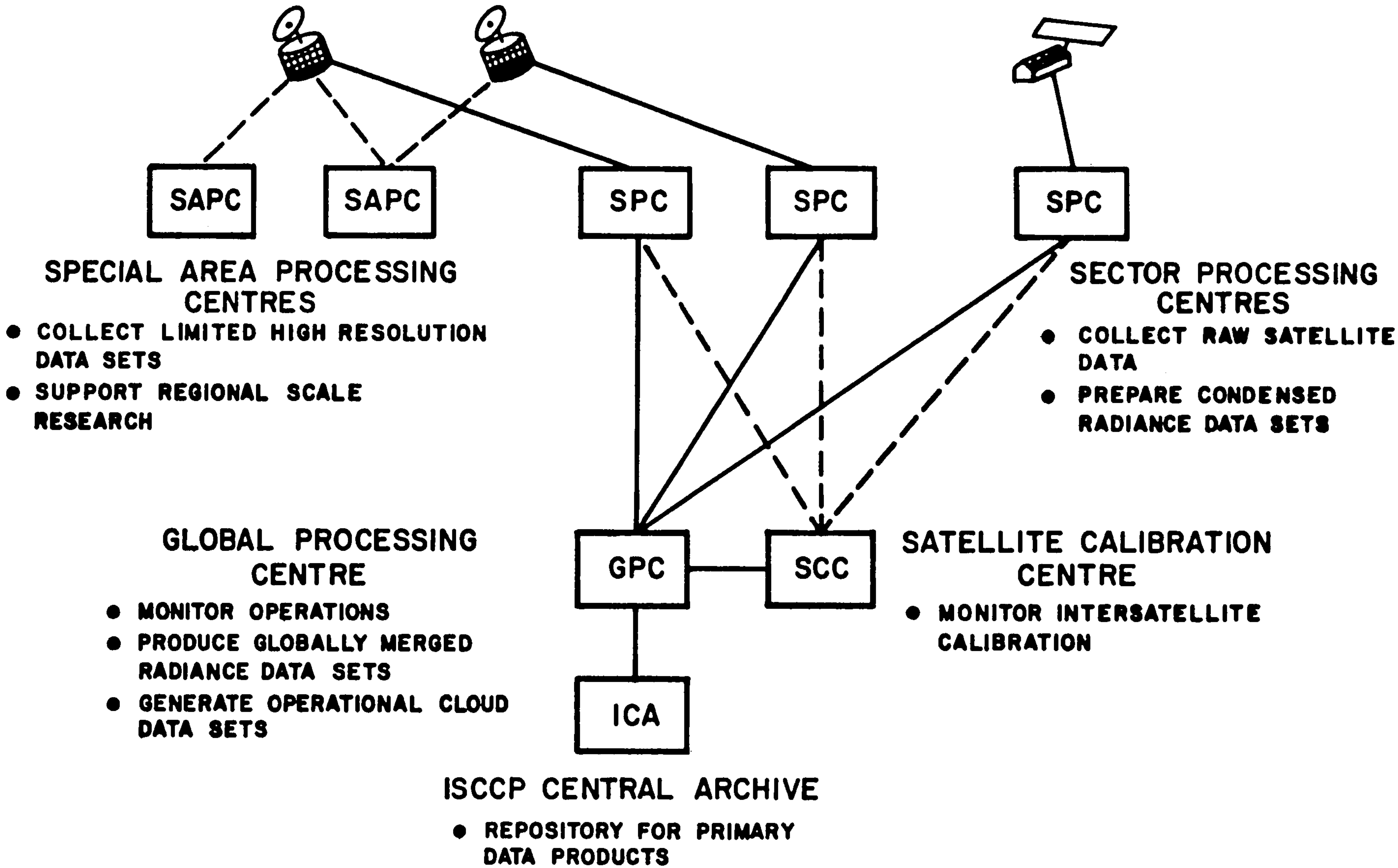
* Highest priority

DATA PROCESSING SECTORS FOR THE INTERNATIONAL SATELLITE CLOUD CLIMATOLOGY PROJECT (ISCCP)



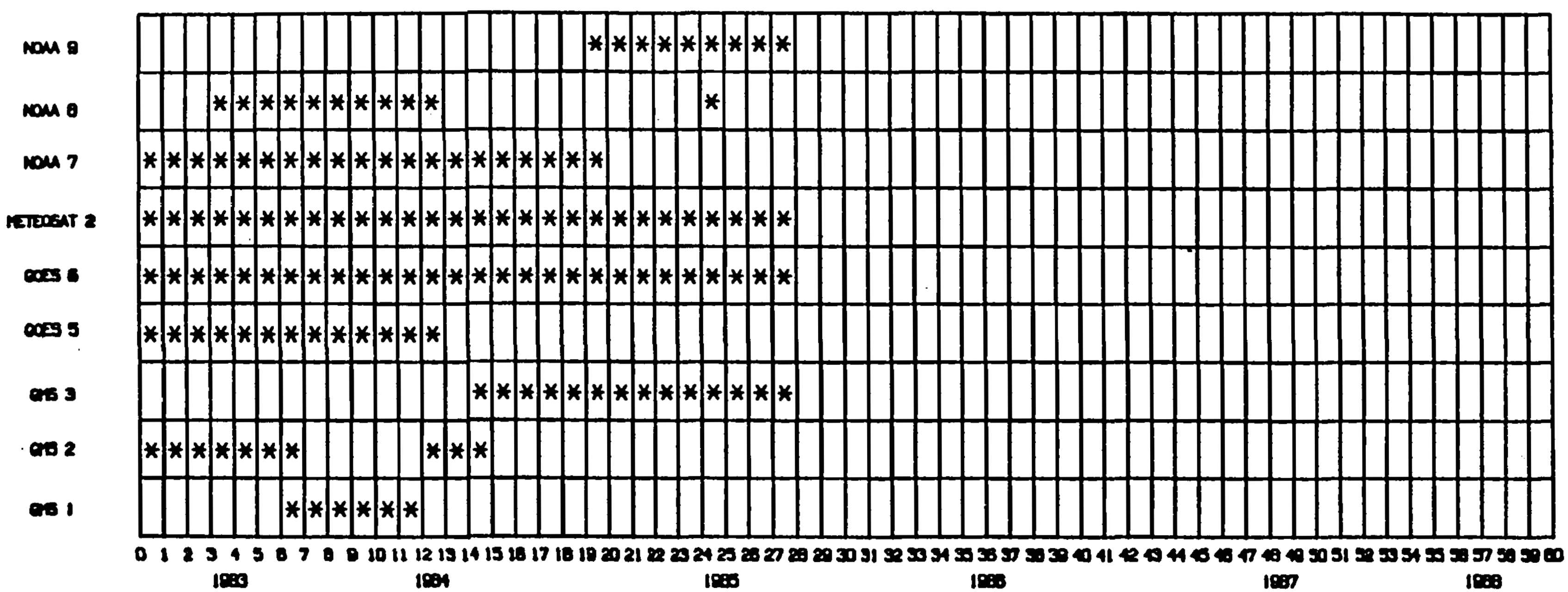
NASA HQ EB83-2947 (1)
7-22-83

ISCCP DATA FLOW CONCEPT

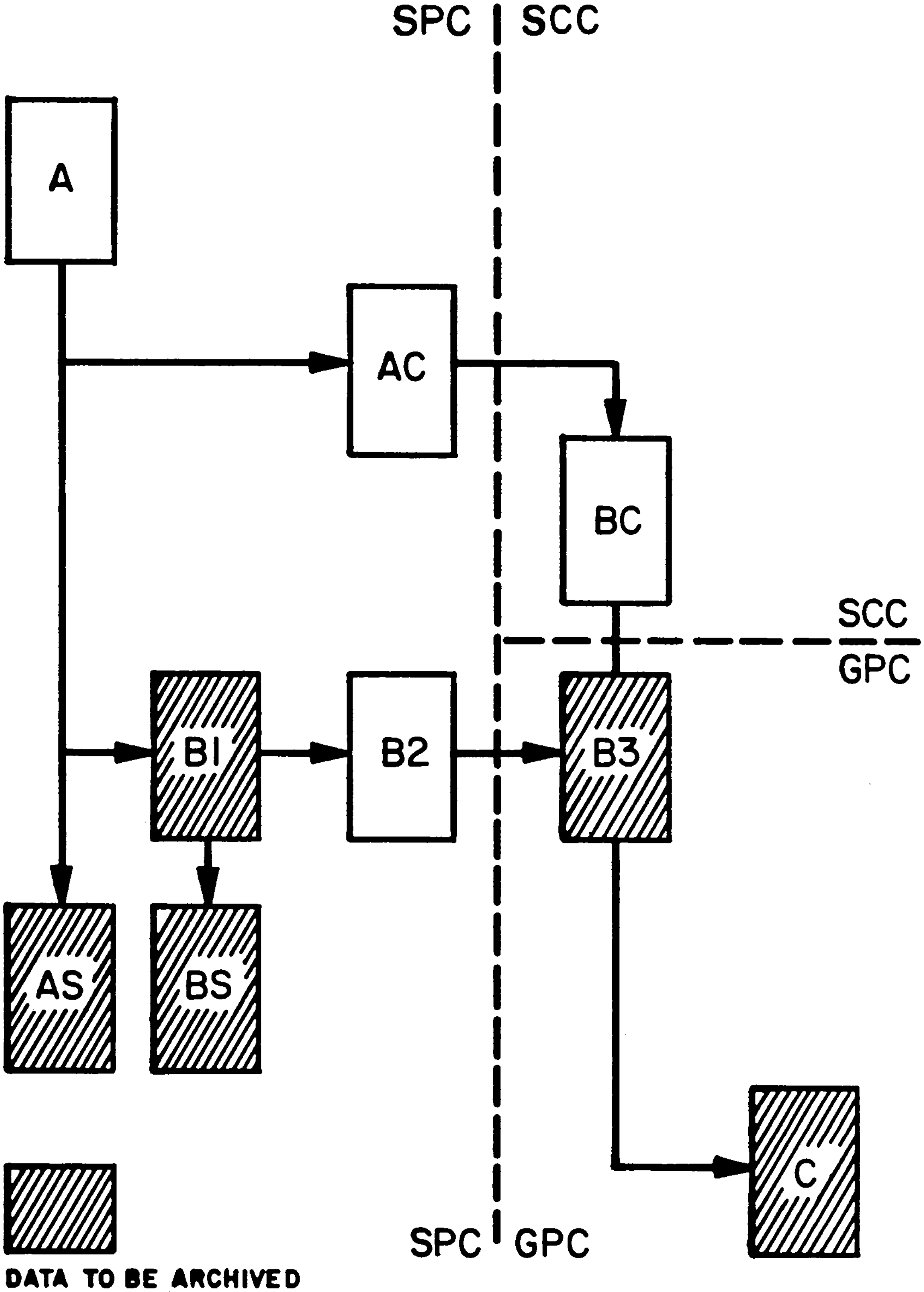


ISCCP SATELLITE NETWORK

* = SATELLITE TRANSMITTING DATA TO SPC



ISCCP DATA STAGES



SPECIAL FEATURES OF ISCCP RADIANCE DATA

- PREDICTABLE ARRANGEMENT OF DATA BY SATELLITE AND TIME

- INDEX TO TAPE CONTENTS PROVIDED

- EACH IMAGE PIXEL HAS ALL SPECTRAL CHANNELS

- EACH IMAGE PIXEL HAS EARTH LOCATION AND VIEWING GEOMETRY

- ORIGINAL COUNT VALUES AND IMAGE FORM PRESERVED

SPECIAL FEATURES OF ISCCP RADIANCE DATA

- UNIFORM TAPE FORMAT FOR ALL SATELLITES

- ONE SOFTWARE TO READ ALL TAPES PROVIDED

- CALIBRATION TABLES FOR EACH CHANNEL CONVERTS COUNTS TO TWO QUANTITIES

- CALIBRATION TABLES FOR NOMINAL, NORMALIZED AND ABSOLUTE CALIBRATION

SPECIAL FEATURES OF ISCCP RADIANCE DATA

- DOCUMENTATION

  EXPLAINS CALIBRATION PROCEDURES

  PROVIDES RADIOMETER SPECIFICATIONS AND SPECTRAL RESPONSES

  EXPLAINS NAVIGATIONAL PROCEDURES

  EXPLAINS DATA TAPE FORMAT

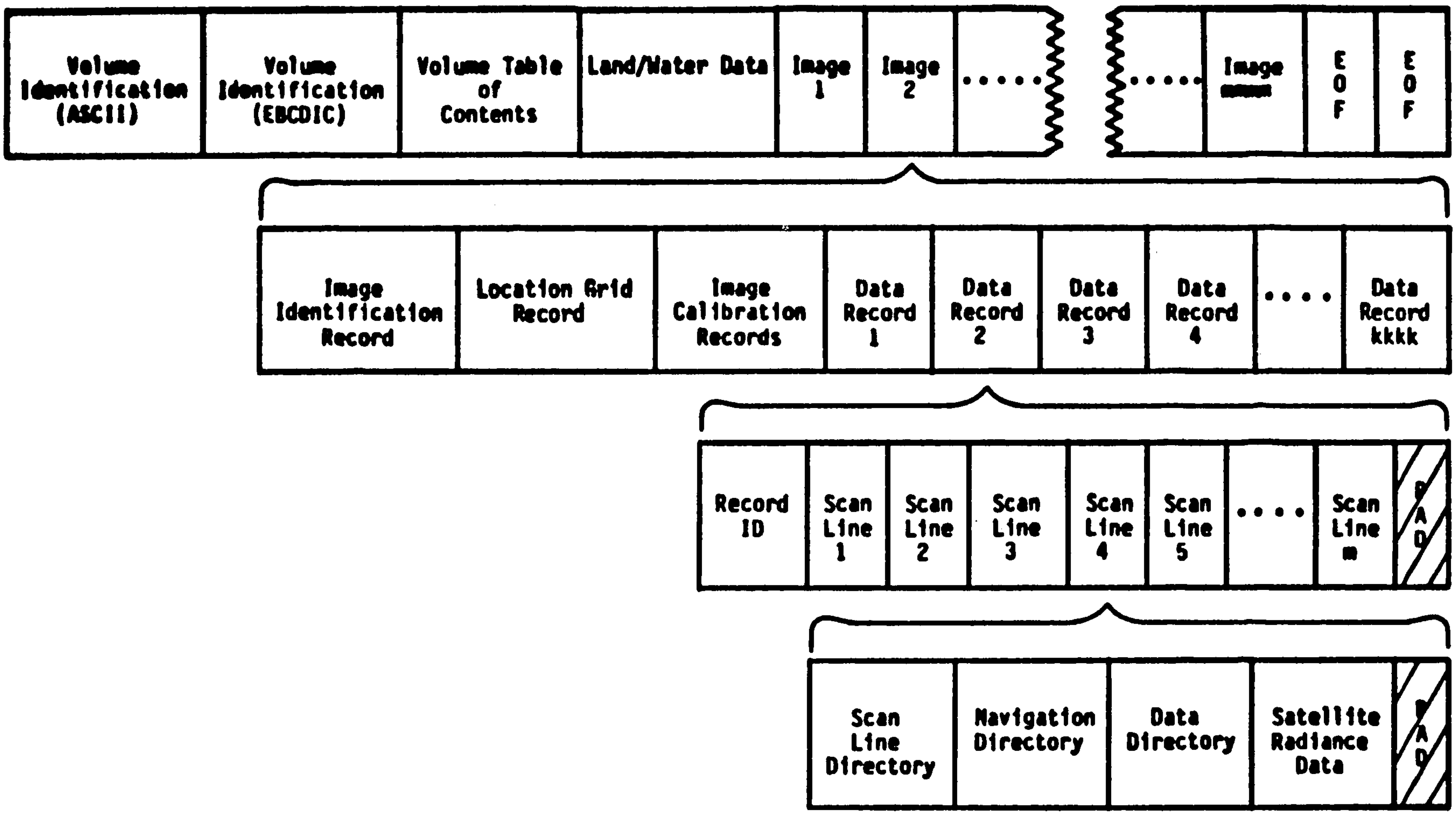


Fig. 5.1. B3 data tape format.

ISCCP B3 TAPE VOLUME HEADER INFORMATION

TAPE NUMBER : GPC.B3.0019.0.83244.83251.NOAA-7
ISCCP
B2 INPUT TAPE NUMBERS : C00099 C00100 C00101 C00102 C00103 C00104 C00105
C00106 C00107 C00108

SATELLITE : NOAA-7
SPC : NOA
DATE OF FIRST IMAGE : 83244
GPC TAPE CREATION DATE : 05/21/85

IMAGE HEADER CODE NUMBER : 11
IMAGE HEADER CODE NUMBER : 1
LAST IMAGE : 83251
B3 SOFTWARE VERSION NUMBER : 850510

CHANNEL IDENTIFICATION

VIS	(.58 - .68)	MICRONS	IMAGE HEADER CODE NUMBER : 1
IR	(10.5 - 11.3)	MICRONS	IMAGE HEADER CODE NUMBER : 2
.725	(.725 - 1.10)	MICRONS	IMAGE HEADER CODE NUMBER : 3
3.55	(3.55 - 3.93)	MICRONS	IMAGE HEADER CODE NUMBER : 4
11.5	(11.5 - 12.5)	MICRONS	IMAGE HEADER CODE NUMBER : 5

CALIBRATION COEFFICIENTS	SLOPE	INTERCEPT	RMS	MINIMUM	MAXIMUM
VIS NORMALIZED CALIBRATION	001.0000	000.0000	-1.0000	000.0000	000.0000
IR NORMALIZED CALIBRATION	001.0000	000.0000	-1.0000	000.0000	000.0000
VIS ABSOLUTE CALIBRATION	001.0000	000.0000	-1.0000	000.0000	000.0000
IR ABSOLUTE CALIBRATION	001.0000	000.0000	-1.0000	000.0000	000.0000

ERROR INFORMATION

NAVIGATION FIT ERROR IN LATITUDE (DEGREES)	.06
NAVIGATION FIT ERROR IN LONGITUDE (DEGREES)	.06
NAVIGATION FIT ERROR IN COSINE SATELLITE ZENITH	.01
NAVIGATION FIT ERROR IN COSINE SOLAR ZENITH	.01
NAVIGATION FIT ERROR IN RELATIVE AZIMUTH (DEGREES)	.50

TOTAL NUMBER OF IMAGES : 113

VOLUME TABLE OF CONTENTS

FILE NUMBER	IMAGE NUMBER	NOMINAL DATE	NOMINAL GMT	LOCATION 1 / 2	GMT 1	GMT 2	NUMBER RECORDS	NUMBER SCANS	PERCENT BAD	NUMBER PIXELS	DAY/NIGHT	CALIBRATION VIS	CALIBRATION IR	CHANNEL AVAILABILITY VIS	IR	3	4	5
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6	2	83244	0	-173/ 18	24915	15808	144	1709	0	65	0	1	1	1	1	1	1	1
7	3	83244	30000	160/ -6	43108	34006	142	1683	0	65	0	1	1	1	1	1	1	1
8	4	83244	30000	135/ -32	61302	52199	144	1703	0	65	0	1	1	1	1	1	1	1
9	5	83244	60000	109/ -57	75500	70397	134	1598	0	65	0	1	1	1	1	1	1	1
10	6	83244	90000	84/ -83	93698	84596	133	1587	0	65	0	1	1	1	1	1	1	1
11	7	83244	90000	58/-108	111897	102791	126	1514	0	65	0	1	1	1	1	1	1	1
12	8	83244	120000	33/-134	130096	120989	131	1568	0	65	0	1	1	1	1	1	1	1
13	9	83244	120000	-1/-159	-1	135187	60	733	0	65	0	1	1	1	1	1	1	1
14	10	83244	150000	-17/ 174	162488	153379	131	1558	0	65	0	1	1	1	1	1	1	1
15	11	83244	150000	-43/ 149	180681	171576	114	1362	0	65	0	1	1	1	1	1	1	1
16	12	83244	180000	-68/ 123	194876	185772	129	1543	0	65	0	1	1	1	1	1	1	1
17	13	83244	180000	-68/ 98	194878	203969	143	1708	0	65	0	1	1	1	1	1	1	1
18	14	83245	0	-145/ 47	5466	366	131	1565	0	65	0	1	1	1	1	1	1	1
19	15	83245	0	-170/ 21	23661	14557	135	1607	0	65	0	1	1	1	1	1	1	1
20	16	83245	30000	163/ -3	41857	32754	144	1707	0	65	0	1	1	1	1	1	1	1
21	17	83245	30000	138/ -29	60057	50952	142	1686	0	65	0	1	1	1	1	1	1	1
22	18	83245	60000	112/ -54	74251	65145	142	1683	0	65	0	1	1	1	1	1	1	1
23	19	83245	90000	87/ -80	92449	83343	134	1594	0	65	0	1	1	1	1	1	1	1
24	20	83245	90000	61/-105	110643	101541	125	1504	0	65	0	1	1	1	1	1	1	1
25	21	83245	120000	36/-131	124842	115741	134	1595	0	65	0	1	1	1	1	1	1	1
26	22	83245	120000	10/-156	143042	133940	133	1583	0	65	0	1	1	1	1	1	1	1
27	23	83245	150000	-14/ 177	161239	152137	133	1580	0	65	0	1	1	1	1	1	1	1
28	24	83245	150000	-40/ 152	175437	170335	132	1579	0	65	0	1	1	1	1	1	1	1
29	25	83245	180000	-65/ 126	193635	184535	112	1339	0	65	0	1	1	1	1	1	1	1
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31	27	83245	210000	-116/ 75	230032	220930	135	1616	0	65	0	1	1	1	1	1	1	1
32	28	83246	0	-142/ 50	4232	235128	132	1574	0	65	0	1	1	1	1	1	1	1
33	29	83246	0	-142/ 50	4232	235128	132	1574	0	65	0	1	1	1	1	1	1	1
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38	34	83246	60000	90/ -76	91222	82120	134	1595	0	65	0	1	1	1	1	1	1	1
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40	36	83246	120000	39/-127	123619	114517	132	1578	0	65	0	1	1	1	1	1	1	1
41	37	83246	120000	13/-153	141818	132716	134	1600	0	65	0	1	1	1	1	1	1	1
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43	39	83246	150000	-37/ 155	174216	165108	132	1575	0	65	0	1	1	1	1	1	1	1
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53	49	83247	90000	67/ -99	104176	95071	125	1507	0	65	0	1	1	1	1	1	1	1
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61	57	83247	210000	-135/ 66	1745	232643	134	1603	0	66	0	1	1	1	1	1	1	1

62	58	83248	0	-161/ 31	16394	10842	135	1612	0	65	0	1	1	1	1	1	1	1
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64	60	83248	30000	147/ -19	52341	43239	143	1700	0	65	0	1	1	1	1	1	1	1
65	61	83248	60000	122/ -45	70540	61436	144	1705	0	65	0	1	1	1	1	1	1	1
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69	65	83248	120000	0/-147	130395	130231	133	1589	0	65	0	1	1	1	1	1	1	1
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71	67	83248	150000	-30/ 161	171730	162626	131	1564	0	65	0	1	1	1	1	1	1	1
72	68	83248	180000	-56/ 136	185928	180826	112	1334	0	65	0	1	1	1	1	1	1	1
73	69	83248	180000	-56/ 110	185928	195023	134	1599	0	65	0	1	1	1	1	1	1	1
74	70	83248	210000	-81/ 85	204127	213222	143	1710	0	65	0	1	1	1	1	1	1	1
75	71	83248	210000	-132/ 59	524	231419	132	1583	0	65	0	1	1	1	1	1	1	1
76	72	83249	0	-158/ 34	14723	5619	135	1621	0	65	0	1	1	1	1	1	1	1
77	73	83249	0	176/ 8	32919	23817	144	1705	0	65	0	1	1	1	1	1	1	1
78	74	83249	30000	150/ -16	51118	42016	144	1709	0	65	0	1	1	1	1	1	1	1
79	75	83249	60000	125/ -42	65317	60210	145	1709	0	65	0	1	1	1	1	1	1	1
80	76	83249	60000	99/ -67	83515	74408	132	1580	0	65	0	1	1	1	1	1	1	1
81	77	83249	90000	74/ -93	101709	92601	143	1705	0	65	0	1	1	1	1	1	1	1
82	78	83249	90000	48/-118	115907	110000	116	1402	0	65	0	1	1	1	1	1	1	1
83	79	83249	120000	23/-144	134106	124997	131	1561	0	65	0	1	1	1	1	1	1	1
84	80	83249	120000	-2/-169	152299	143196	132	1573	0	65	0	1	1	1	1	1	1	1
85	81	83249	150000	-27/ 164	170497	161389	132	1577	0	65	0	1	1	1	1	1	1	1
86	82	83249	180000	-53/ 139	184690	175585	112	1344	0	65	0	1	1	1	1	1	1	1
87	83	83249	180000	-53/ 113	184692	193784	133	1589	0	65	0	1	1	1	1	1	1	1
88	84	83249	210000	-78/ 88	202890	211982	143	1710	0	65	0	1	1	1	1	1	1	1
89	85	83249	210000	-129/ 62	235284	230178	133	1590	0	65	0	1	1	1	1	1	1	1
90	86	83250	0	-155/ 37	13479	4374	135	1609	0	65	0	1	1	1	1	1	1	1
91	87	83250	0	179/ 11	31675	22567	143	1692	0	65	0	1	1	1	1	1	1	1
92	88	83250	30000	153/ -13	45870	40767	142	1680	0	65	0	1	1	1	1	1	1	1
93	89	83250	60000	128/ -39	64070	54961	145	1709	0	65	0	1	1	1	1	1	1	1
94	90	83250	60000	102/ -64	82263	73154	133	1583	0	65	0	1	1	1	1	1	1	1
95	91	83250	90000	77/ -89	100459	91354	143	1700	0	65	0	1	1	1	1	1	1	1
96	92	83250	90000	51/-115	114659	105552	116	1398	0	65	0	1	1	1	1	1	1	1
97	93	83250	120000	26/-140	132856	123748	132	1577	0	65	0	1	1	1	1	1	1	1
98	94	83250	120000	0/-166	151051	141943	132	1574	0	65	0	1	1	1	1	1	1	1
99	95	83250	150000	-24/ 168	165249	160141	133	1580	0	65	0	1	1	1	1	1	1	1
100	96	83250	180000	-50/ 142	183443	174340	113	1349	0	65	0	1	1	1	1	1	1	1
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102	98	83250	210000	-75/ 91	201641	210737	143	1710	0	65	0	1	1	1	1	1	1	1
103	99	83250	210000	-126/ 66	234038	224936	136	1626	0	65	0	1	1	1	1	1	1	1
104	100	83251	0	-152/ 40	12237	3133	133	1587	0	65	0	1	1	1	1	1	1	1
105	101	83251	0	-177/ 15	30435	21333	133	1572	0	65	0	1	1	1	1	1	1	1
106	102	83251	30000	156/ -10	44634	35530	144	1709	0	65	0	1	1	1	1	1	1	1
107	103	83251	60000	131/ -35	62832	53728	145	1709	0	65	0	1	1	1	1	1	1	1
108	104	83251	60000	105/ -61	81031	71927	134	1598	0	65	0	1	1	1	1	1	1	1
109	105	83251	90000	80/ -86	95229	90125	143	1711	0	65	0	1	1	1	1	1	1	1
110	106	83251	90000	54/-112	113427	104323	116	1404	0	65	0	1	1	1	1	1	1	1
111	107	83251	120000	29/-137	131626	122522	132	1579	0	65	0	1	1	1	1	1	1	1
112	108	83251	120000	3/-163	145825	140721	133	1577	0	65	0	1	1	1	1	1	1	1
113	109	83251	150000	-21/ 171	164023	154919	133	1581	0	65	0	1	1	1	1	1	1	1
114	110	83251	150000	-47/ 145	182221	173117	113	1345	0	65	0	1	1	1	1	1	1	1
115	111	83251	180000	-47/ 120	182222	191316	130	1557	0	65	0	1	1	1	1	1	1	1
116	112	83251	210000	-72/ 94	200419	205510	143	1709	0	65	0	1	1	1	1	1	1	1
117	113	83251	210000	-123/ 69	232816	223700	135	1612	0	65	0	1	1	1	1	1	1	1

TEMPORAL COVERAGE

DAY OF MONTH

GMT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
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3	2	2	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	1	1	2	2	1	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	2	2	1	1	1	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	2	2	2	2	3	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	2	2	2	2	2	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	2	2	2	2	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	1	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

```
OUTPUT FROM SAMPLE PROGRAM USING B3READ SUBROUTINE TO ACCESS B3-FORMATTED DATA

READ AND DECODE IMAGE NUMBER :     5
FOR SCAN LINE    200  PRINT DATA VALUES AND ANGLE VALUES FOR ALL PIXELS

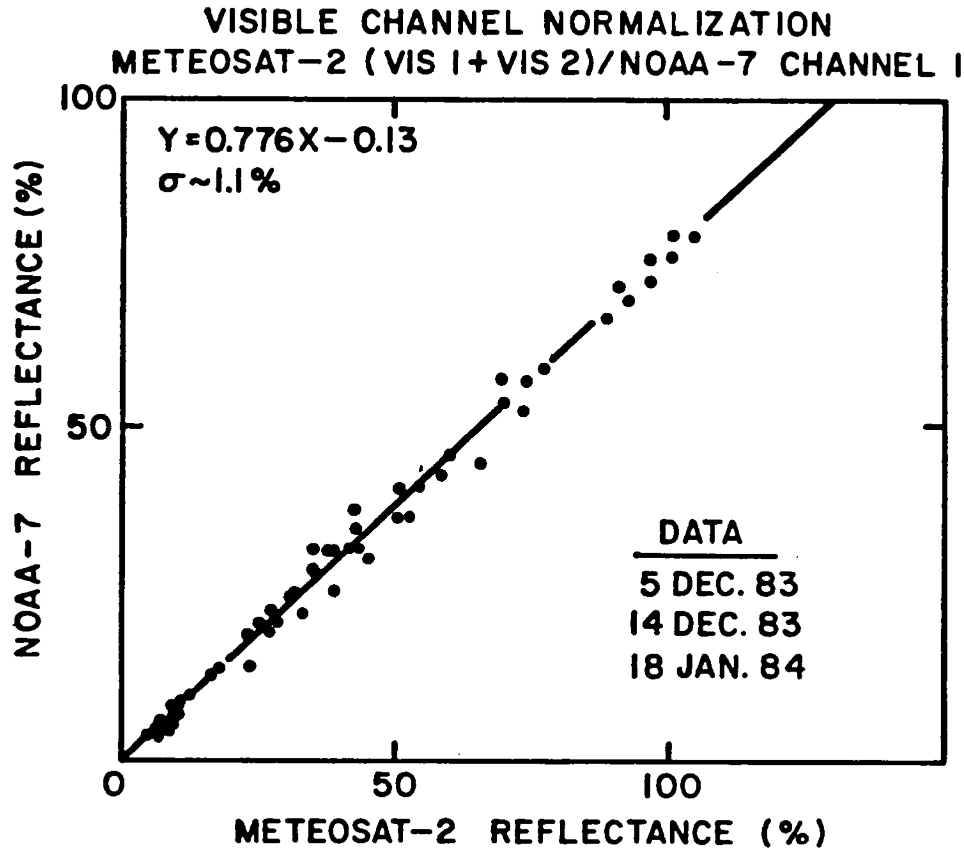

IMAGE DESCRIPTION
=================

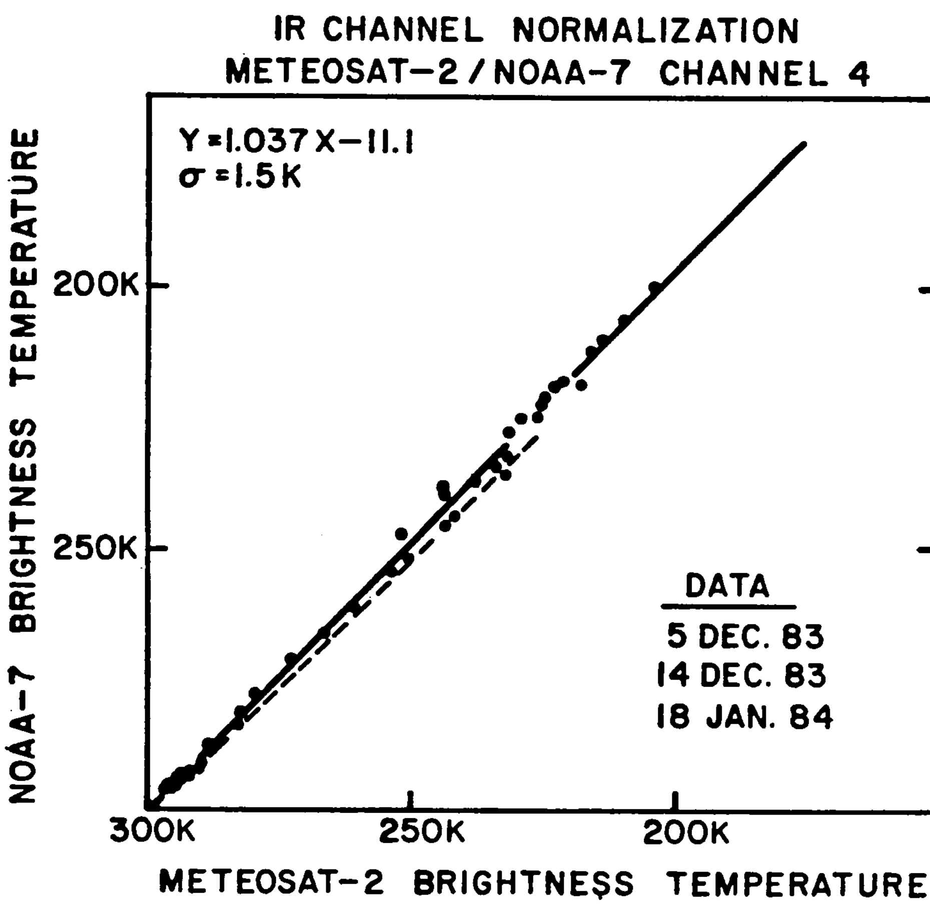
IMAGE SEQUENCE NUMBER :      5
SPC ID NOA      CODE     1    SATELLITE ID NOAA-7   CODE   11
JULIAN DAY (DDD): 244   YEAR (YYYY): 1983  MONTH :  9  DAY :  1
NOMINAL GMT (HHMMSS) :  60000  HOUR :  6 MINS :   0
NUMBER OF DATA RECORDS :   134
NUMBER OF SCAN LINES :  1598
PERCENTAGE BAD SCAN LINES :      0
GMT (HHMMSS) OF BEGINNING SCAN LINE :    63949  ENDING :   82617
DATE (YYDDD) OF BEGINNING SCAN LINE :   83244  ENDING :   83244
NUMBER OF PIXELS / SCAN LINE :      65
NUMBER OF ACTIVE CHANNELS :      5
CHANNEL  1     VIS      (   .58  -    .68  )  MICRONS             CODE :      1
CHANNEL  2     IR       ( 10.50  -  11.30  )  MICRONS             CODE :      2
CHANNEL  3     .725     (   .725 -   1.10  )  MICRONS             CODE :      3
CHANNEL  4     3.55     (  3.55  -   3.93  )  MICRONS             CODE :      4
CHANNEL  5     11.5     ( 11.50  -  12.50  )  MICRONS             CODE :      5
CALIBRATION FLAGS (VIS IR):     1    1
DAY OR NIGHT  FLAG      0
ASCENDING EQUATOR CROSSING LONGITUDE OR SUBSATELLITE POINT LONGITUDE      109  GMT    75500
DESCENDING EQUATOR CROSSING LONGITUDE OR SUBSATELLITE POINT LATITUDE      -57  GMT    70397
```

LOCATION GRID

LATITUDE

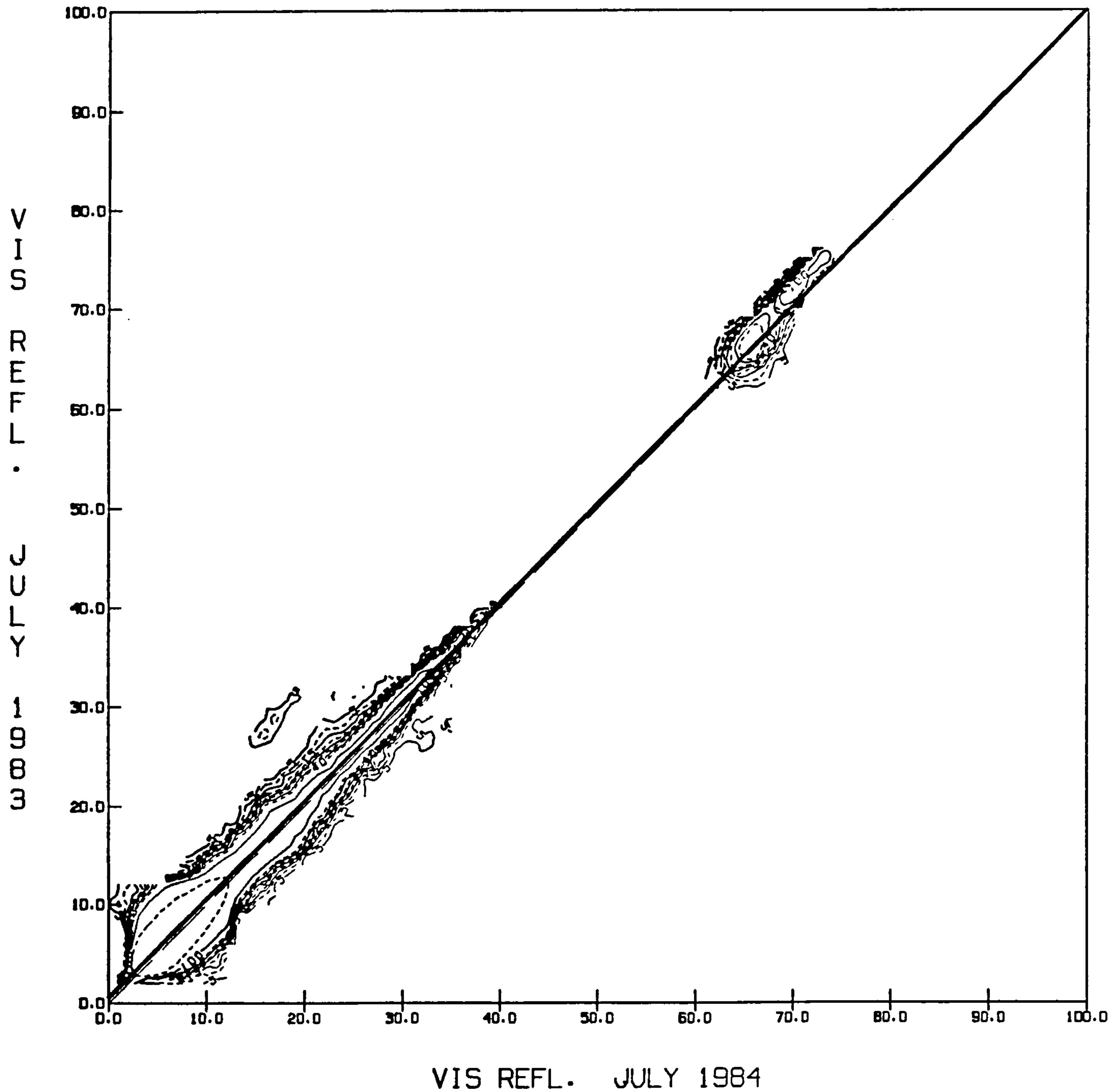
LONG	-85	-75	-65	-55	-45	-35	-25	-15	-5	5	15	25	35	45	55	65	75	85
5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	121	639	221
15	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	578	159
25	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	367	140
35	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	306	139
45	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92	355	134
55	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	203	406	127
65	8	0	0	0	0	0	0	0	0	0	0	0	0	0	61	306	458	118
75	9	0	0	0	0	0	0	0	0	0	0	0	0	48	367	611	461	102
85	15	0	0	0	0	0	0	0	0	0	0	20	217	554	806	774	391	88
95	43	1	0	0	0	0	0	0	71	219	466	811	1097	1206	1010	619	281	79
105	44	113	117	150	219	352	555	861	1186	1467	1595	1510	1224	869	567	353	195	64
115	66	194	356	608	936	1288	1529	1553	1366	1074	743	472	296	186	126	86	97	46
125	80	292	639	1020	1160	1011	725	397	173	38	0	0	0	0	0	0	0	44
135	90	398	766	761	515	185	10	0	0	0	0	0	0	0	0	0	0	14
145	105	459	591	350	41	0	0	0	0	0	0	0	0	0	0	0	0	9
155	119	453	371	60	0	0	0	0	0	0	0	0	0	0	0	0	0	8
165	126	397	201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
175	135	347	97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
185	138	304	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
195	144	278	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
205	139	277	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
215	139	279	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
225	138	299	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
235	136	335	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
245	132	392	170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
255	117	441	336	30	0	0	0	0	0	0	0	0	0	0	0	0	0	24
265	110	466	546	271	12	0	0	0	0	0	0	0	0	0	0	0	15	44
275	92	417	749	674	383	79	0	0	0	0	0	0	0	0	0	0	154	75
285	81	314	693	1037	1063	834	489	213	45	0	0	0	0	0	0	0	193	72
295	66	214	412	705	1079	1398	1524	1402	1127	775	480	279	158	92	44	64	392	124
305	52	123	162	217	325	613	791	1126	1437	1637	1623	1401	1060	725	488	423	600	141
315	45	8	0	0	0	0	0	49	173	374	605	1040	1274	1258	965	790	729	176
325	18	0	0	0	0	0	0	0	0	0	0	74	332	686	895	1030	819	191
335	10	0	0	0	0	0	0	0	0	0	0	0	0	92	441	803	842	215
345	8	0	0	0	0	0	0	0	0	0	0	0	0	0	92	495	808	230
355	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	262	706	235


VISIBLE CHANNEL NORMALIZATION
METEOSAT-2 (VIS 1 + VIS 2)/NOAA-7 CHANNEL 1
Y=0.776X-0.13
σ~1.1%
NOAA-7 REFLECTANCE (%)
100
50
0
50
100
DATA
5 DEC. 83
14 DEC. 83
18 JAN. 84
METEOSAT-2 REFLECTANCE (%)


IR CHANNEL NORMALIZATION
METEOSAT-2/NOAA-7 CHANNEL 4
Y=1.037X-11.1
σ=1.5K
NOAA-7 BRIGHTNESS TEMPERATURE
200K
250K
300K
250K
200K
DATA
5 DEC. 83
14 DEC. 83
18 JAN. 84
METEOSAT-2 BRIGHTNESS TEMPERATURE

NOA8307 VS NOA8407

MEAN X:	8.7	R:	0.99
MEAN Y:	9.2	SLOPE:	1.00
DIFF(X-Y):	0.5	Y INT:	0.5
SDEV X:	9.4	RMSE:	1.6
SDEV Y:	9.5	TOT PIX:	182314



CORRELATIVE DATA

CONTENTS AND FORMAT

ATMOSPHERIC

DAILY OZONE COLUMN ABUNDANCE	(2.5°)	(TOVS)
6 HR HUMIDITY PROFILE	(2.5°)	(TOVS)
6 HR TEMPERATURE PROFILE	(2.5°)	(TOVS)

SURFACE

SST SHIP OBSERVATIONS	(2.5°)	(NMC)
3 HR SURFACE TEMPERATURE REPORTS	(1.25°)	(NMC)
3 HR SURFACE OBS (HUMIDITY, CLOUDS)	(1.25°)	(NMC)
WEEKLY SNOW COVER	(1.25°)	(NOAA)
WEEKLY SEA ICE COVER	(2.5°)	(NAVY)

FORMAT

MODEST EXTRAPOLATION BUT FLAGGED

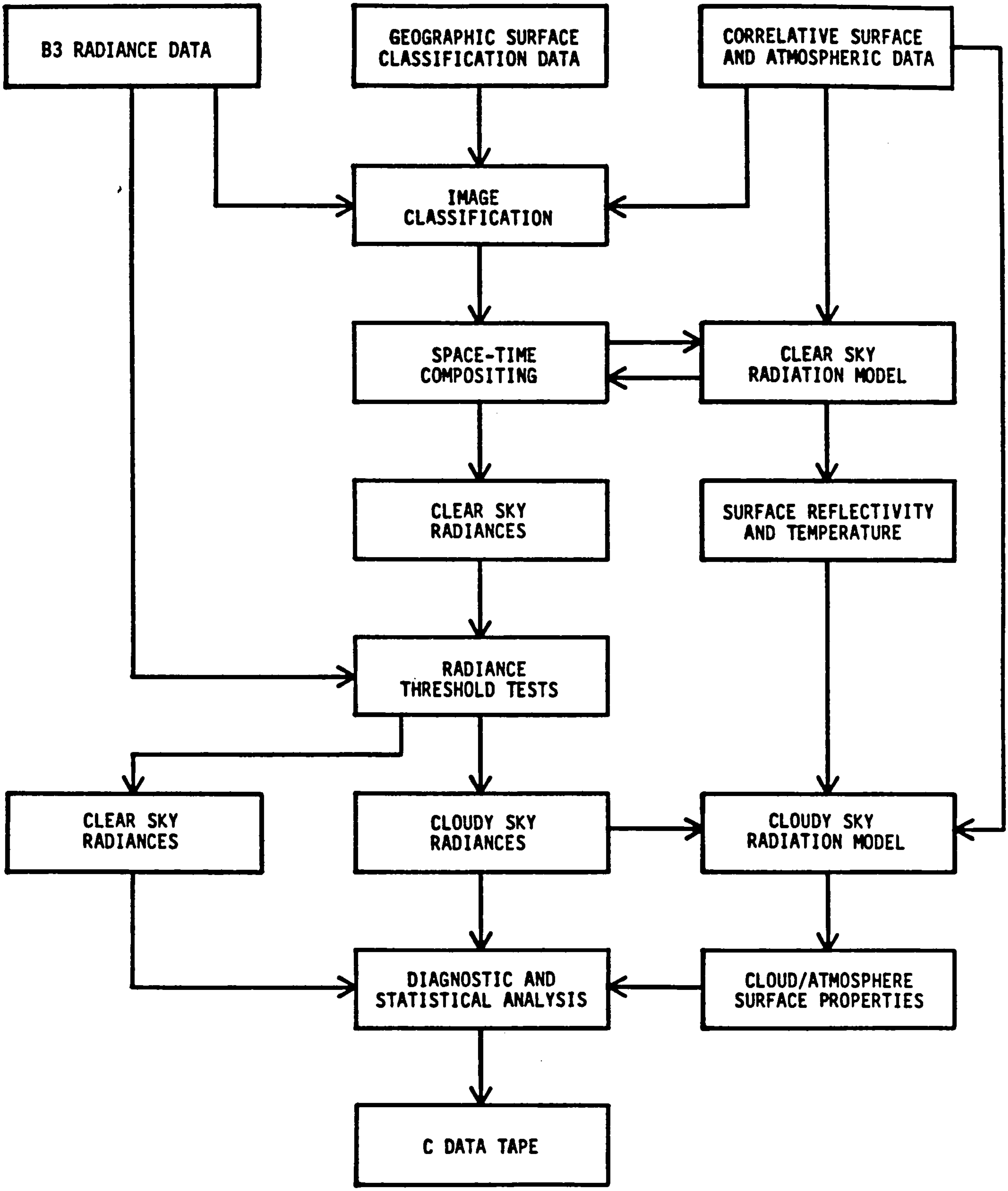
COMPATABLE MAP GRIDS

SOFTWARE FOR REMAPPING

WEEKLY SINGLE VARIABLE FILES

ADDITIONAL GEOPHYSICAL MAPS (LAND/WATER, TOPOGRAPHY, VEGETATION)

ISCCP CLOUD ALGORITHM



PROPOSED CLIMATOLOGY
TAPE CONTENTS

RESOLUTION : 3 HR, 250 KM ALSO MONTHLY, 250 KM

CLOUD TYPES : TOTAL, LOW, MIDDLE, HIGH, CIRRUS, DEEP CONVECTIVE

CLOUD PROPERTIES : AMOUNT,
OPTICAL THICKNESS,
TOP TEMPERATURE AND PRESSURE
ANALYSIS FLAGS

RADIANCE PROPERTIES : TOTAL RADIANCES,
CLEAR SKY RADIANCES

ATMOSPHERIC PROPERTIES : TEMPERATURE AND HUMIDITY PROFILES
OZONE COLUMN ABUNDANCE

SURFACE PROPERTIES : TEMPERATURE
VISIBLE REFLECTANCE
SNOW/ICE

STATISTICS : MEAN (UNCORRELATED)
VARIANCE
CLUSTERS (CORRELATED)

ISCCP PILOT STUDIES

- CLOUD ALGORITHM INTERCOMPARISON AND DATA COMPRESSION STUDY
- RADIANCE DATA FORMAT DESIGN TESTS
- ALGORITHM SENSITIVITY AND ERROR TESTS
- POLAR REGION CLOUD ALGORITHM STUDY
- CLOUD CLIMATOLOGY AND CLIMATE MODEL COMPARISON STUDY

THE FIRE PROJECT

Mr. David McDougal
Mail Stop 483
NASA Langley Research Center
Hampton, Virginia 23665

The First ISCCP Regional Experiment (FIRE) Project is a program to validate the cloud parameters derived by the ISCCP. The 4- to 5-year program will concentrate on clouds in the continential United States, particularly cirrus and marine stratocumulus clouds.

As part of the validation process, FIRE will acquire satellite, aircraft, balloon, and surface data. These data (except for the satellite data) will be amalgamated into one common data set. Plans are to generate a standardized format structure for use in the PCDS. Data collection will begin in April 1986, but will not be available to the general scientific community until 1987 or 1988.

Additional pertinent data sets already reside in the PCDS. Other qualifications of the PCDS for use in this validation program were enumerated.

PCDS

- Generalized Information/Management System
  - Interactive
  - Easy to Use
  - On Line
  - Remote Access
- Other FIRE-Related Data Sets
- Affordable
- "Working" Archive Limited to FIRE Researchers
- Direct Transfer to "Permanent" Archive
- Standardized Data Format Structure

NIMBUS CLOUD PRODUCTS

Dr. Paul Hwang
Code 636
Goddard Space Flight Center
Greenbelt, Maryland 20771

The value of PCDS in data validation studies is explained through an examination of the Nimbus-7 Cloud Product. The Cloud Product was produced (outside of the PCDS) by merging IR cloud data from the Nimbus-7 Temperature Humidity Infrared Radiometer (THIR) and UV cloud data from the Nimbus-7 Total Ozone Mapping Spectrometer (TOMS) together to obtain daily and monthly global, zonal, and hemispheric values for low, middle, high, and cirrus cloud amounts (NCLE tapes). Further processing resulted in the production of C-Matrix tapes, a product that includes 117 parameters. Six years of global cloud data were processed, resulting in the final Nimbus-7 Cloud Product.

The PCDS was used to display zonal-mean cloud amounts of various cloud types for local noon and local midnight from the C-Matrix tape. It was also demonstrated that zonal-mean time cross-sections in the form of contour plots generated by the PCDS are a useful tool to review the climatological data set.

NIMBUS-7 CLOUD DATA PRODUCTION
USING PCDS FOR ANALYSIS AND VALIDATION

- ANALYSIS OF NIMBUS-7 CLOUD DATA PRODUCTS
- CMATRIX ON PCDS
  - CMATRIX TAPE
  - ZONAL MEAN
  - ZONAL MEAN VS TIME
- CONCLUTION

1/21/86 P. HWANG GSFC/CODE 636

ANALYSIS OF GLOBAL CLOUD DATA DERIVED FROM NIMBUS-7 THIR/TOMS DATA

- OBJECTIVE: EVALUATE VALIDITY OF NIMBUS-7 CLOUD FROM CLIMATOLOGICAL POINT OF VIEW
- NIMBUS-7 CLOUD ALGORITHM: IR/UV THRESHOLD METHOD
- NIMBUS-7 CLOUD PRODUCT:
  - DAILY & MONTHLY CLOUD PARAMETERS:
  - LOW, MID, HIGH, CIRRUS CLOUD AMOUNTS & MEAN RADIANCES
  - ZONAL, HEMISPHERIC AND GLOBAL AVERAGES
- GLOBAL CLOUD DISTRIBUTION
- ZONAL MEAN

7/29/85

P. HWANG

NASA/GSF

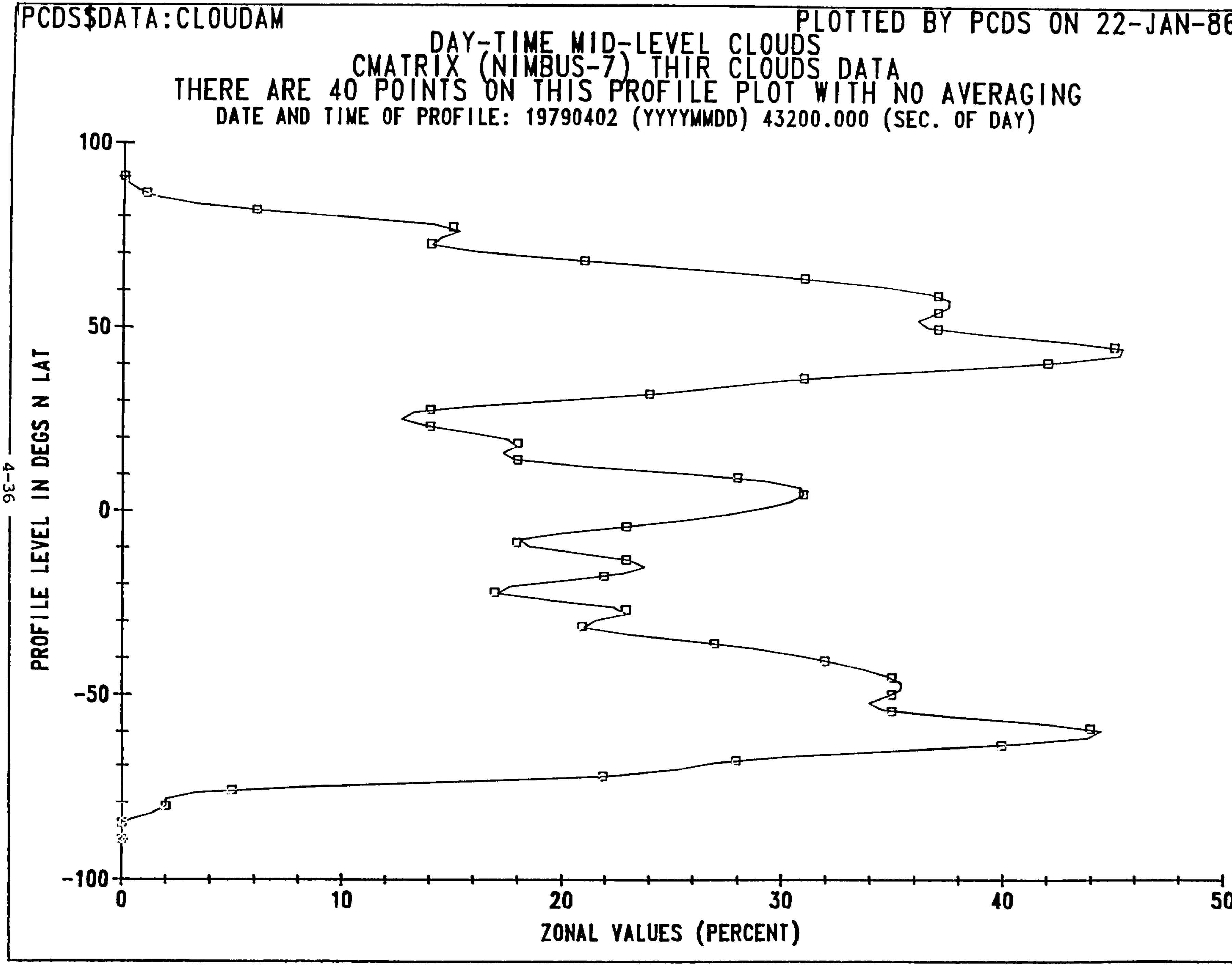
GSFC

CMATRIX TAPES

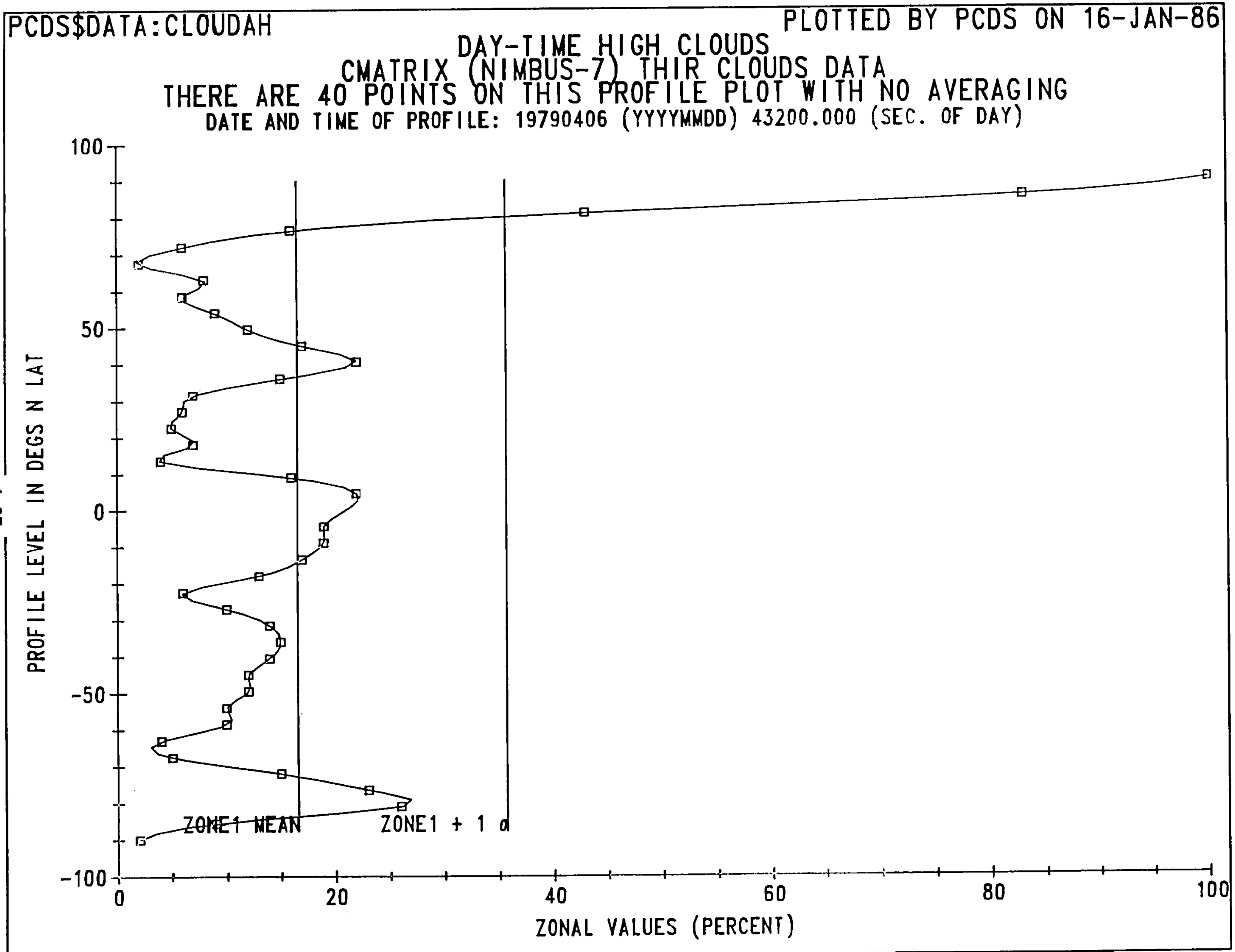
PARAMETERS

- CLOUD AMOUNT (TOTAL, LOW, MID, HIGH, CIRRUS)
- 11.5 MICRON RADIANCE (TOTAL, LOW, MID, HIGH, CLEAR)
- SURFACE TEMPERATURE
- TOMS (UV) REFLECTIVITY
- MEAN & RMS
- ASCENDING & DESCENDING
- DAILY & MONTHLY
- 117 PARAMETERS TOTAL

1/24/86 P. HWANG GSFC/CODE 636

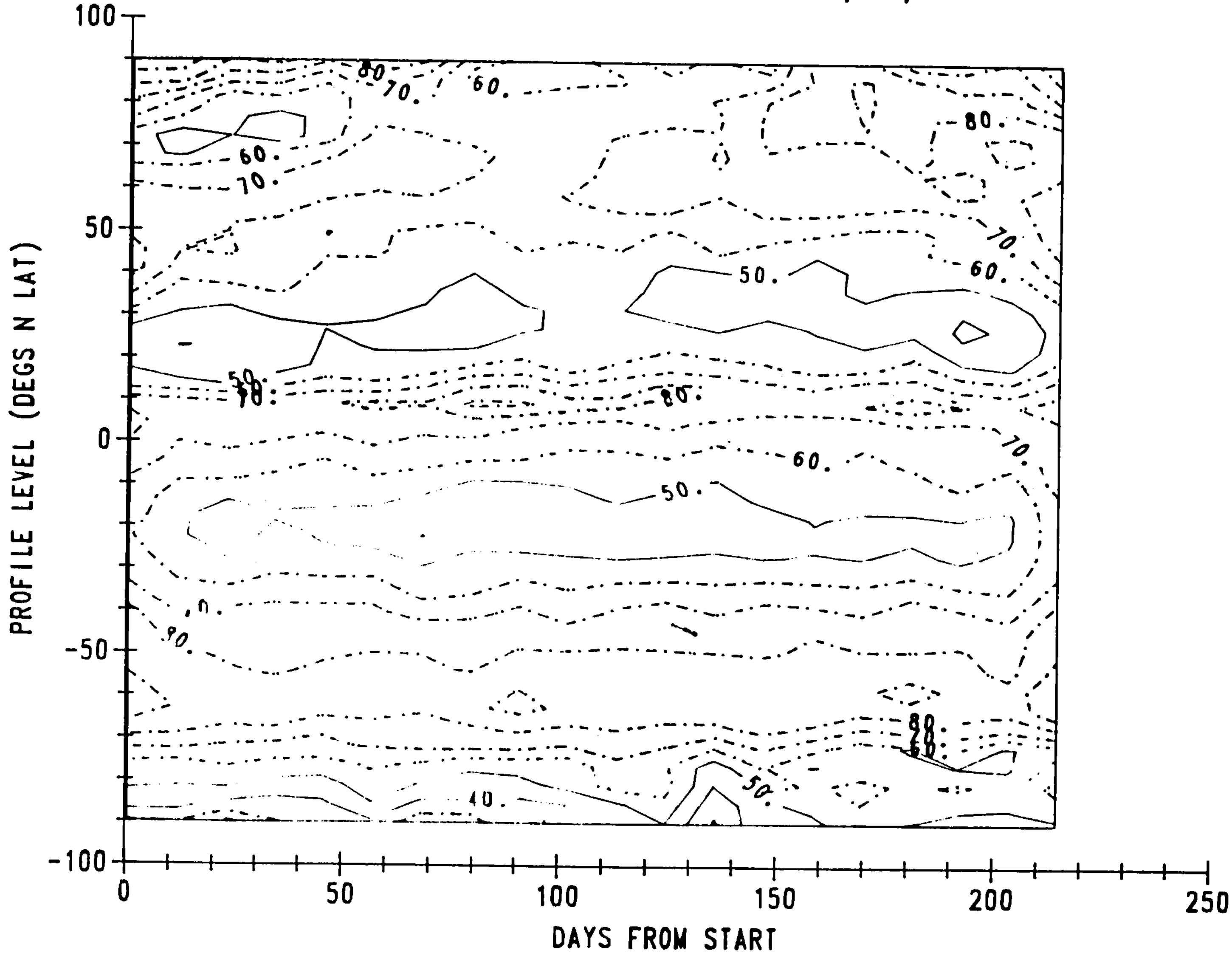


PCDS$DATA:CLOUDAM
PLOTTED BY PCDS ON 22-JAN-86
DAY-TIME MID-LEVEL CLOUDS
CMATRIX (NIMBUS-7) THIR CLOUDS DATA
THERE ARE 40 POINTS ON THIS PROFILE PLOT WITH NO AVERAGING
DATE AND TIME OF PROFILE: 19790402 (YYYYMMDD) 43200.000 (SEC. OF DAY)
PROFILE LEVEL IN DEGS N LAT
100
50
0
-50
-100
0
10
20
30
40
50
ZONAL VALUES (PERCENT)


PCDS$DATA:CLOUDAH
PLOTTED BY PCDS ON 16-JAN-86
DAY-TIME HIGH CLOUDS
CMATRIX (NIMBUS-7) THIR CLOUDS DATA
THERE ARE 40 POINTS ON THIS PROFILE PLOT WITH NO AVERAGING
DATE AND TIME OF PROFILE: 19790406 (YYYYMMDD) 43200.000 (SEC. OF DAY)
PROFILE LEVEL IN DEGS N LAT
ZONAL VALUES (PERCENT)
ZONE1 MEAN
ZONE1 + 1 σ
100
50
0
-50
-100
0
20
40
60
80
100

DRC0:[PCDS3.DEMO]CLOUDT PLOTTED BY PCDS ON 23-JAN-86

TOTAL CLOUDINESS - ASCENDING
CMATRIX (NIMBUS-7) THIR CLOUDS DATA
THERE ARE 8400 DATA VALUES USED OUT OF 302400 POSSIBLE VALUES
1979/04/01 12:00:00 < DATE TIME < 1979/11/01 12:00:00

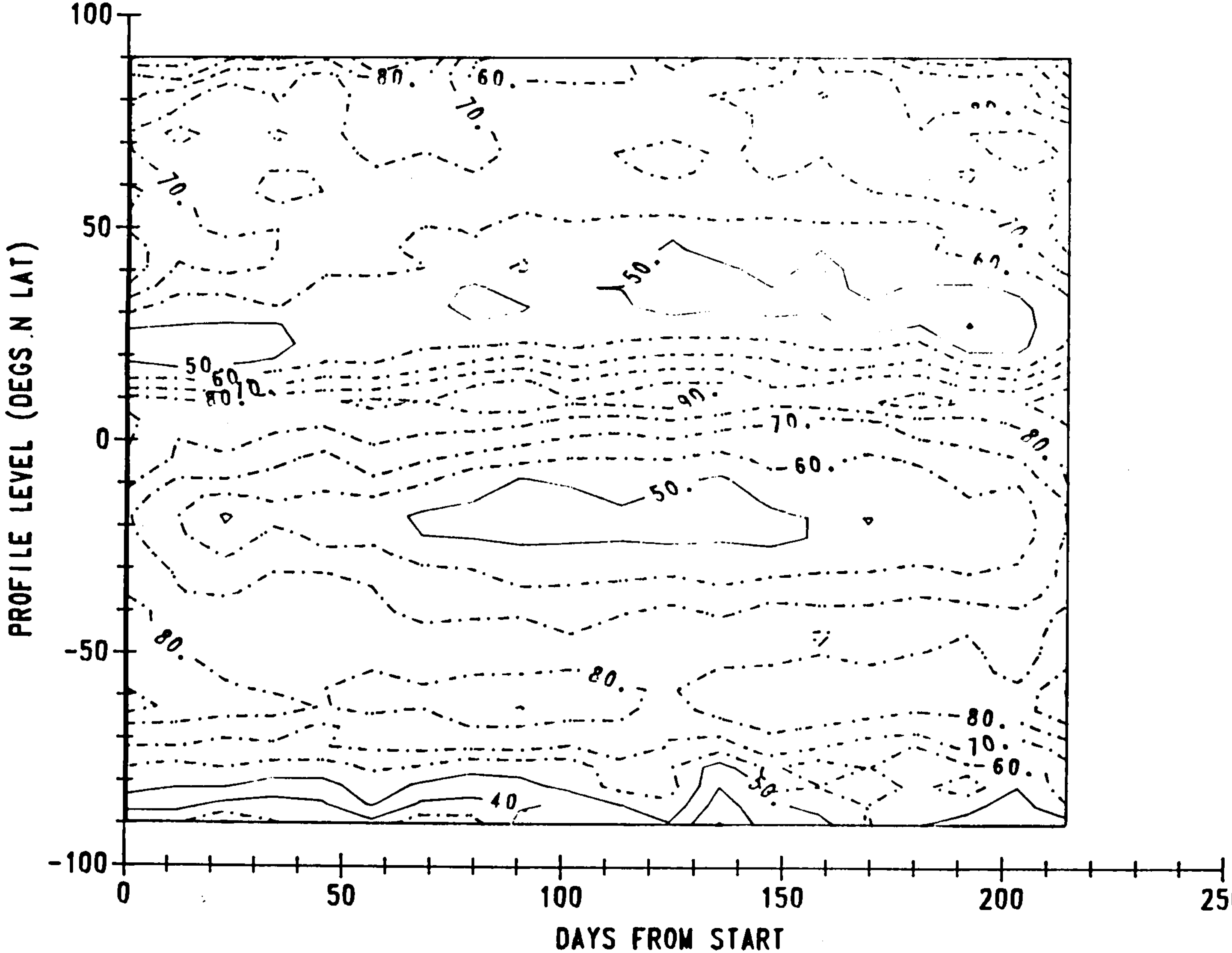


CONTOUR PLOT OF ZONAL VALUES (PERCENT)

1.0 < PARAMETER (DIGIT) < 1.0

DRC0:[PCDS3.DEMO]CLOUDT PLOTTED BY PCDS ON 24-JAN-86

TOTAL CLOUDINESS - DESCENDING
CMATRIX (NIMBUS-7) THIR CLOUDS DATA
THERE ARE 8400 DATA VALUES USED OUT OF 302400 POSSIBLE VALUES
1979/04/01 12:00:00 < DATE TIME < 1979/11/01 12:00:00



CONTOUR PLOT OF ZONAL VALUES (PERCENT)

55.0 < PARAMETER (DIGIT) < 55.0

SUMMARY AND CONCLUSION

- USEFUL FOR CMATRIX DATA ANALYSIS
- WOULD LIKE TO USE SYSTEM FOR SMMR DATA SET ANALYSIS

USING PCDS TO STUDY THE INFLUENCE OF UV FLUX VARIATION ON THE MIDDLE ATMOSPHERE

Mr. Warren Heilman
Meteorology Department
304 Curtiss Hall
Iowa State University
Ames, Iowa 50011

The value of the PCDS in examining the influences of short-period solar flux variations on the middle atmosphere was demonstrated. Several Nimbus satellite data sets proposed for the study exist in the PCDS. Planned for retrieval through the PCDS are ozone mixing ratios and cumulative ozone profiles available from the Backscatter Ultraviolet Spectrophotometer (BUV) on Nimbus-4. Also to be accessed are Nimbus-7 data sets that will provide ozone and nitrogen dioxide mixing ratios, temperature profiles from the Limb Infrared Monitor of the Stratosphere (LIMS), and ozone mixing ratio profiles from the Solar Backscatter Ultraviolet Spectrophotometer (SBUV).

Bypassing the time-consuming process of reading raw data tapes, the researchers plan to transfer the PCDS processed data to an IBM PC at Iowa State University. The IBM PC will serve as an intermediate vehicle for transferring the data to the NOAA CYBER 840 at Boulder, Colorado, where research will continue on both an eight-layer radiative-photochemical numerical model and on a nonlinear dynamical model, with the hope of understanding how motions take place in the stratosphere. All the graphics will be done at Boulder, where NCAR graphics packages are available for plotting.

Also being contemplated for possible utilization in this research are the FGGE and ERB data sets. These relevant data sets also reside in the PCDS. Problems associated with remote access to the PCDS were discussed in regard to all the PCDS data sets.

USING PCDS TO STUDY THE INFLUENCES OF UV FLUX VARIATIONS ON THE MIDDLE ATMOSPHERE

I. RESEARCH WORK - THE INFLUENCE OF ULTRAVIOLET FLUX VARIATIONS ON THE MIDDLE ATMOSPHERE

II. OBJECTIVES

A. TO USE NIMBUS 4 AND NIMBUS 7 DATA WITH A RADIATIVE-PHOTOCHEMICAL NUMERICAL MODEL TO UNDERSTAND HOW OZONE AND TEMPERATURE FIELDS IN THE STRATOSPHERE RESPOND TO ACTUAL SHORT-PERIOD (13-27 DAYS) VARIATIONS IN THE SOLAR FLUX.

B. TO COUPLE THE OZONE AND TEMPERATURE VARIATIONS, DUE IN PART TO SOLAR FORCING, TO THE STRATOSPHERIC DYNAMICS IN A NONLINEAR MODEL TO GAIN SOME UNDERSTANDING AS TO HOW RADIATION, PHOTOCHEMISTRY, AND DYNAMICS INTERACT IN THE STRATOSPHERE.

III. RATIONALE FOR THE RESEARCH

* MOST STUDIES TO DATE HAVE BEEN STATISTICAL.
* AMPLITUDE AND PHASE OF OZONE AND TEMPERATURE VARIATIONS DEPEND UPON PERIOD OF SOLAR FORCING.
* STATISTICAL STUDIES MAY NOT SHOW A RELATIONSHIP BETWEEN OZONE AND SOLAR FORCING EXCEPT IN VERY SPECIAL CASES.
* COUPLING OF DYNAMICS, RADIATION, AND PHOTOCHEMISTRY IN PROPOSED MODEL SHOULD GIVE SOME INSIGHT INTO THE EFFECTS OF TIME DEPENDENT SOLAR/THERMAL FORCING AND NONLINEARITY.

IV. PHOTOCHEMICAL REACTIONS

$O_2 + H\nu \rightarrow O + O$	J_2
$O + O_2 + M \rightarrow O_3 + M$	K_{12}
$O_3 + O \rightarrow 2O_2$	K_{13}
$O_3 + H\nu \rightarrow O_2 + O$	J_3
$H + O_3 \rightarrow OH + O_2$	α_{10}
$OH + O_3 \rightarrow HO_2 + O_2$	α_{11}
$HO_2 + O_3 \rightarrow OH + 2O_2$	α_{12}
$OH + O \rightarrow H + O_2$	α_{13}
$HO_2 + O \rightarrow OH + O_2$	α_{14}
$OH + OH \rightarrow H_2O + O$	α_{16}
$NO + O_3 \rightarrow NO_2 + O_2$	β_{27}
$NO_2 + O \rightarrow NO + O_2$	β_{28}
$NO_2 + H\nu \rightarrow NO + O$	J_{29}
$CL + O_3 \rightarrow CLO + O_2$	γ_{56}
$CLO + O \rightarrow CL + O_2$	γ_{57}

J'S ARE PHOTODISSOCIATION RATES.

α'S, β'S, AND γ'S ARE TEMPERATURE DEPENDENT REACTION RATES.

V. RADIATIVE-PHOTOCHEMICAL MODEL

A. OZONE PROGNOSTIC EQUATION WHICH INCLUDES NITROGEN, HYDROGEN, AND CHLORINE PHOTOCHEMISTRY

1. TIME AND WAVELENGTH-DEPENDENT SOLAR FORCING
2. TEMPERATURE DEPENDENT REACTION RATES
3. ADVECTION IGNORED

B. TEMPERATURE PROGNOSTIC EQUATION

1. HEATING RATE DEPENDENT ON SOLAR FLUX AND OZONE AMOUNT
2. NEWTONIAN COOLING
3. ADVECTION IGNORED

$$\frac{d\phi}{dt} = \frac{-2J_3K_{13}}{K_{12}\eta_{O_2}}\phi^2 - (\alpha_{13}\eta_{OH} + \alpha_{14}\eta_{HO_2} + \beta_{28}\eta_{NO_2} + \gamma_{57}\eta_{ClO})\frac{J_3}{K_{12}\eta_{O_2}\eta_m}\phi$$

$$-(\alpha_{10}\eta_H + \alpha_{11}\eta_{OH} + \alpha_{12}\eta_{HO_2} + \beta_{27}\eta_{NO} + \gamma_{56}\eta_{Cl})\phi + 2J_2\frac{\eta_{O_2}}{\eta_m}$$

$$+ J_{29}\eta_{NO_2} + \alpha_{16}\eta_{OH}^2$$

$$\frac{dT}{dt} = \eta\phi - aT + b$$

VI. DYNAMICAL MODEL

A. OZONE PROGNOSTIC EQUATION WHICH INCLUDES NITROGEN, HYDROGEN, AND CHLORINE PHOTOCHEMISTRY

1. TIME AND WAVELENGTH-DEPENDENT SOLAR FORCING
2. TEMPERATURE-DEPENDENT REACTION RATES
3. ADVECTION INCLUDED

B. TEMPERATURE PROGNOSTIC EQUATION

1. HEATING RATE DEPENDENT ON SOLAR FLUX AND OZONE AMOUNT
2. NEWTONIAN COOLING
3. ADVECTION INCLUDED

C. QUASI-GEOSTROPHIC POTENTIAL VORTICITY EQUATION

1. MOTION FIELD IS COUPLED TO TIME-DEPENDENT SOLAR FORCING THROUGH DIABATIC HEATING TERM

$$\left[\frac{\partial}{\partial t}+\frac{\partial\psi}{\partial x}\frac{\partial}{\partial y}-\frac{\partial\psi}{\partial y}\frac{\partial}{\partial x}\right]\left[\nabla^2\psi+\beta y+\frac{f_o^{\,2}}{\rho_s(z)}\frac{\partial}{\partial z}\left(\frac{\rho_s(z)}{N^2}\frac{\partial\psi}{\partial z}\right)\right]$$

$$= \frac{Rf_o}{c_p h\rho_s(z)}\frac{\partial}{\partial z}\underbrace{\left[\frac{\rho_s(z)}{N^2}\,(H_f+H_d)\right]}_{\text{DIABATIC HEATING TERM}}$$

$H_f \alpha \eta\phi$

$H_d \alpha - aT + b$

VII. PROPOSED PCDS USAGE

A. OZONE MIXING RATIO AND CUMULATIVE OZONE PROFILES FROM BACKSCATTER ULTRAVIOLET SPECTROPHOTOMETER (BUV) ON NIMBUS 4

1. DATA AVAILABLE FROM 1970-1977
2. 80°N-80°S SPATIAL COVERAGE
3. TAPE - DAILY ZONAL MEANS OF PROFILE OZONE (DZP)
4. PROFILE DATA FROM 13 PRESSURE LEVELS (0.7, 1.0, 1.5, 2.0, 3.0, 4.0, 5.0, 7.0, 10, 15, 20, 30, AND 40 MB)
5. SHOULD GET AN IDEA OF THE IMPACT AND INTERACTION OF SHORT-TERM UV FLUX VARIATIONS ON OZONE AND TEMPERATURE

B. OZONE MIXING RATIO AND TEMPERATURE PROFILES FROM LIMB INFRARED MONITOR OF THE STRATOSPHERE (LIMS) ON NIMBUS 7

1. DATA AVAILABLE FROM OCTOBER 25, 1978 - MAY 29, 1979
2. 84°N-64°S SPATIAL COVERAGE
3. TAPE - MAP ARCHIVAL TAPES (LAMAT)
   * CONTAIN DAILY WORLD MAP GRIDS OF HARMONIC COEFFICIENTS FOR OZONE, NITRIC ACID, WATER VAPOR, NITROGEN DIOXIDE, AND TEMPERATURE AT STANDARD PRESSURE LEVELS AVERAGED INTO 38 FOUR DEGREE LATITUDE BANDS.
4. DATA IS GIVEN FOR BOTH THE ASCENDING AND DESCENDING PART OF THE NIMBUS 7 SATELLITE ORBIT.
5. HAS BETTER VERTICAL RESOLUTION THAN BUV AND ENABLES US TO LOOK FOR EFFECTS AS LOW AS 100 MB.

C. OZONE MIXING RATIO PROFILES FROM SOLAR BACKSCATTER ULTRAVIOLET SPECTROPHOTOMETER (SBUV) ON NIMBUS 7

1. DATA AVAILABLE FROM NOVEMBER 1978 - 1982
2. 80°N-80°S SPATIAL COVERAGE
3. TAPE - OZONE FROM SBUV (OZONE-S)
   * CONTAIN TOTAL OZONE, REFLECTIVITY, MIXING RATIOS, AND LAYER OZONE AMOUNTS, SCAN BY SCAN AND ORBIT BY ORBIT.
4. MIXING RATIOS GIVEN AT 16 PRESSURE LEVELS (0.3-40 MB)
5. POWER ON 3 DAYS OF 4

D. DATA USAGE

1. INITIAL CONDITIONS FOR RADIATIVE-PHOTOCHEMICAL MODEL AND DYNAMICAL MODEL
   * OZONE MIXING RATIO PROFILES
   * NITROGEN DIOXIDE MIXING RATIO PROFILES
   * TEMPERATURE PROFILES
   * CUMULATIVE OZONE PROFILES
   * GEOPOTENTIAL HEIGHTS FROM <u>FGGE</u>?
2. TEMPORAL VARIATION OF SOLAR FLUX IN DISCRETE WAVELENGTH BANDS FOR MODEL FORCINGS FROM <u>ERB</u> INSTRUMENT ON NIMBUS 7?
3. COMPARISON WITH MODEL RESULTS
4. DATA WILL BE TRANSFERRED FROM PCDS TO IBM-PC TO NOAA CYBER 840 AT BOULDER, CO, WHERE THE MODELS ARE/WILL BE RUN.

VIII. REMOTE USER PROBLEMS

A. COMMUNICATION WITH PCDS WITHOUT NETWORK ACCESS OR TOLL-FREE NUMBER IS PROHIBITIVELY EXPENSIVE.

B. ACCESSING DATA AT NIGHT

C. AVAILABILITY OF TAPE DRIVES

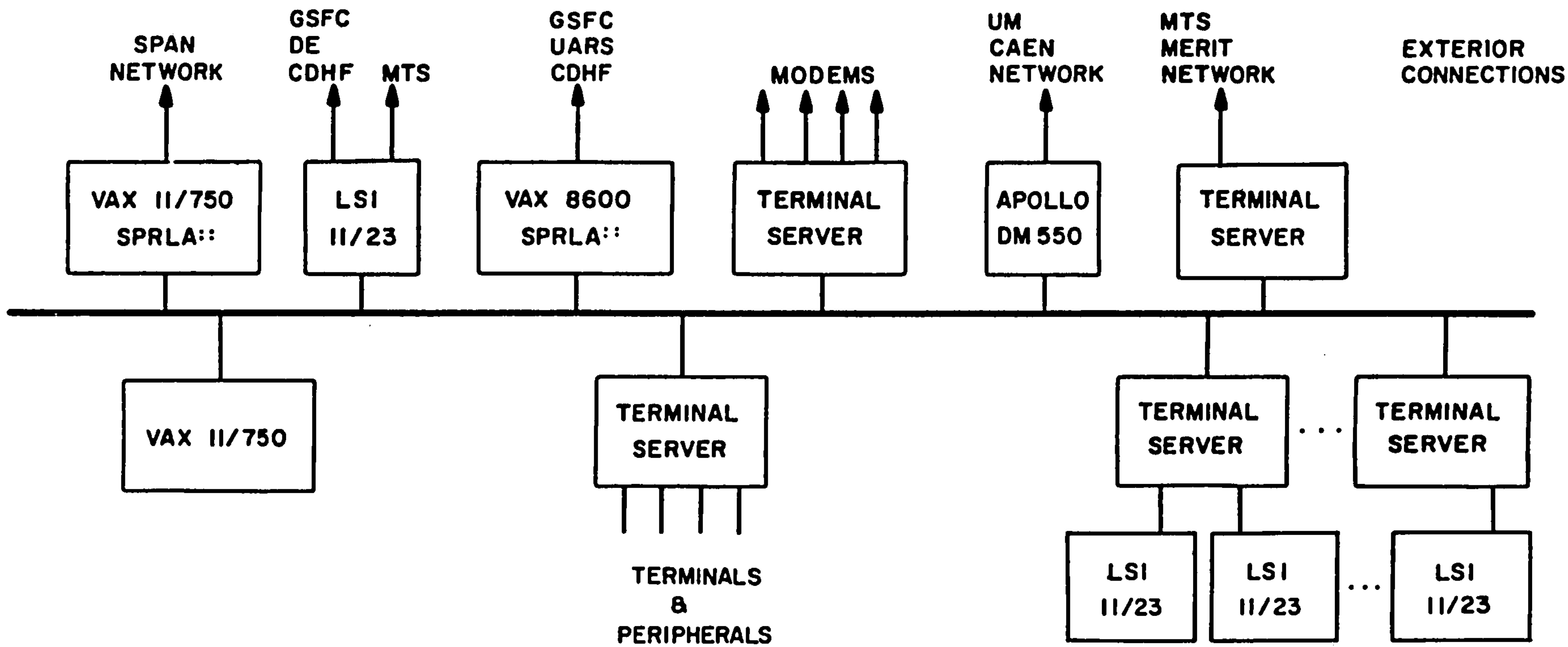
D. AVAILABILITY OF DOCUMENTATION ON ITEM DESCRIPTIONS

PCDS AS A TOOL IN TEACHING AND RESEARCH AT THE UNIVERSITY OF MICHIGAN

Professor Vincent Abreu
University of Michigan
2455 Hayward
Ann Arbor, Michigan 40105

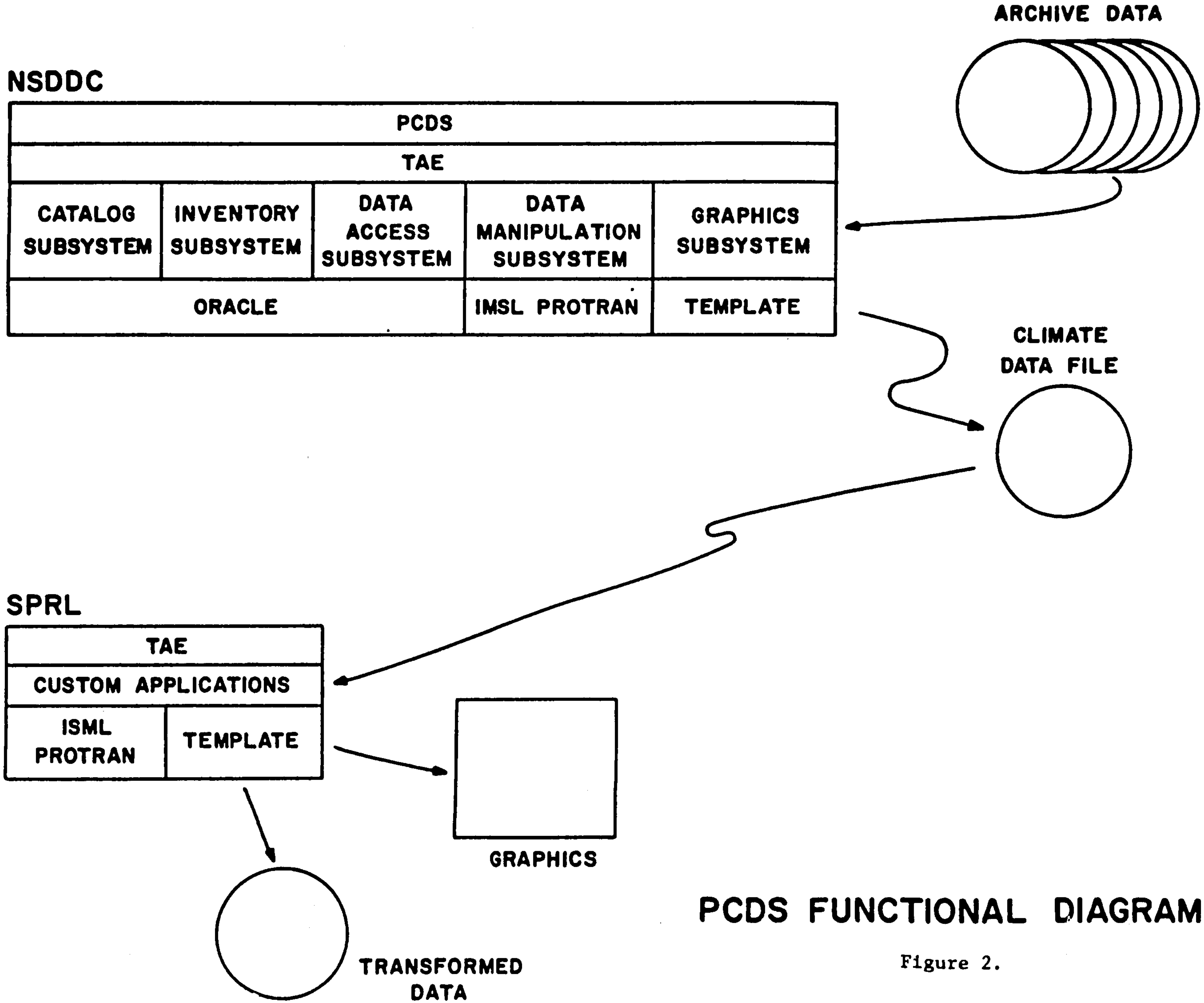
The Space Physics Research Laboratory (SPRL) has a long history of involvement in the development of satellite instrumentation and data analysis. A few years ago, it became evident to the members of the SPRL that success as a research and teaching institution was very much linked to their capability to effectively use data bases available in the community. For this purpose, a computer center was established to provide the hardware and software necessary to fully utilize existing data bases for research and teaching purposes. A schematic of the SPRL network is shown in Figure 1. The core of the system consists of two VAX 11/750s and a VAX 8600, networked through ETHERNET to several LSI 11/23 microprocessors. As indicated in the schematic, much of the system is used for external communications with major networks and data centers. A VAX 11/750 provides DECNET services through the SPAN network to the PCDS. Figure 2 is a functional diagram of PCDS usage. As indicated in the figure, the browsing capabilities of the PCDS are used to generate data files, which are later transferred to the SPRL center for further data manipulation and display. This mode of operation for classroom instruction will be used to effectively use terminals and to simplify usage of the data base. The Atmosphere Explorer data base has been used successfully in a similar manner in courses related to the thermosphere and ionosphere.

The main motivation to access the PCDS was to complement research efforts related to the High Resolution Doppler Imager (HRDI), to be flown on the Upper Atmosphere Research Satellite (UARS). The HRDI will measure wind velocities in the stratosphere and mesosphere during the day and the mesosphere and thermosphere at night, with an accuracy of 5 m/sec. HRDI will determine winds by measuring Doppler shifts of atmospheric absorption and emission features. The PCDS has been used to provide input parameters to a forward model that simulates the measurement. Parameters of interest are temperature, ozone density, aerosol optical thickness, and water vapor content.



SPRL NETWORK
SCHEMATIC

Figure 1.



PCDS FUNCTIONAL DIAGRAM

Figure 2.

PLANNING FOR THE UTILIZATION OF THE PCDS IN STUDYING THE INTERACTION OF CLOUDS (ISCCP-C DATA) AND THE EARTH RADIATION BUDGET (ERBE DATA)

Dr. Herbert Jacobowitz
ISCCP National Project Manager and ERBE Science Team
National Environmental Satellite Data and Information Service
Suitland Professional Center
E/RA 11, Room 313
Washington, DC 20233

The PCDS affords an opportunity to analyze data from different but highly complementary data sets. Two of these highly complementary data sets supported by the PCDS are the International Satellite Cloud Climatology Project (ISCCP) and the Earth Radiation Budget Experiment (ERBE). Both data set sponsors are aware of the utility of one data set to the other, and both projects utilize gridded data on a 2.5° by 2.5° grid. The ISCCP data have been collected since July 1983, and the NOAA-9 data for ERBE have been collected for more than a year. Therefore, there is a good chance to use these temporally overlapping data sets to investigate hypothesized relationships.

Changes in cloudiness affect both cloud albedo feedback (shortwave) and the greenhouse effect (longwave). The relative importance of the effects of clouds on albedo versus outgoing longwave radiation (OLR) in determining the radiation balance has long been a matter of controversy. Now, however, changes in cloud amount as observed by the ISCCP can be correlated to corresponding changes in the albedo and changes in the OLR from ERBE. Monthly means can be utilized in all instances.

The marriage of these two data sets represents a significant opportunity for radiation balance-related research. Suggestions for additional research studies were presented, along with suggestions for data manipulation tools and techniques that could prove helpful in the PCDS.

Plan for Utilization of the PCDS in Studying the Interaction of Clouds (ISCCP – C Data) and the Earth's Radiation Budget (ERBE Data)

1. Objectives of the Study

2. Data Sets Required

3. Studies to be Performed

4. Requirements of the PCDS

1. Objectives of the Study

- o To understand the influence of changes in cloud cover (amount and type) on the Earth's radiation budget

  - How does cloud cover affect the OLR, albedo and net radiation?

  - What is the influence of surface type on the cloud cover?

  - How is the distribution of clouds (amount and height) on the Earth related to the variation of the components of its radiation budget?

  - What parameters other than clouds must be taken into account to enable one to estimate the radiation budget?

$$\text{Net} = Q - F$$

$$Q = S_o (1 - \boldsymbol{\alpha})$$

$$\boldsymbol{\delta} = \frac{\partial(\text{Net})}{\partial A_c} = -S_o \frac{\partial \boldsymbol{\alpha}}{\partial A_c} - \frac{\partial F}{\partial A_c}$$

$$\boldsymbol{\delta} = -S_o \frac{\boldsymbol{\Delta} \boldsymbol{\alpha}}{\boldsymbol{\Delta} A_c} - \frac{\boldsymbol{\Delta} F}{\boldsymbol{\Delta} A_c}$$

2. Data Sets Required

- o Monthly mean ERBE scanner OLR and albedo for a 2.5°×2.5° grid, including the scene type.

- o Monthly mean ISCCP cloud parameters (amount, top temperature, type, etc.) for the 2.5°×2.5° grid above, for the same months as ERBE.

- o Monthly mean correlative data such as surface temperature for the same grid.

3. Studies to be Performed

- o Compute $\frac{\Delta\alpha}{\Delta A_c}$, $\frac{\Delta F}{\Delta A_c}$, and $\frac{\Delta(Net)}{\Delta A_c}$ for each 2.5°×2.5° grid area by using interannual changes in the monthly means.

- o Determine the distribution of above in space and time as functions of surface and predominant cloud type.

- o Develop relationships to enable the estimation of the Earth's radiation budget from the ISCCP data.

- o Develop relationships to enable the estimation of the cloud cover from ERBE data.

4. Requirements of the PCDS

- Be able to store for ready access required ERBE and ISCCP monthly mean products and correlative parameters (approx. 250,000 values per month or 3,000,000 per year.

- Be able to perform multiple linear and nonlinear regressions, including signifance tests.

- Be able to do EOF or spherical harmonic analyses of various results

UV ALBEDO OF CLOUDS FROM TOMS DATA

Mr. David Short
Climate and Radiation Branch
Goddard Space Flight Center
Greenbelt, Maryland 20771

The PCDS was found to be useful in examining a subset of data from the Nimbus-7 Total Ozone Mapping Spectrometer (TOMS). The TOMS instrument scans with six channels between .3 and .4 micrometers. It was suggested that by analyzing albedo values from the longer wavelength channels of the TOMS, the effects of increasing optical depth could be determined. It is the spectral relationship of albedo-to-optical depth that is investigated in this study. The question can be stated: "Is there spectral differentiation in albedo with changes in the optical depth of clouds?"

Nimbus-7 TOMS data were obtained through the PCDS for an area and time period for which correlative NOAA AVHRR data were available. The AVHRR data were important in determining the existing cloud patterns.

As expected, no spectral differentiation was observed at very high albedos (associated with high optical depths). However, at lower optical depths, evidence of spectral dependence on albedo was observed. Mapping the results geographically was deemed highly desirable but was not possible through the PCDS at the time.

The PCDS can be viewed as an effective research tool to access selected portions of data. Without being intimately familiar with a data set, a PCDS user can successfully manipulate data in a scientific study.

ULTRAVIOLET ALBEDO OF CLOUDS FROM TOMS DATA

DAVID A. SHORT/NASA-GSFC-CODE 613

TOTAL

OZONE

MAPPING

SPECTROMETER

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American Meterological Society
Printed in U. S. A.

The Effects of Very Large Drops on Cloud Absorption. Part I: Parcel Models

W. J. WISCOMBE

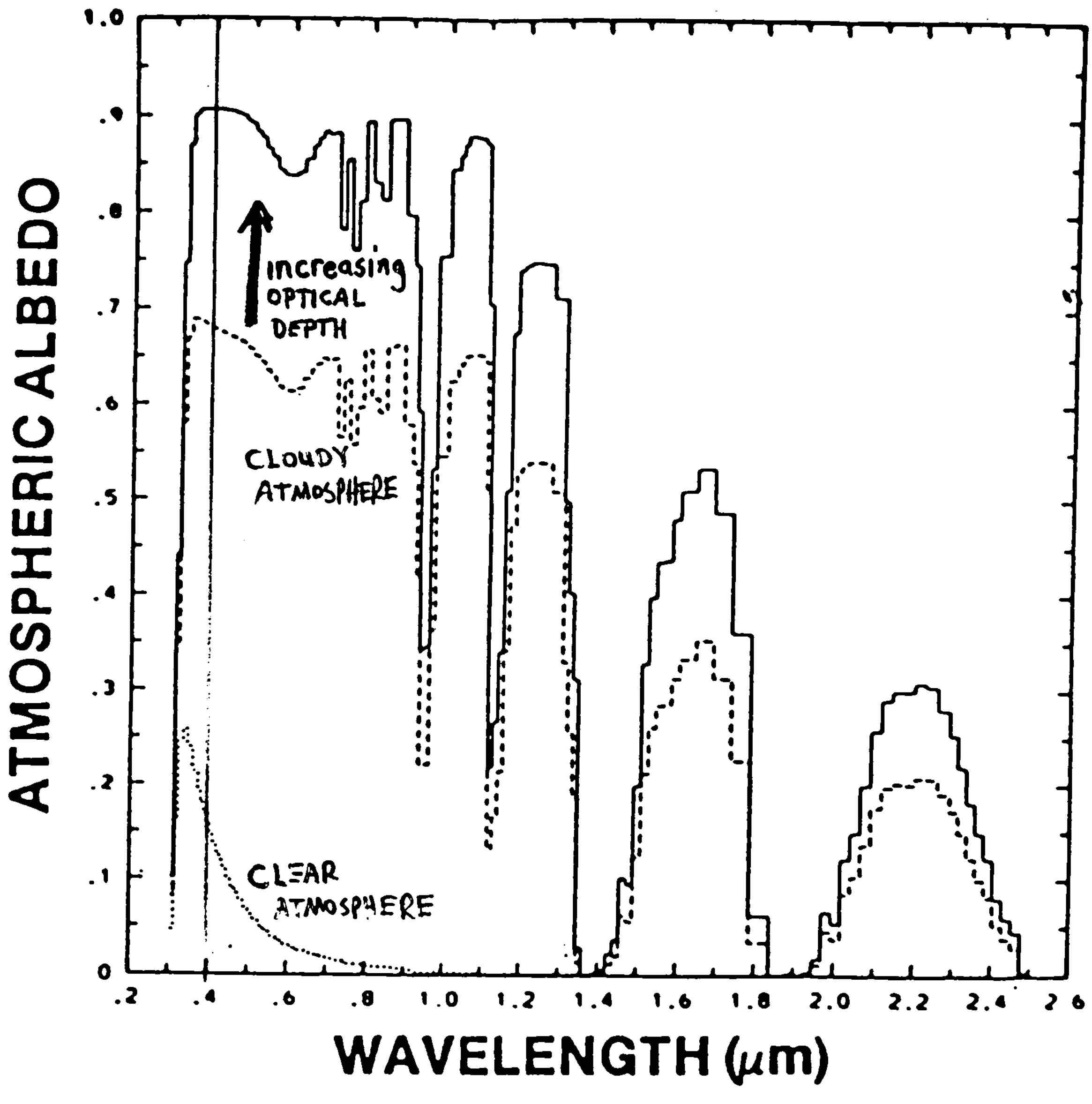
Department of Applied Science, New York University, New York, NY 10003

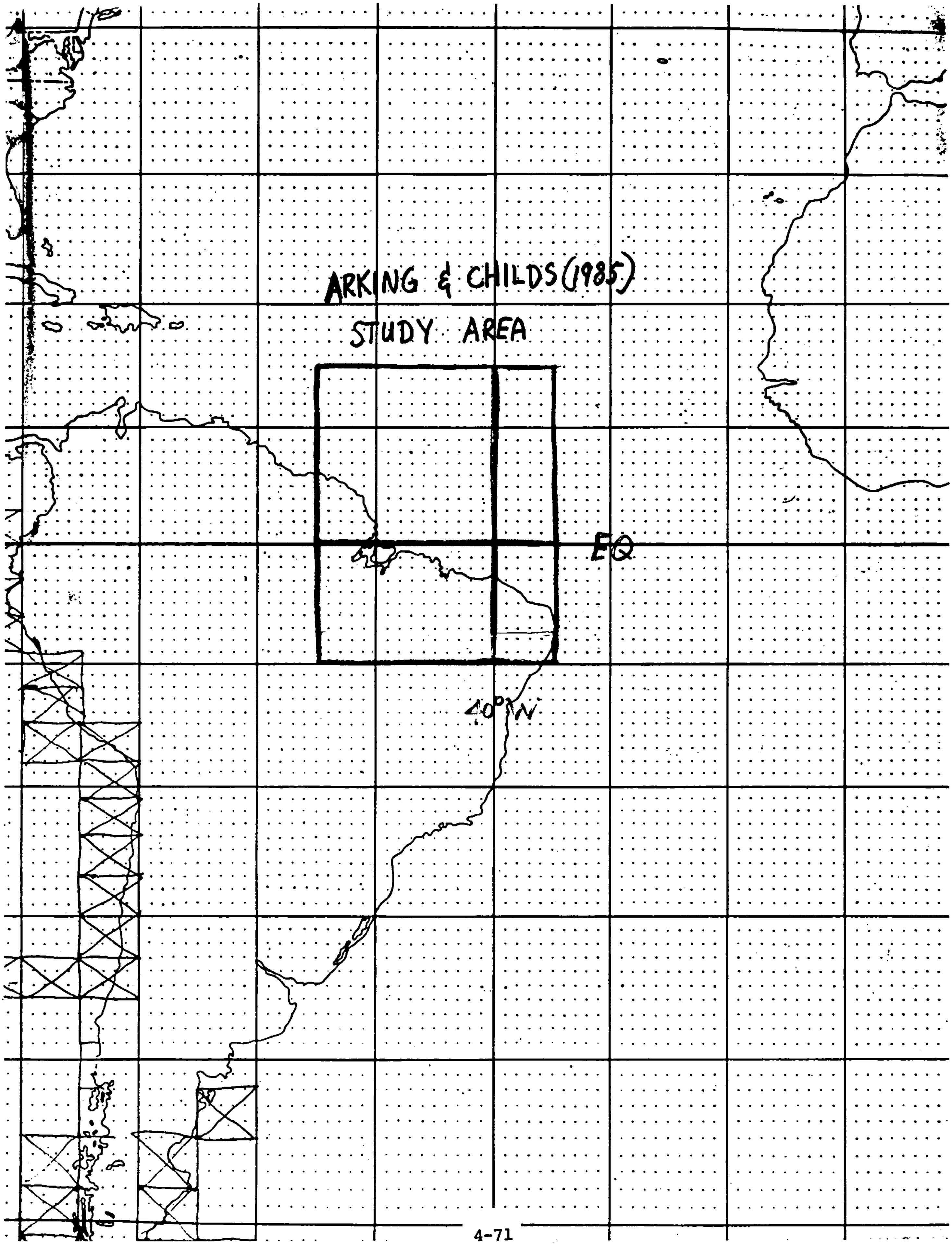
R. M. WELCH

Institute of Atmospheric Sciences, South Dakota School of Mines and Technology, Rapid City, SD 57701

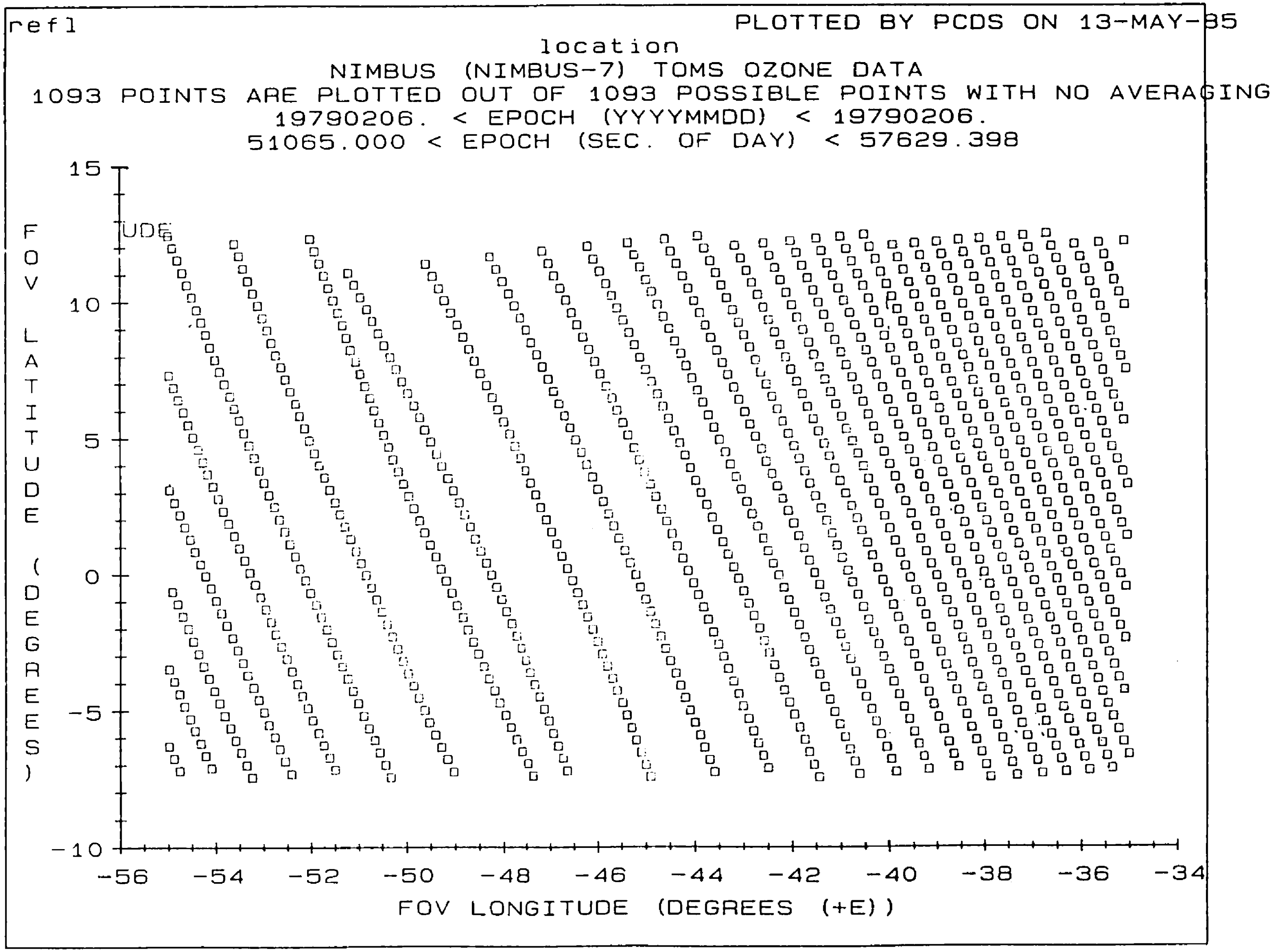
W. D. HALL

Convective Storms Division, National Center for Atmospheric Research,[1] Boulder, CO 80307



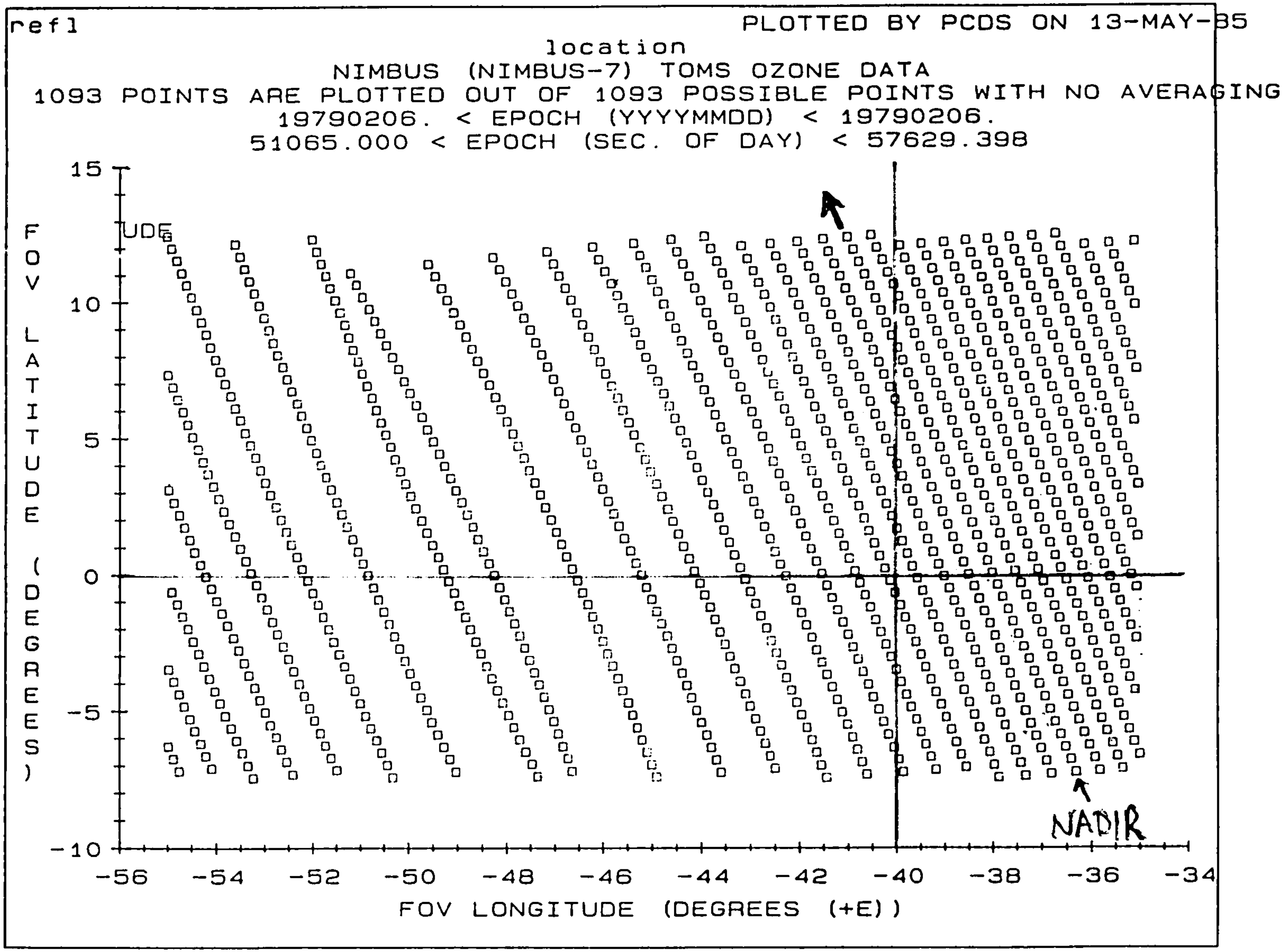

ARKING & CHILDS (1985)
STUDY AREA
EQ
40°W

LOCATION



refl
PLOTTED BY PCDS ON 13-MAY-85
location
NIMBUS (NIMBUS-7) TOMS OZONE DATA
1093 POINTS ARE PLOTTED OUT OF 1093 POSSIBLE POINTS WITH NO AVERAGING
19790206. < EPOCH (YYYYMMDD) < 19790206.
51065.000 < EPOCH (SEC. OF DAY) < 57629.398
FOV LATITUDE (DEGREES)
15
10
5
0
-5
-10
-56
-54
-52
-50
-48
-46
-44
-42
-40
-38
-36
-34
FOV LONGITUDE (DEGREES (+E))

LOCATION


refl
PLOTTED BY PCDS ON 13-MAY-85
location
NIMBUS (NIMBUS-7) TOMS OZONE DATA
1093 POINTS ARE PLOTTED OUT OF 1093 POSSIBLE POINTS WITH NO AVERAGING
19790206. < EPOCH (YYYYMMDD) < 19790206.
51065.000 < EPOCH (SEC. OF DAY) < 57629.398
UDE
FOV LATITUDE (DEGREES)
15
10
5
0
-5
-10
-56
-54
-52
-50
-48
-46
-44
-42
-40
-38
-36
-34
FOV LONGITUDE (DEGREES (+E))
NADIR

```
TUTOR DISPLAY - LEVEL 2:  ELEMENT                                    PAGE # 1+
                Selection of Climate Data Elements for Plotting

                              KEYWORD:  XAXIS

Use the integer next to a data quantity to select it for plotting on the
independent axis
For histograms and profile plots simply enter 0
   1  EPOCH (YYYYMMDD)
   2  EPOCH (SEC. OF DAY)
   3  SCAN LATITUDE (DEGREES)
   4  SCAN LONGITUDE (DEGREES (+E))
   5  SOLAR ZENITH ANG (DEGREES)
   6  ORBIT NUMBER (ORBIT NUMBER)
   7  QCODE T_OZONE
   8  BEST OZONE (MATM-CM)
   9  A-PAIR OZONE (MATM-CM)
  10  B-PAIR OZONE (MATM-CM)
  11  A-B PAIR DIFF (MATM-CM)
------------------------------------------------------------------------------

Enter EXIT to terminate HELP display, press RETURN to page.
?
```

```
TUTOR DISPLAY - LEVEL 2:  ELEMENT                                    PAGE # 2.
                Selection of Climate Data Elements for Plotting

                              KEYWORD:  XAXIS

  12  REFLECTIVITY
  13  RP-RM DIFF
  14  TERRAIN HEIGHT (ATMOSPHRES)
  15  QCODE PROFILE
  16  LAYER PROFILE (MATM-M) (Pick this item to examine the profile.)
  28  STD FOR LAYERS (MATMCM) (Pick this item to examine the profile.)
  40  MR PROFILES (MICROGRAM/GM) (Pick this item to examine the profile.)
  56  C.G. OF PROFILE (MILLIBARS)
  57  C PARAMETER (MATM-CM)
  58  SIGMA PARAMETER
  59  N-VALUES  (Pick this item to examine the profile.)


------------------------------------------------------------------------------
Enter EXIT to terminate HELP display, press RETURN to page.
? EXIT
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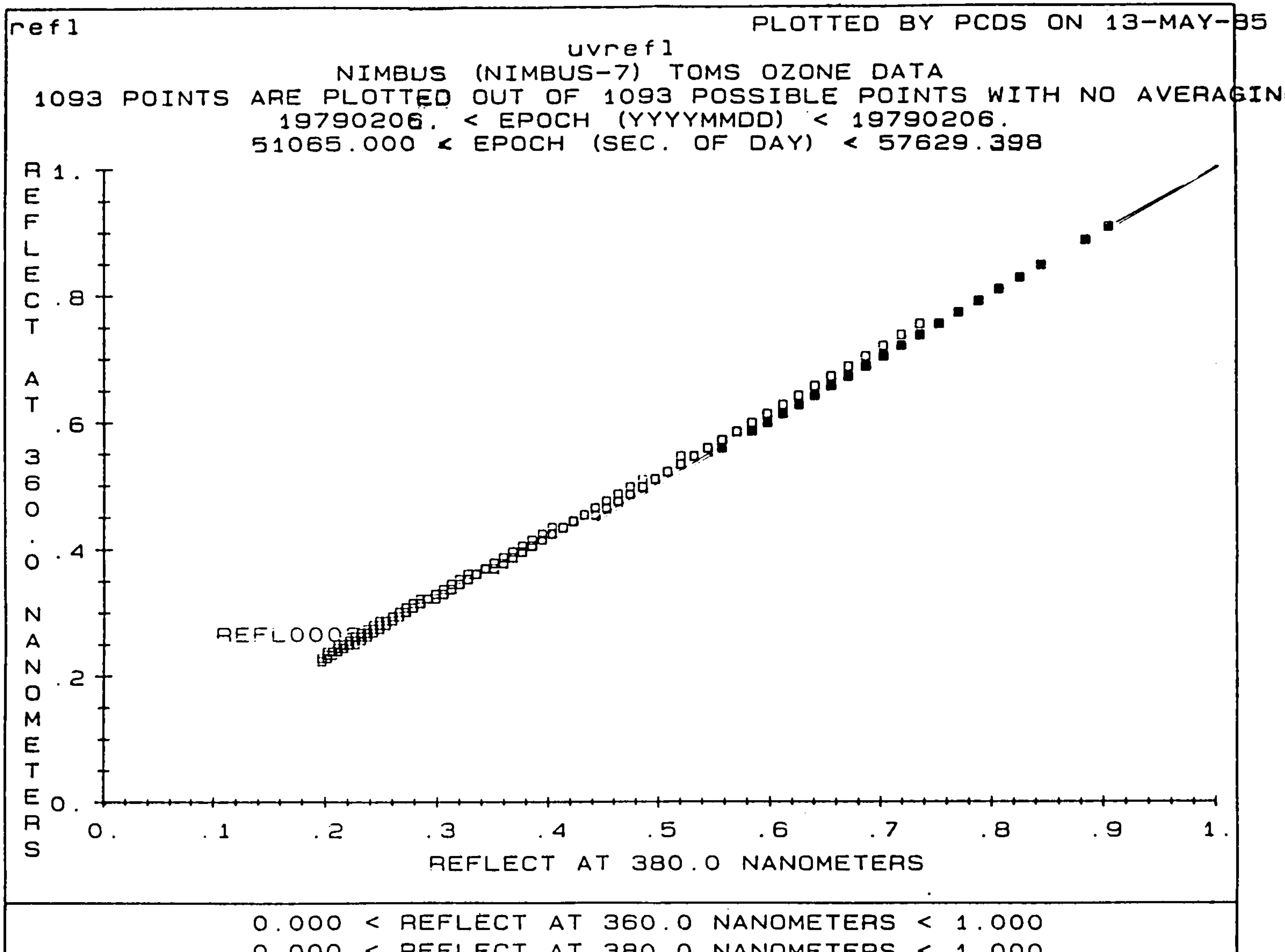
uvreflect



refl
PLOTTED BY PCDS ON 13-MAY-85
uvrefl
NIMBUS (NIMBUS-7) TOMS OZONE DATA
1093 POINTS ARE PLOTTED OUT OF 1093 POSSIBLE POINTS WITH NO AVERAGING
19790206. < EPOCH (YYYYMMDD) < 19790206.
51065.000 < EPOCH (SEC. OF DAY) < 57629.398
REFLECT AT 360.0 NANOMETERS
1.
.8
.6
.4
.2
0.
REFL0003
0.
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.
REFLECT AT 380.0 NANOMETERS
0.000 < REFLECT AT 360.0 NANOMETERS < 1.000
0.000 < REFLECT AT 380.0 NANOMETERS < 1.000

ANALYSIS OF RAINFALL OVER NORTHERN PERU DURING EL NIÑO--A PCDS APPLICATION

Dr. Richard Goldberg
Electrodynamics Branch
Goddard Space Flight Center
Greenbelt, Maryland 20771
and
Ing. Gilberto Tisnado
Instituto Nacional de Investigacion
de Transportes ("INAIT")
Peru

In an examination of GOES satellite data during the 1982 through 1983 El Nino period, the appearance of lee wave cloud patterns was revealed. A correlation was hypothesized--relating an anomalous easterly flow across the Andes with the appearance of these wave patterns and with the subsequent onset of intense rainfall. The cloud patterns are believed to be associated with the El Niño period and could be viewed as precursors to significant changes in weather patterns. The ultimate goal of the researchers will be the ability to predict occurrences of rainstorms associated with the appearance of lee waves and related cloud patterns as harbingers of destruction caused by flooding, huaycos, and other catastrophic consequences of heavy and abnormal rainfall. It is hoped that forecasting of such phenomena can alleviate some of the tragic effects associated with them.

Rainfall data from about 70 stations in northern Peru from 1980 through 1984 were formatted into CDFs to be utilized within the PCDS.* This time period includes the 1982 through 1983 El Niño period. As an example of the approach, a well-pronounced lee wave pattern was shown from a GOES satellite image of April 4, 1983. The ground truth data were then displayed via the PCDS to graphically demonstrate the increase in intensity and areal distribution of rainfall in the northern Peruvian area in the next 4 to 5 days. The graphical technique used to display the rainfall ground truth included a sequence of histograms, contour plots, and three-dimensional surface diagrams.

An exciting consequence of this investigation is the researchers' plan to quantify the available GOES satellite cloud data (on an IBM PC) and to transfer it to the PCDS for further analysis. This use of the PCDS to integrate satellite and nonsatellite data should prove to be extremely beneficial in future research.

*This is a user produced data set and is not available to other users at this time.

Analysis of Rainfall over Northern Peru During El Niño: A PCDS Application

R. A. Goldberg
Laboratory for Extraterrestrial Physics
NASA/Goddard Space Flight Center

G. Tisnado
Instituto Nacional de Investigacion de
Transportes ("INAIT")
Peru

Project PREPAREN:

GOES/METSAT Applications

for Disaster Early Warning

in Ecuador and Peru

(*PRE*cipitation *PA*tterns *R*elated to *E*l *N*iño)

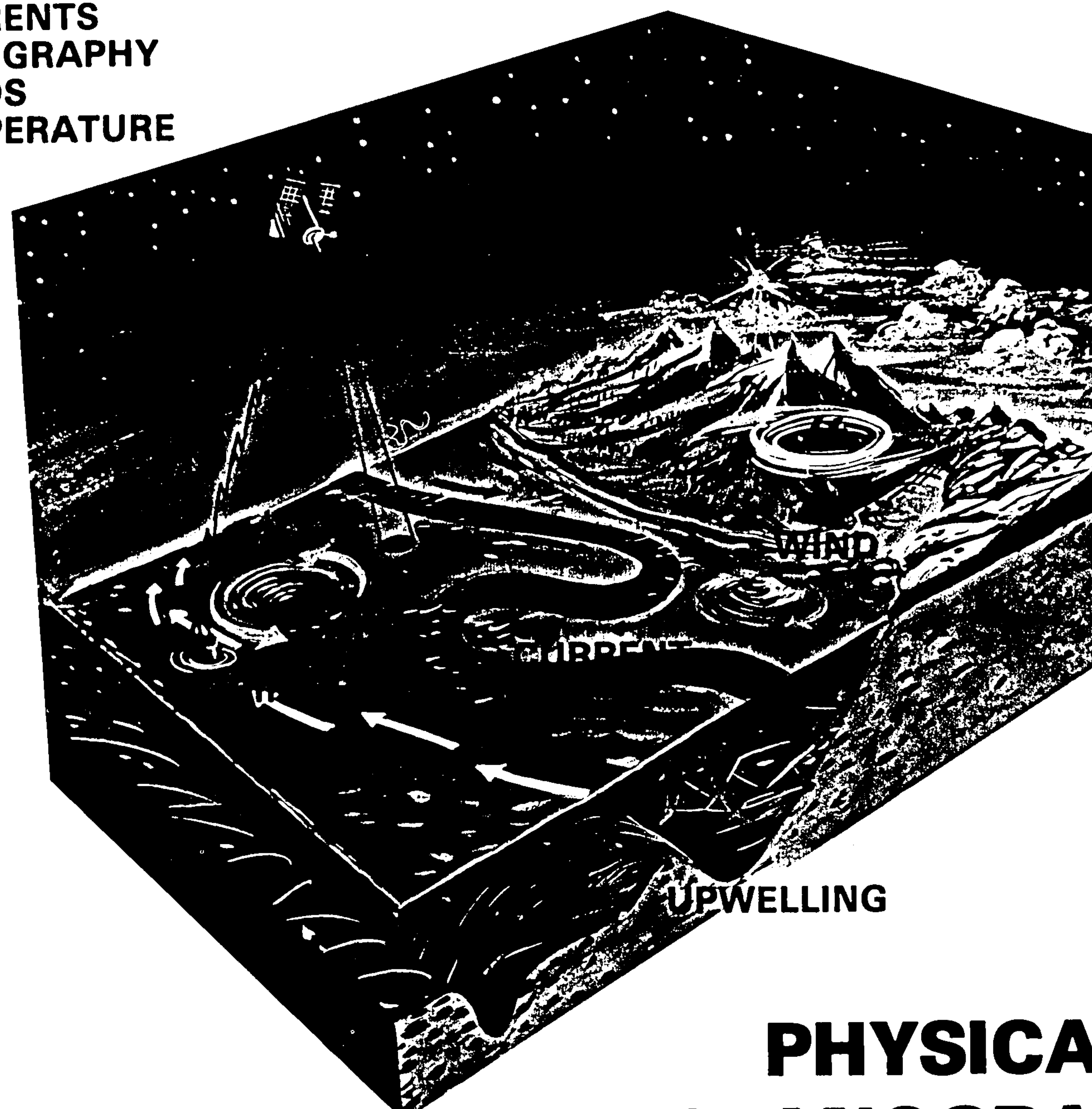
Sponsor:	P. Krumpe (AID/OFDA)
Technical Officer:	L. Steyaert (NOAA)
Study Scientist:	R. Goldberg (NASA)
Visiting Scientist:	G. Tisnado (INAIT/Peru)

Project PREPAREN – Objective

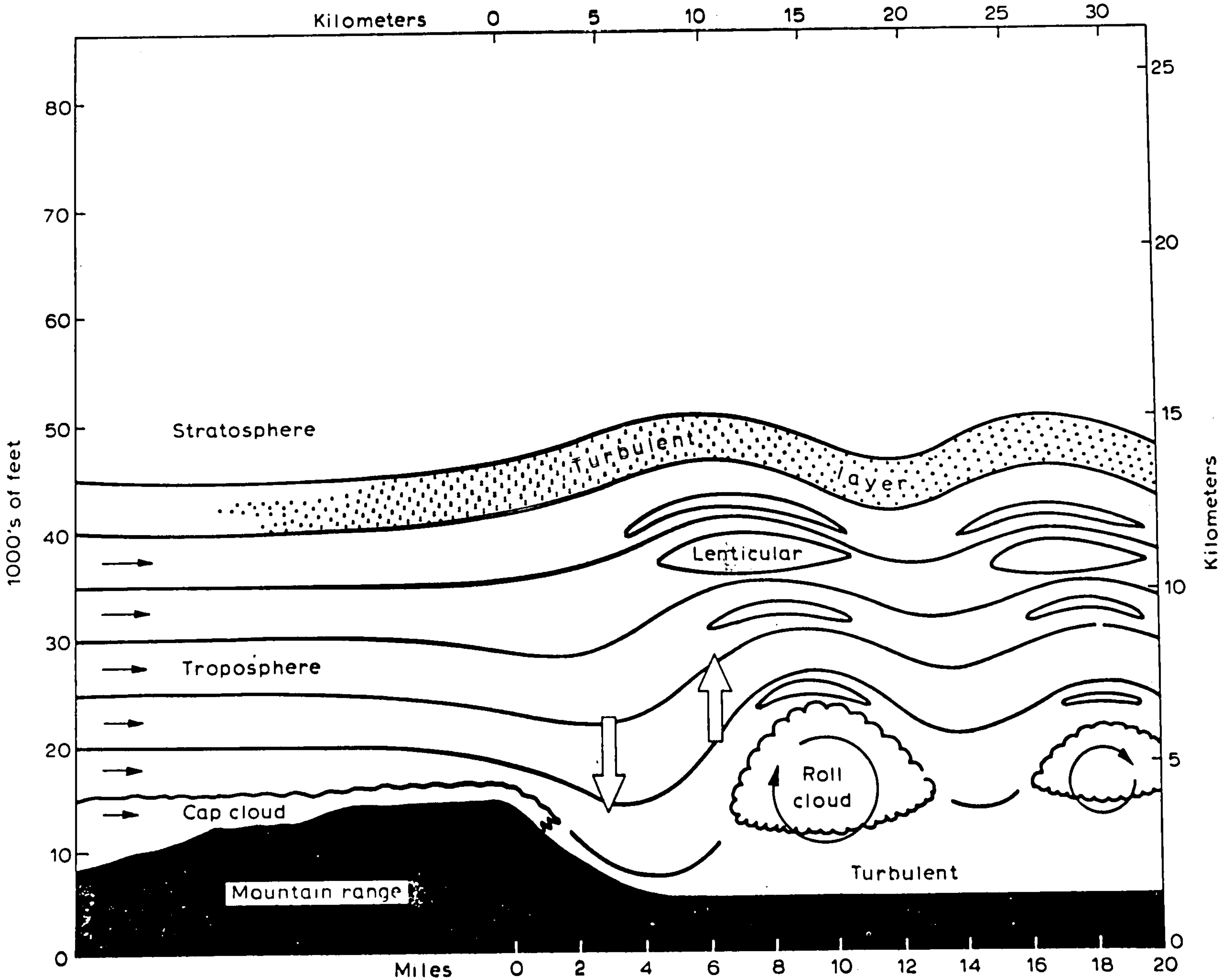
To investigate associations between lee wave cloud patterns and extreme rainfall events in coastal regions of Northern Peru and Ecuador to develop flood alert models for these regions.

OCEAN CIRCULATION

- CURRENTS
- TOPOGRAPHY
- WINDS
- TEMPERATURE

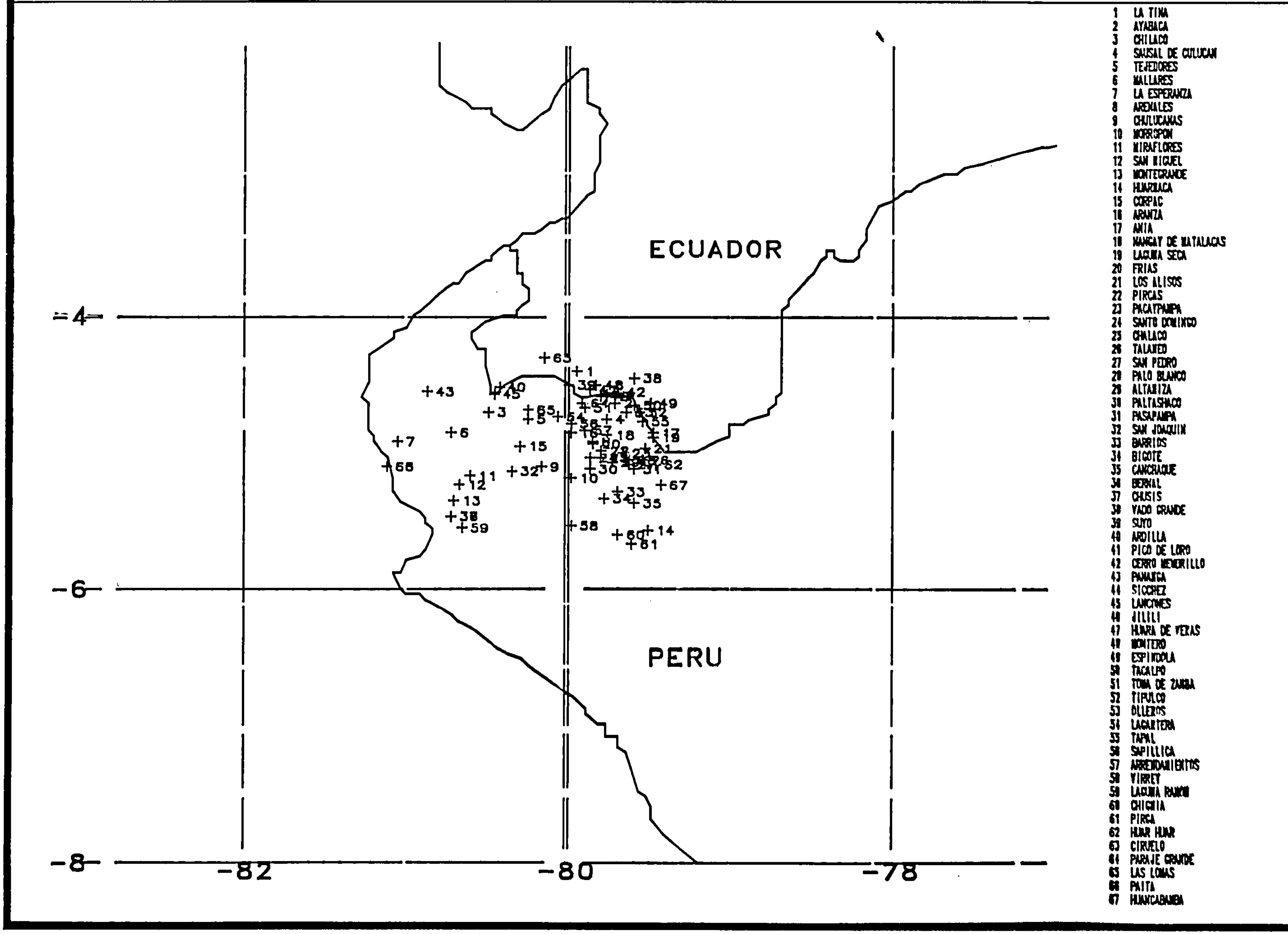


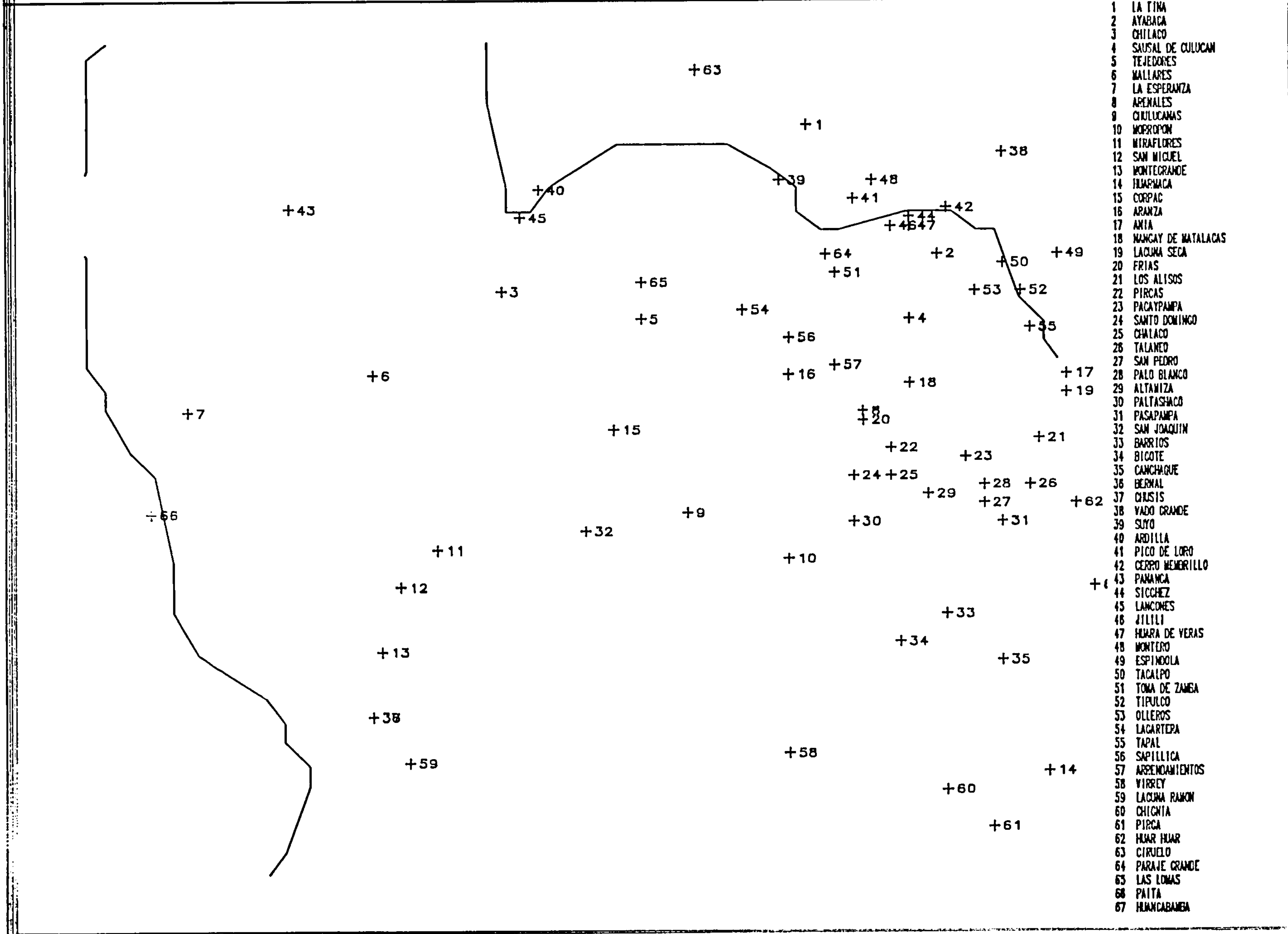
PHYSICAL OCEANOGRAPHY



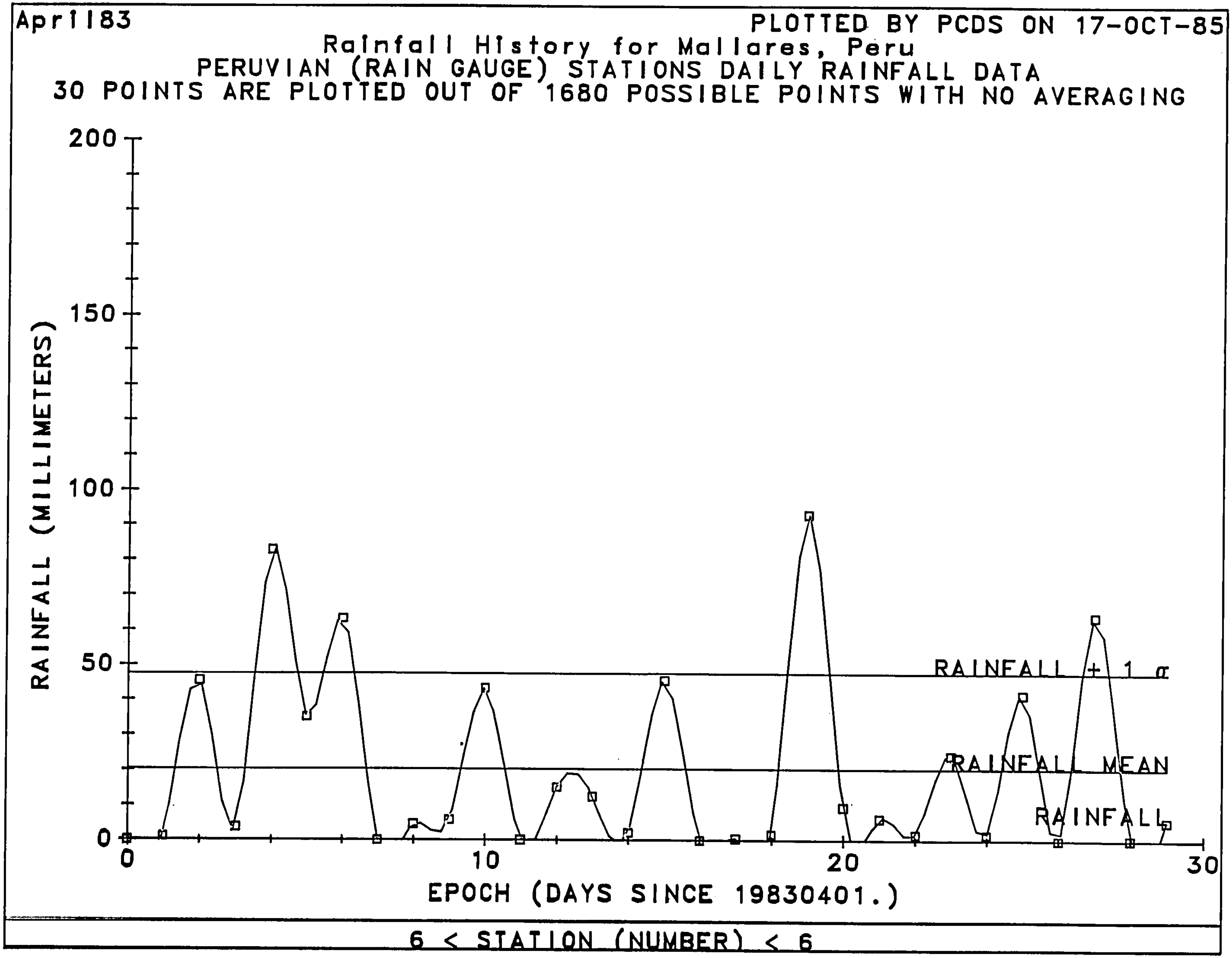
Kilometers
0
5
10
15
20
25
30
1000's of feet
80
70
60
50
40
30
20
10
0
Kilometers
25
20
15
10
5
0
Stratosphere
Turbulent layer
Lenticular
Troposphere
Cap cloud
Roll cloud
Turbulent
Mountain range
Miles
0
2
4
6
8
10
12
14
16
18
20

Peruvian Rainfall Stations





Peruvian Rainfall Stations

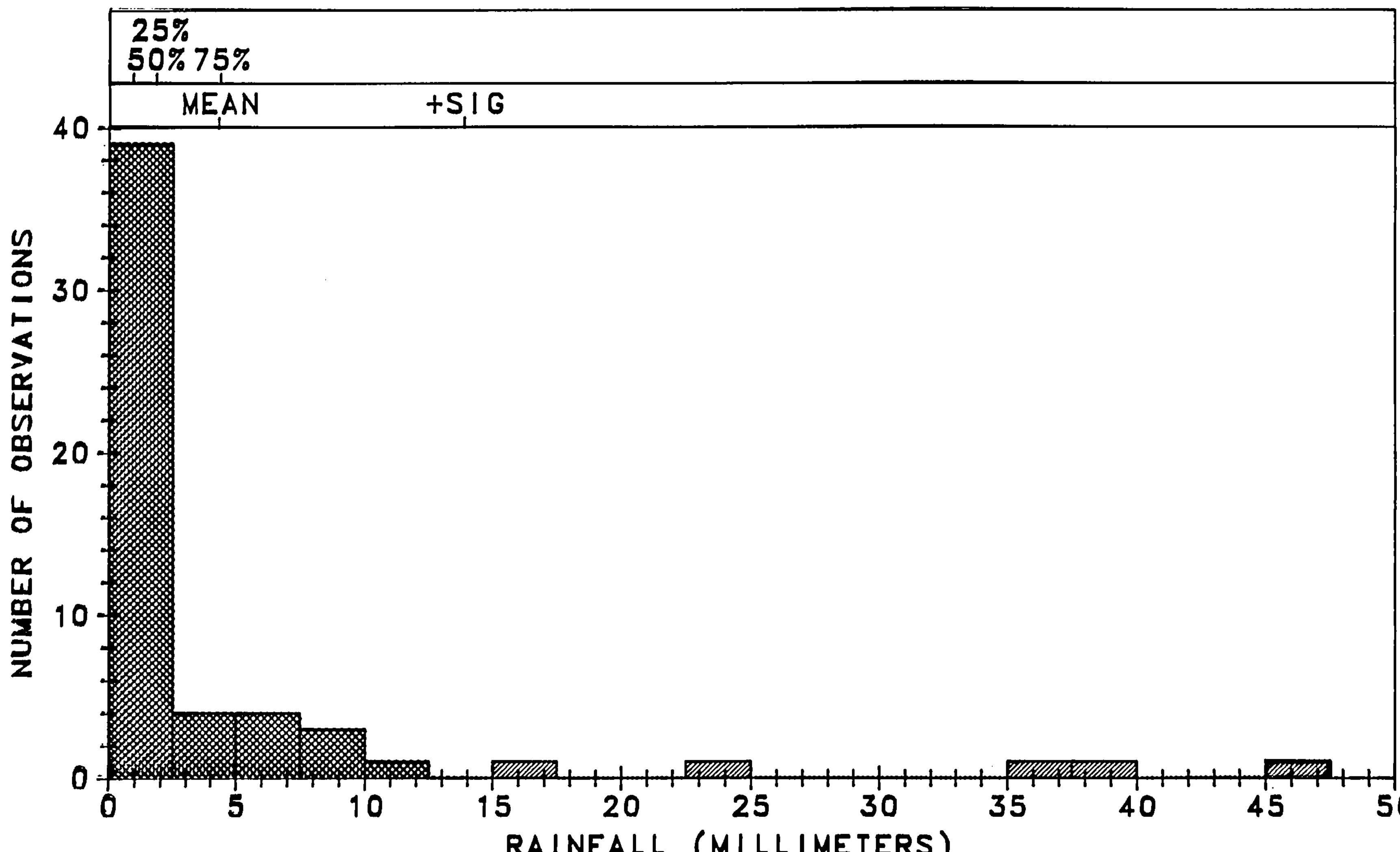

Apr183
PLOTTED BY PCDS ON 17-OCT-85
Rainfall History for Mallares, Peru
PERUVIAN (RAIN GAUGE) STATIONS DAILY RAINFALL DATA
30 POINTS ARE PLOTTED OUT OF 1680 POSSIBLE POINTS WITH NO AVERAGING
RAINFALL (MILLIMETERS)
200
150
100
50
0
RAINFALL + 1 σ
RAINFALL MEAN
RAINFALL
0
10
20
30
EPOCH (DAYS SINCE 19830401.)
6 < STATION (NUMBER) < 6

Apr183 PLOTTED BY PCDS ON 16-OCT-85

Rainfall Histogram for April 3, 1983

PERUVIAN (RAIN GAUGE) STATIONS DAILY RAINFALL DATA

56 POINTS ARE PLOTTED OUT OF 1680 POSSIBLE POINTS WITH NO AVERAGING



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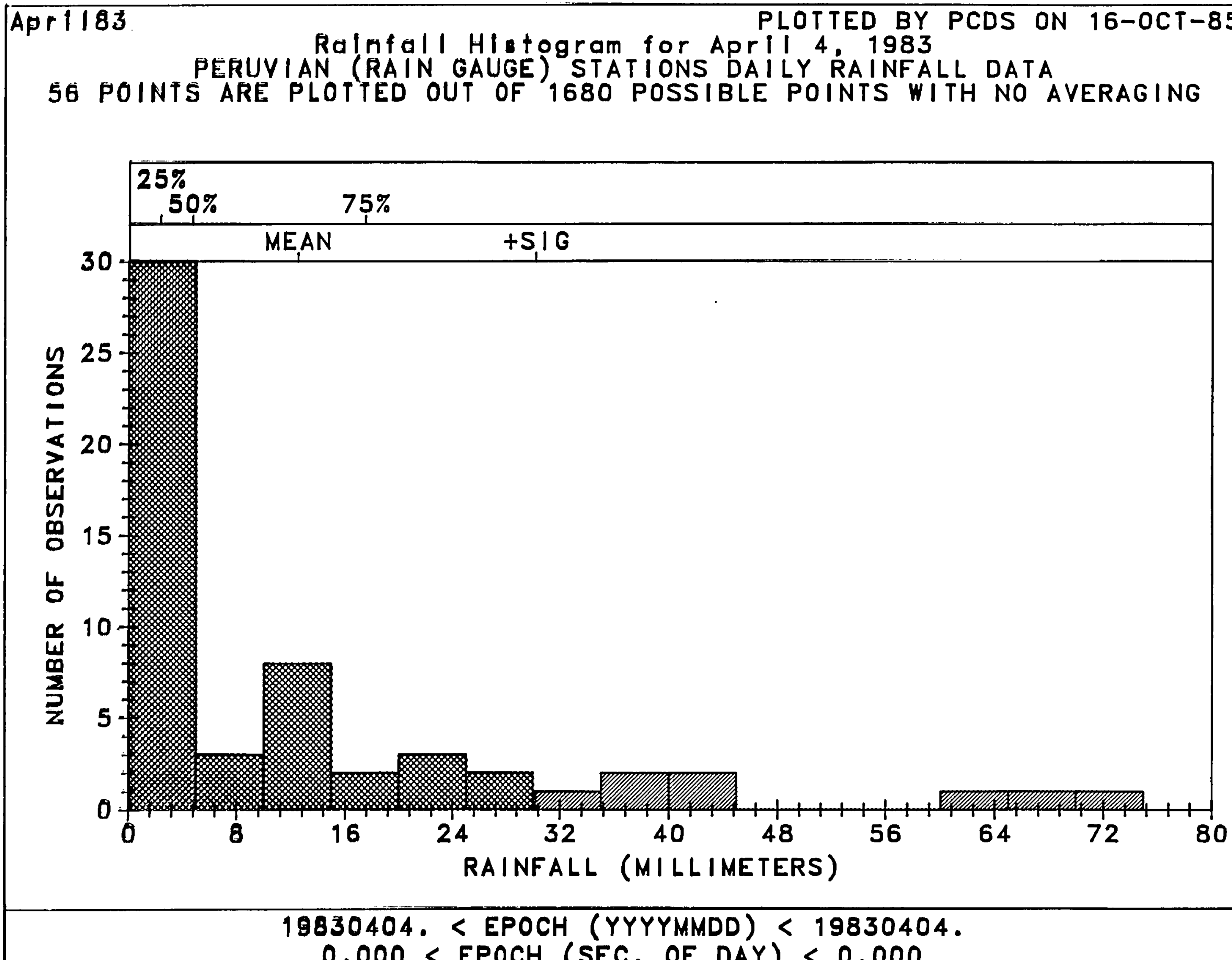
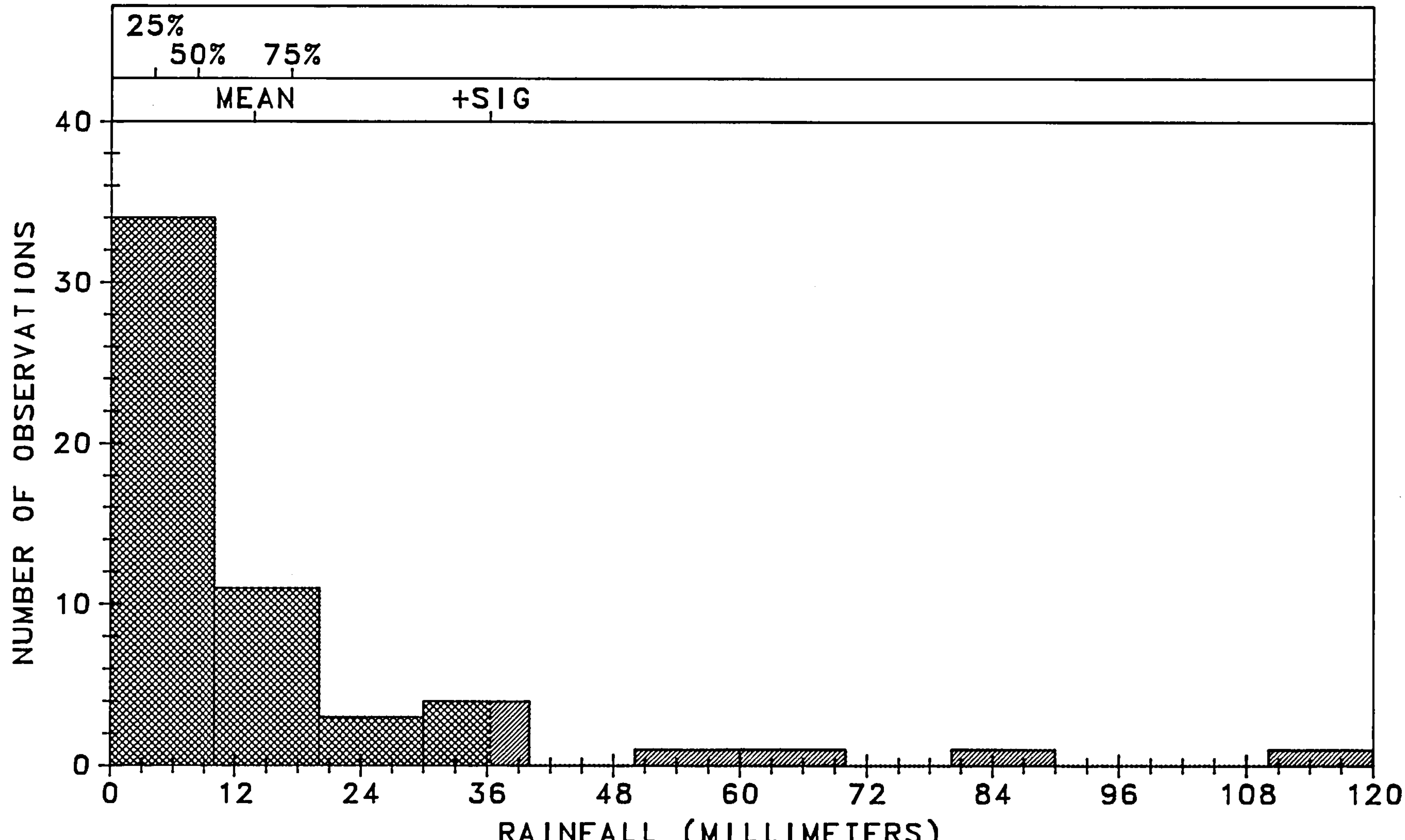

Apr1183
PLOTTED BY PCDS ON 16-OCT-85
Rainfall Histogram for April 4, 1983
PERUVIAN (RAIN GAUGE) STATIONS DAILY RAINFALL DATA
56 POINTS ARE PLOTTED OUT OF 1680 POSSIBLE POINTS WITH NO AVERAGING
25%
50%
75%
MEAN
+SIG
NUMBER OF OBSERVATIONS
0
5
10
15
20
25
30
0
8
16
24
32
40
48
56
64
72
80
RAINFALL (MILLIMETERS)
19830404. < EPOCH (YYYYMMDD) < 19830404.
0.000 < EPOCH (SEC. OF DAY) < 0.000

April83 PLOTTED BY PCDS ON 16-OCT-85

Rainfall Histogram for April 5, 1983

PERUVIAN (RAIN GAUGE) STATIONS DAILY RAINFALL DATA

56 POINTS ARE PLOTTED OUT OF 1680 POSSIBLE POINTS WITH NO AVERAGING



19830405. < EPOCH (YYYYMMDD) < 19830405.

0.000 < EPOCH (SEC. OF DAY) < 0.000

Apr183

PLOTTED BY PCDS ON 16-OCT-85

Rainfall Map for April 5, 1983

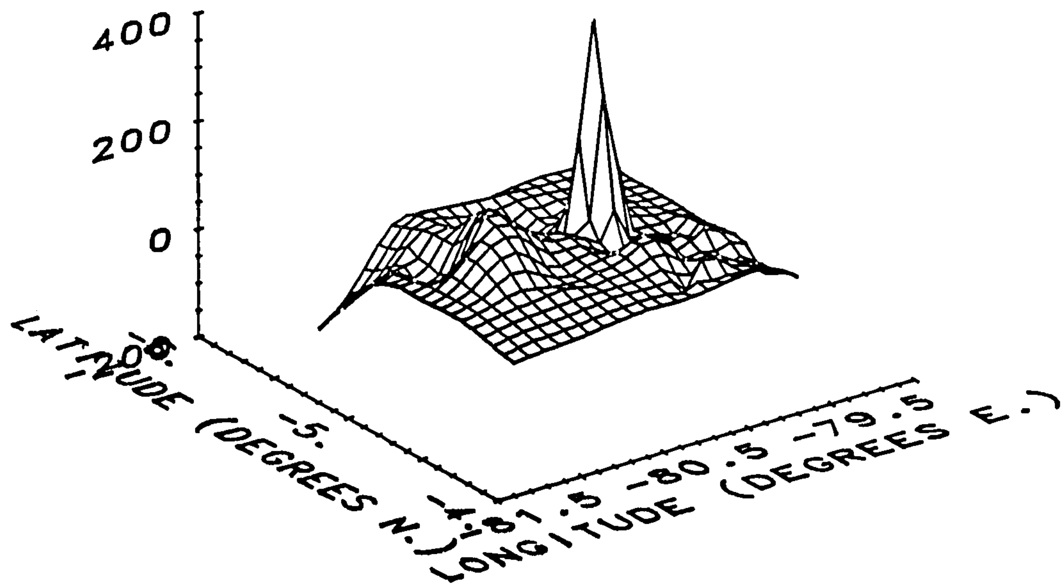
PERUVIAN (RAIN GAUGE) STATIONS DAILY RAINFALL DATA

THERE ARE 56 DATA VALUES USED OUT OF 1680 POSSIBLE VALUES

1983/04/05 00:00:00 < DATE TIME < 1983/04/05 00:00:00

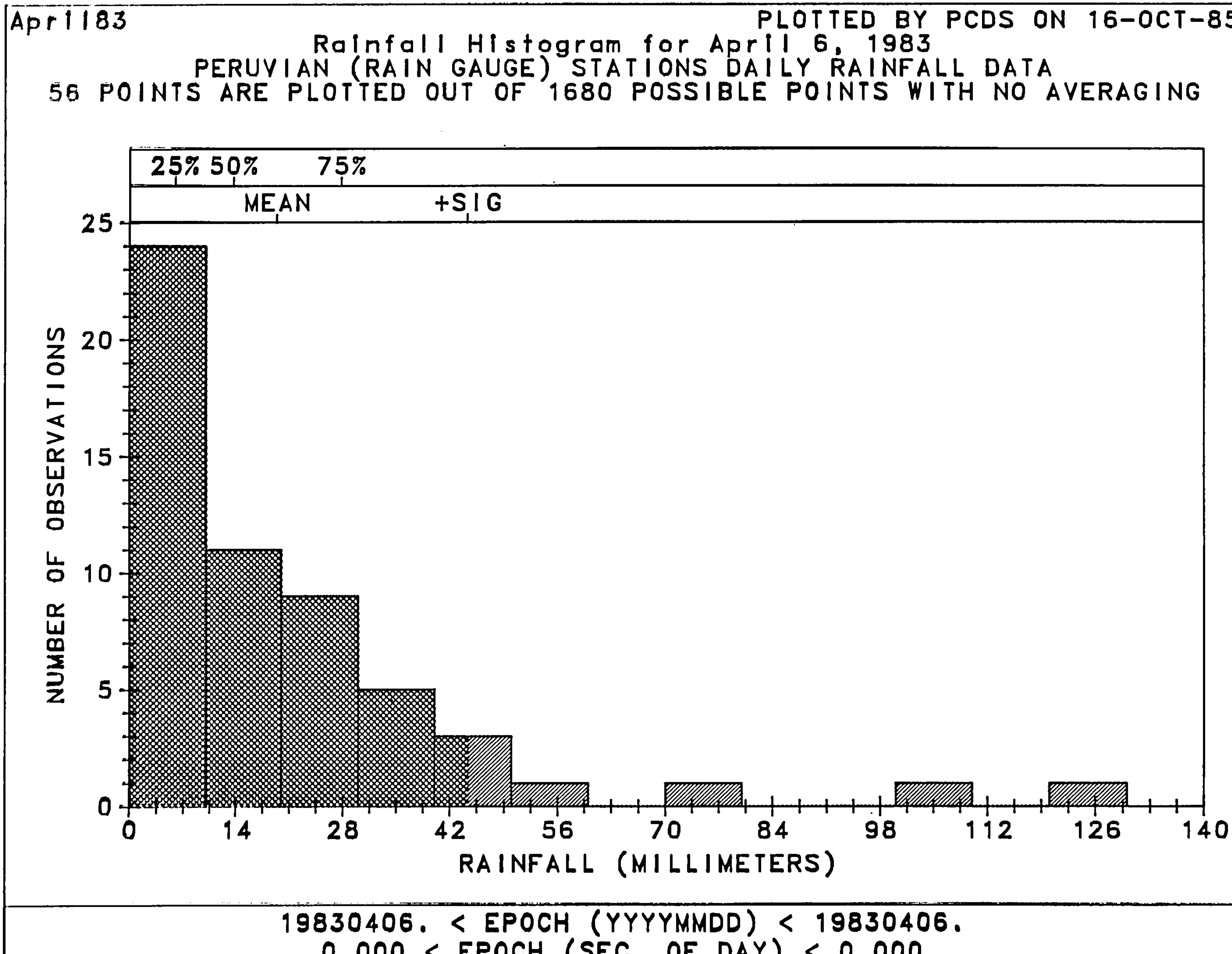
STANDARD DEVIATION = 22.41

MEAN VALUE = 13.79



SURFACE PLOT OF RAINFALL (MILLIMETERS)

9830405. < EPOCH (YYYMMDD) < 9830405.


Apr1183
PLOTTED BY PCDS ON 16-OCT-85
Rainfall Histogram for April 6, 1983
PERUVIAN (RAIN GAUGE) STATIONS DAILY RAINFALL DATA
56 POINTS ARE PLOTTED OUT OF 1680 POSSIBLE POINTS WITH NO AVERAGING
25% 50% 75%
MEAN +SIG
NUMBER OF OBSERVATIONS
0 5 10 15 20 25
0 14 28 42 56 70 84 98 112 126 140
RAINFALL (MILLIMETERS)
19830406. < EPOCH (YYYYMMDD) < 19830406.
0.000 < EPOCH (SEC. OF DAY) < 0.000

April83 PLOTTED BY PCDS ON 16-OCT-85

Rainfall Map for April 6, 1983

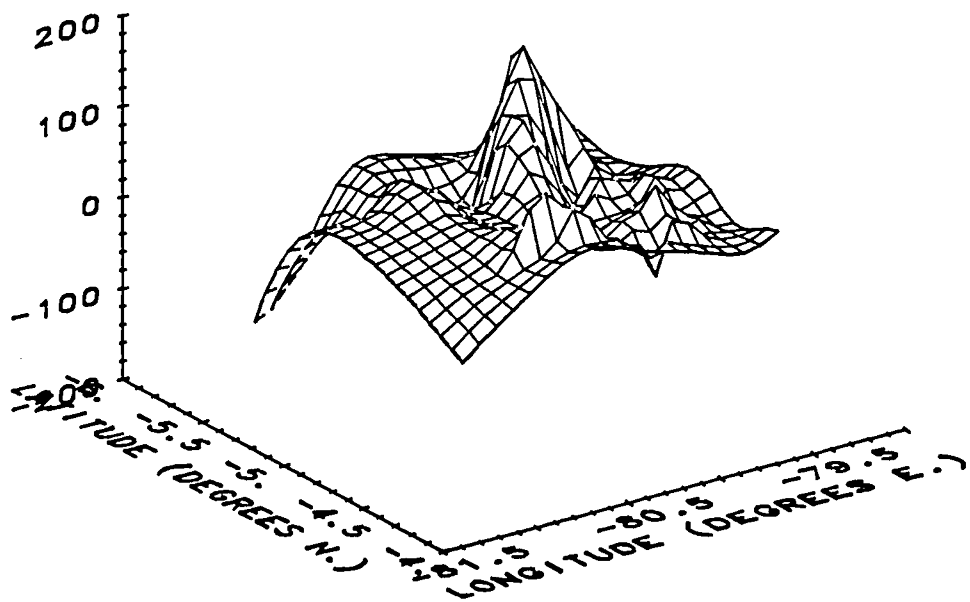
PERUVIAN (RAIN GAUGE) STATIONS DAILY RAINFALL DATA

THERE ARE 56 DATA VALUES USED OUT OF 1680 POSSIBLE VALUES

1983/04/06 00:00:00 < DATE TIME < 1983/04/06 00:00:00

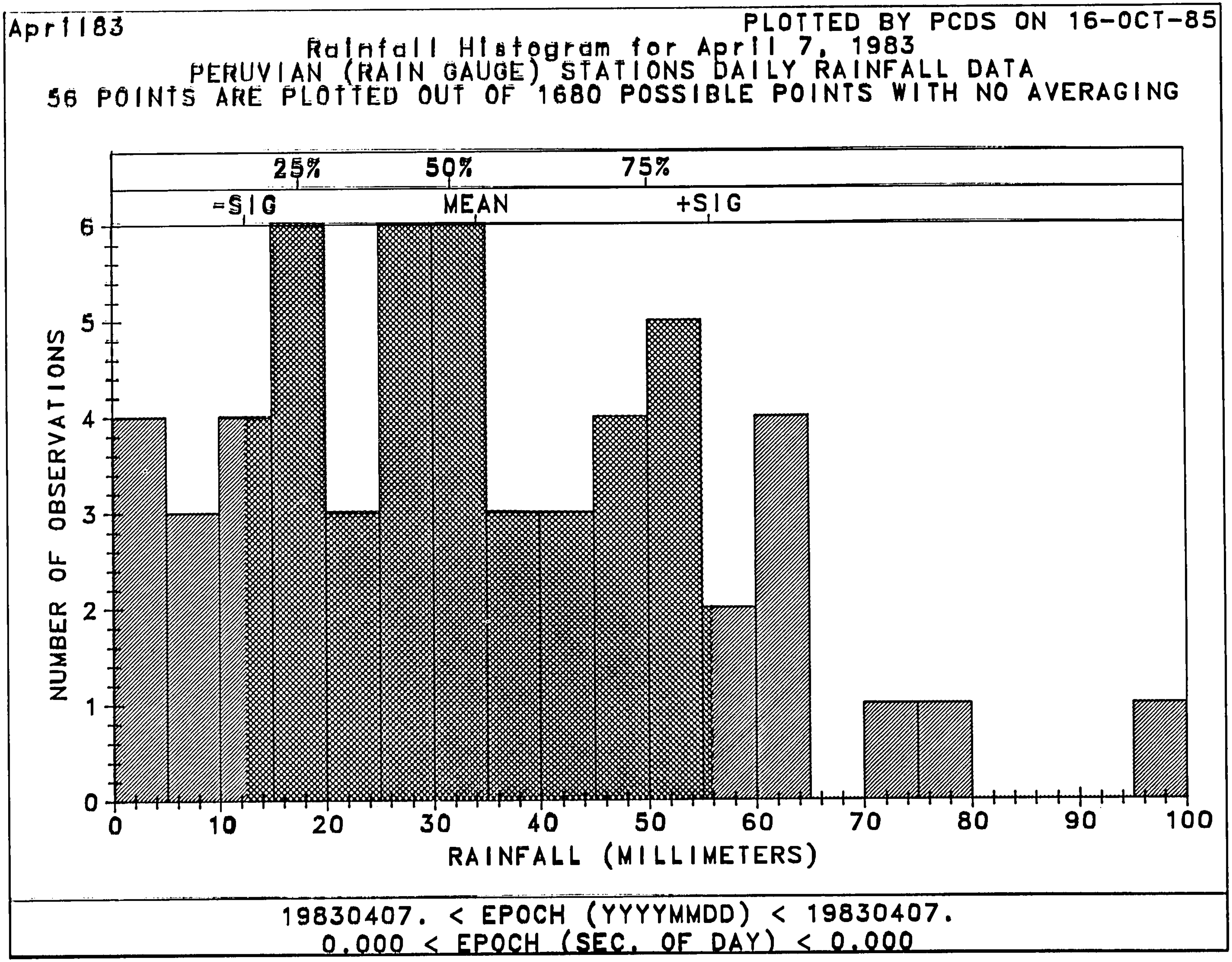
STANDARD DEVIATION = 24.93

MEAN VALUE = 19.35



SURFACE PLOT OF RAINFALL (MILLIMETERS)

9830406. < EPOCH (YYYMMDD) < 9830406.


Apr1183
PLOTTED BY PCDS ON 16-OCT-85
Rainfall Histogram for April 7, 1983
PERUVIAN (RAIN GAUGE) STATIONS DAILY RAINFALL DATA
56 POINTS ARE PLOTTED OUT OF 1680 POSSIBLE POINTS WITH NO AVERAGING
25%
50%
75%
-SIG
MEAN
+SIG
NUMBER OF OBSERVATIONS
0
1
2
3
4
5
6
0
10
20
30
40
50
60
70
80
90
100
RAINFALL (MILLIMETERS)
19830407. < EPOCH (YYYYMMDD) < 19830407.
0.000 < EPOCH (SEC. OF DAY) < 0.000

April83 PLOTTED BY PCDS ON 16-OCT-85

Rainfall Map for April 7, 1983

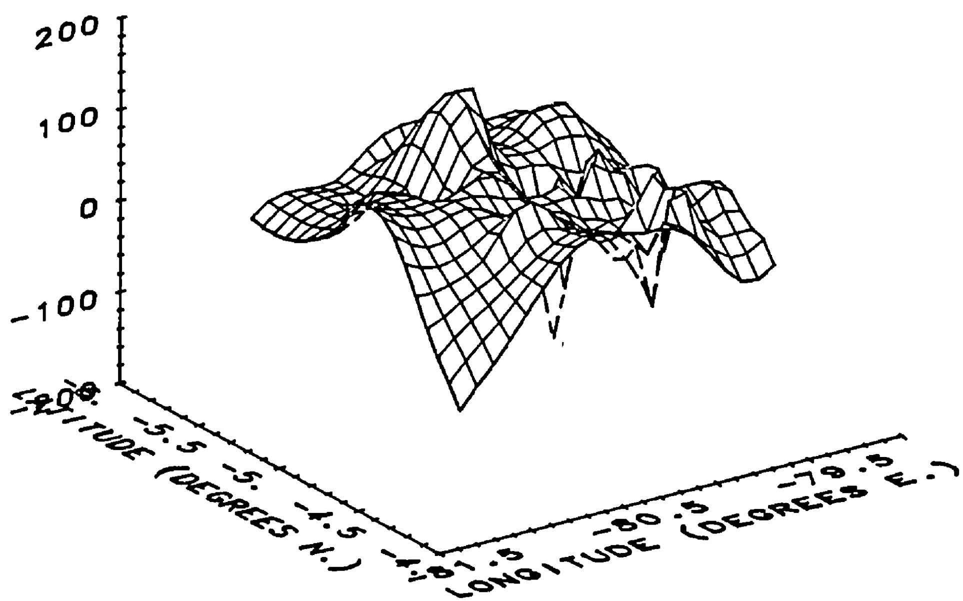
PERUVIAN (RAIN GAUGE) STATIONS DAILY RAINFALL DATA

THERE ARE 56 DATA VALUES USED OUT OF 1680 POSSIBLE VALUES

1983/04/07 00:00:00 < DATE TIME < 1983/04/07 00:00:00

STANDARD DEVIATION = 21.67

MEAN VALUE = 34.18



SURFACE PLOT OF RAINFALL (MILLIMETERS)

9830407. < EPOCH (YYMMDD) < 9830407.

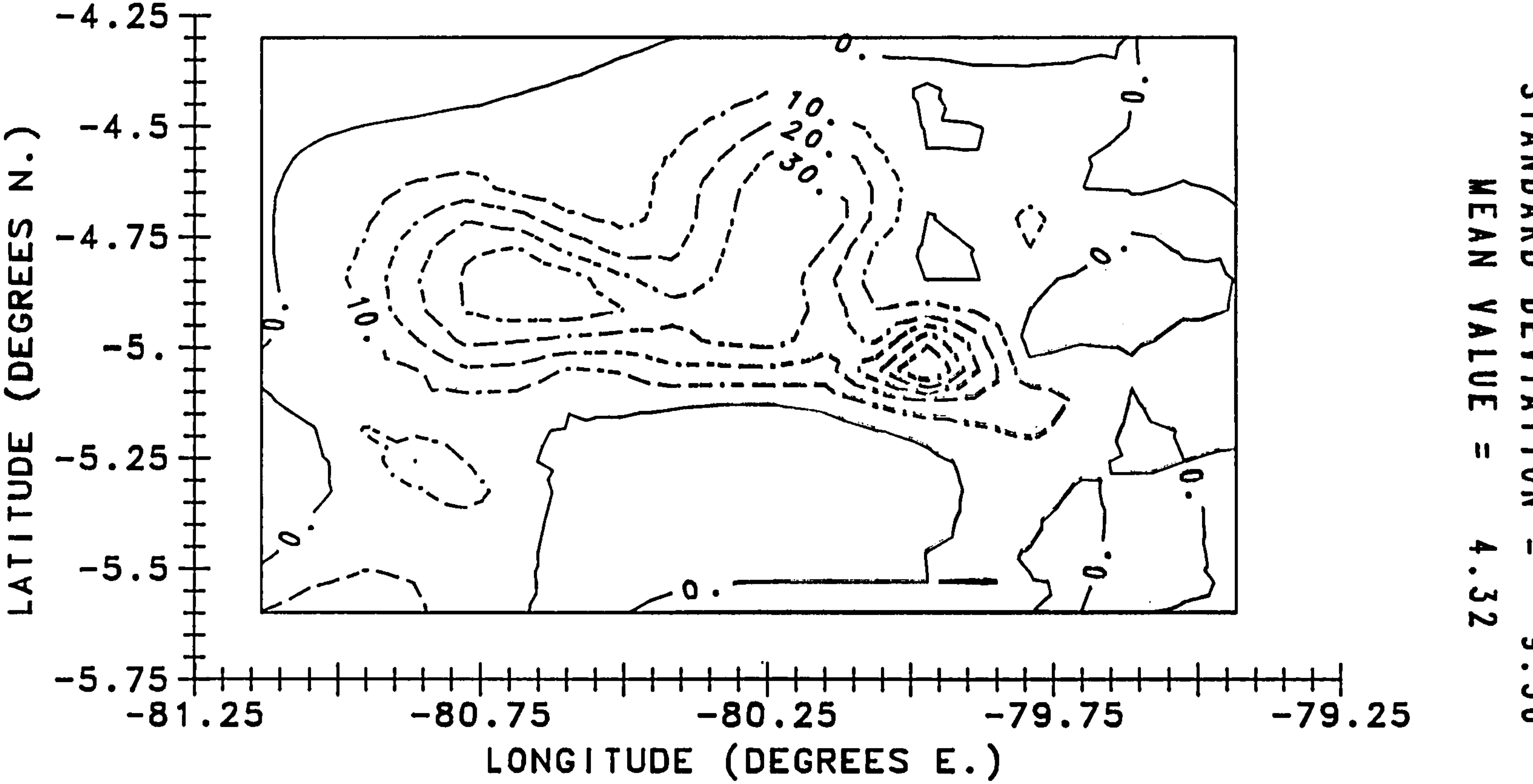
Apr183 PLOTTED BY PCDS ON 16-OCT-85

Rainfall Map for April 3, 1983

PERUVIAN (RAIN GAUGE) STATIONS DAILY RAINFALL DATA

THERE ARE 56 DATA VALUES USED OUT OF 1680 POSSIBLE VALUES

1983/04/03 00:00:00 < DATE TIME < 1983/04/03 00:00:00



CONTOUR PLOT OF RAINFALL (MILLIMETERS)

9830403. < EPOCH (YYYMMDD) < 9830403.

April83

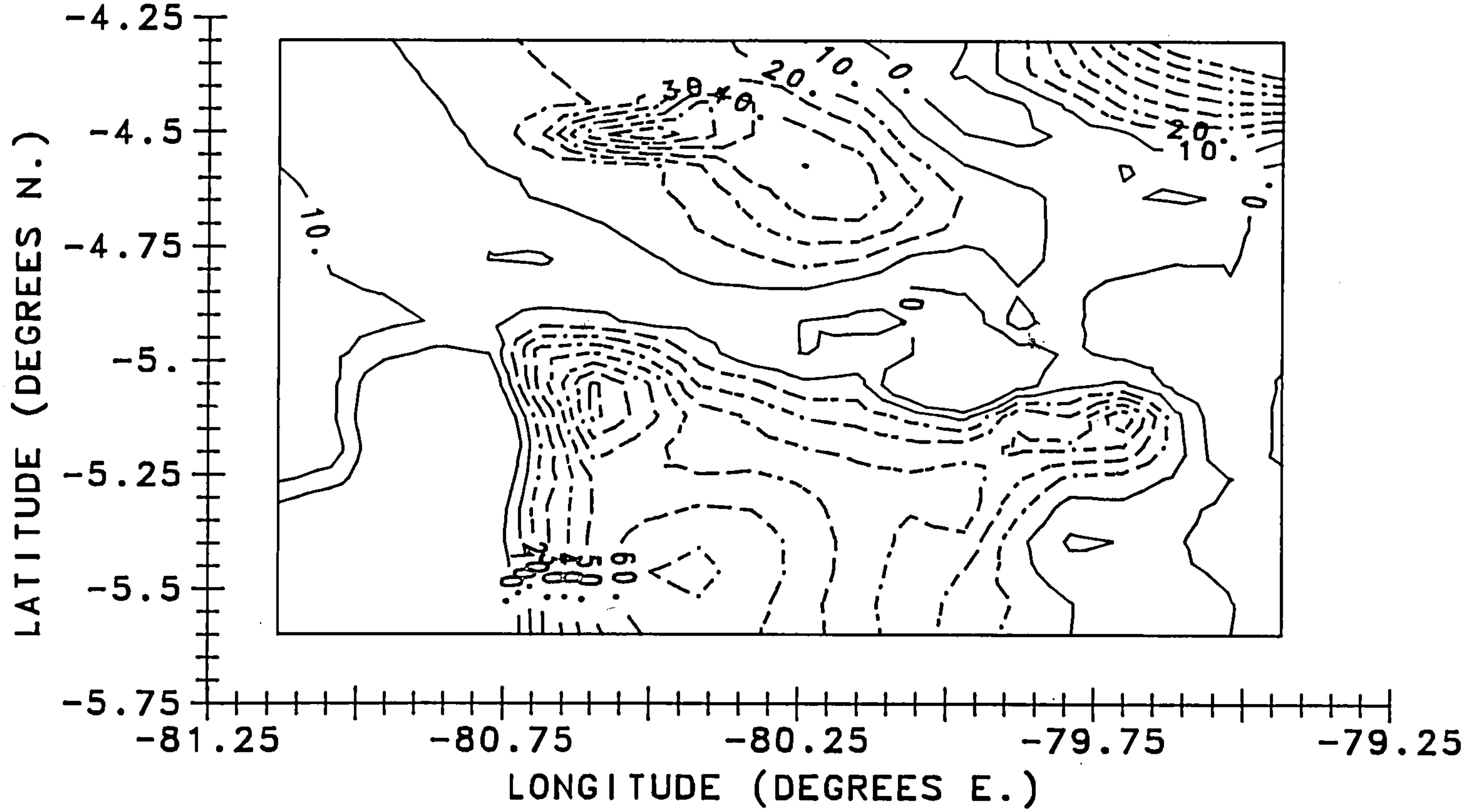
PLOTTED BY PCDS ON 16-OCT-85

Rainfall Map for April 4, 1983

PERUVIAN (RAIN GAUGE) STATIONS DAILY RAINFALL DATA

THERE ARE 56 DATA VALUES USED OUT OF 1680 POSSIBLE VALUES

1983/04/04 00:00:00 < DATE TIME < 1983/04/04 00:00:00



STANDARD DEVIATION = 17.71

MEAN VALUE = 12.47

CONTOUR PLOT OF RAINFALL (MILLIMETERS)

9830404. < EPOCH (YYYMMDD) < 9830404.

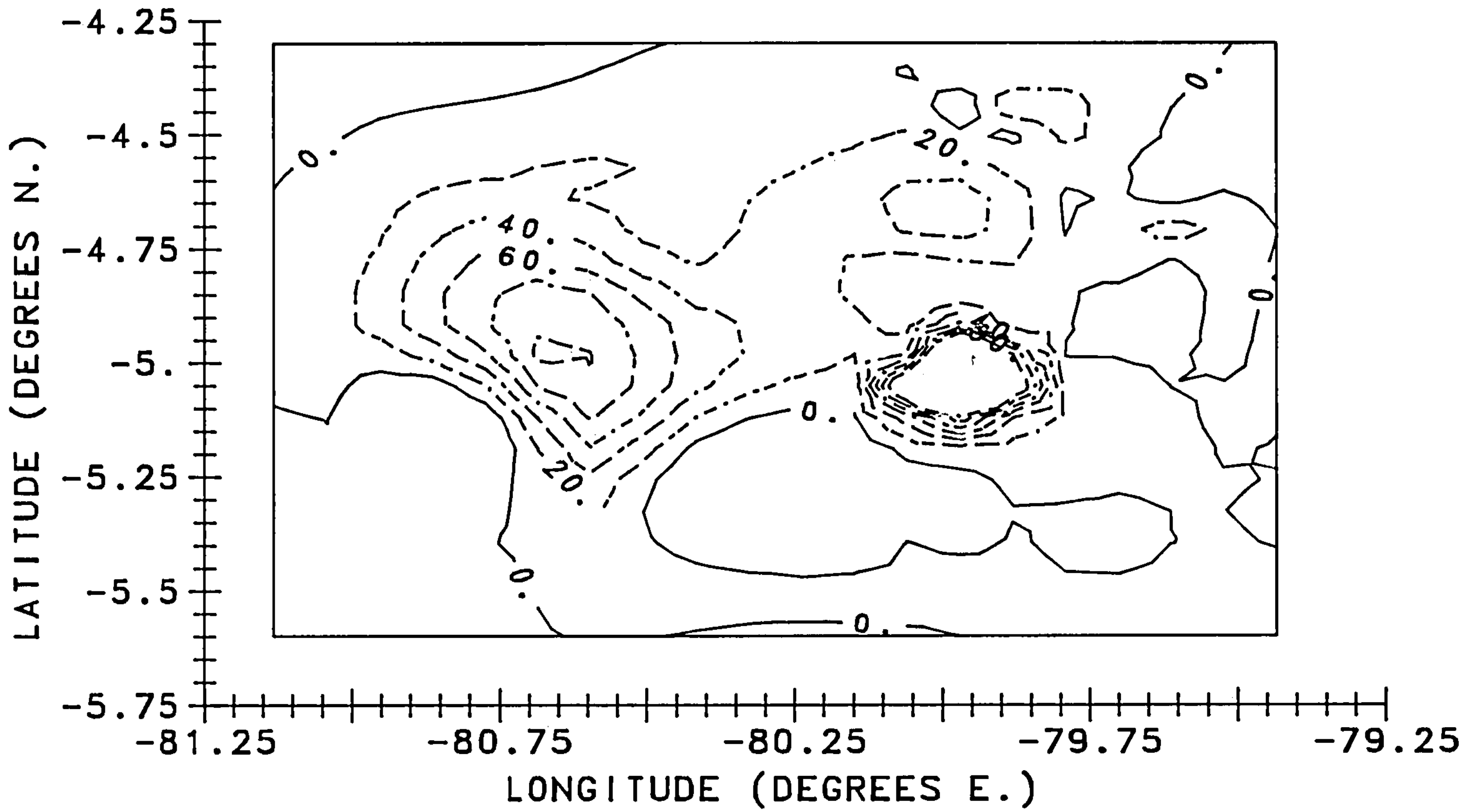
April83 PLOTTED BY PCDS ON 16-OCT-85

Rainfall Map for April 5, 1983

PERUVIAN (RAIN GAUGE) STATIONS DAILY RAINFALL DATA

THERE ARE 56 DATA VALUES USED OUT OF 1680 POSSIBLE VALUES

1983/04/05 00:00:00 < DATE TIME < 1983/04/05 00:00:00

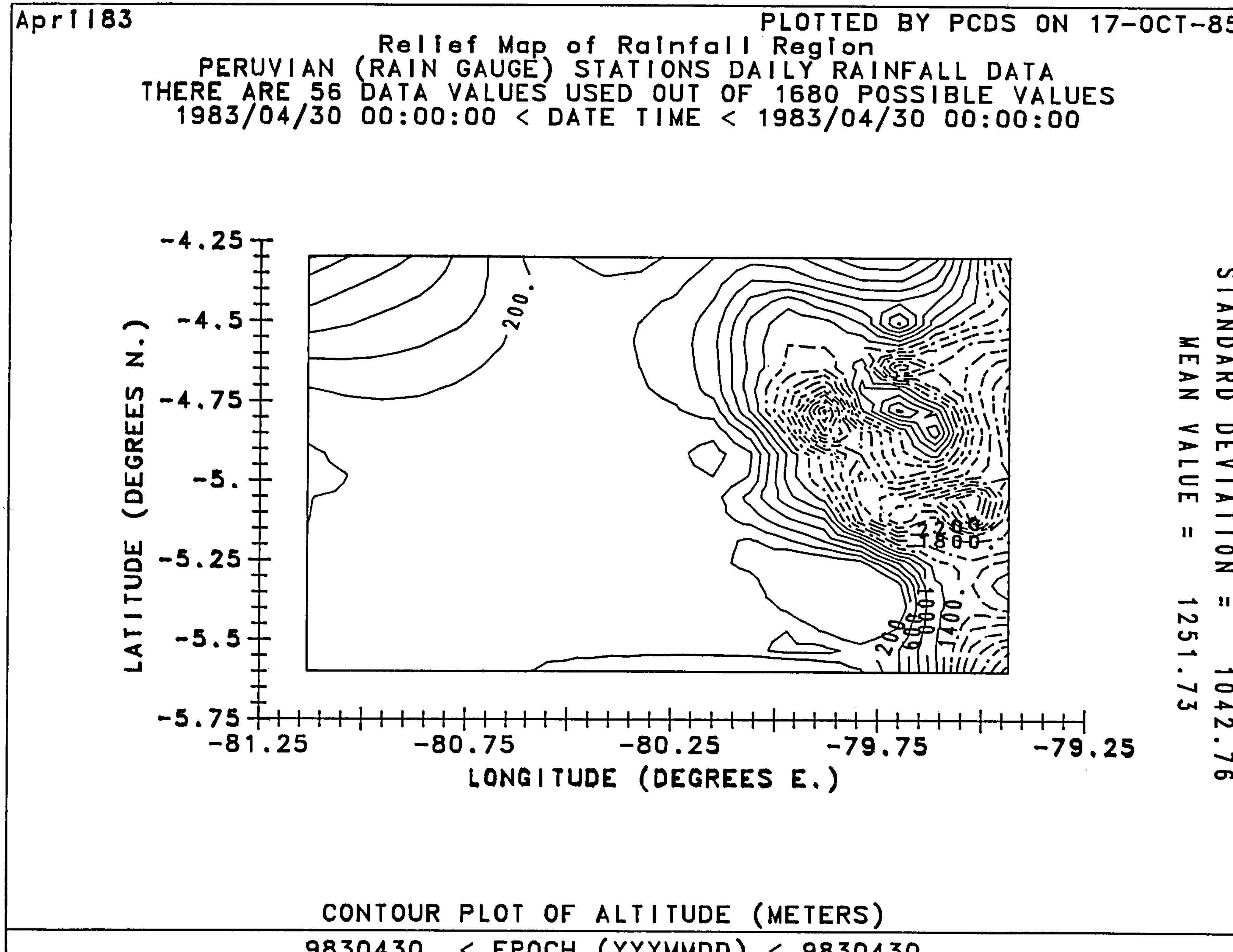


STANDARD DEVIATION = 22.41

MEAN VALUE = 13.79

CONTOUR PLOT OF RAINFALL (MILLIMETERS)

9830405. < EPOCH (YYYMMDD) < 9830405.



Apr183
PLOTTED BY PCDS ON 17-OCT-85
Relief Map of Rainfall Region
PERUVIAN (RAIN GAUGE) STATIONS DAILY RAINFALL DATA
THERE ARE 56 DATA VALUES USED OUT OF 1680 POSSIBLE VALUES
1983/04/30 00:00:00 < DATE TIME < 1983/04/30 00:00:00
LATITUDE (DEGREES N.)
-4.25
-4.5
-4.75
-5.
-5.25
-5.5
-5.75
200.
2200
1800.
1000.
1400.
600.
200.
-81.25
-80.75
-80.25
-79.75
-79.25
LONGITUDE (DEGREES E.)
STANDARD DEVIATION = 1042.76
MEAN VALUE = 1251.73
CONTOUR PLOT OF ALTITUDE (METERS)
9830430. < EPOCH (YYYMMDD) < 9830430.

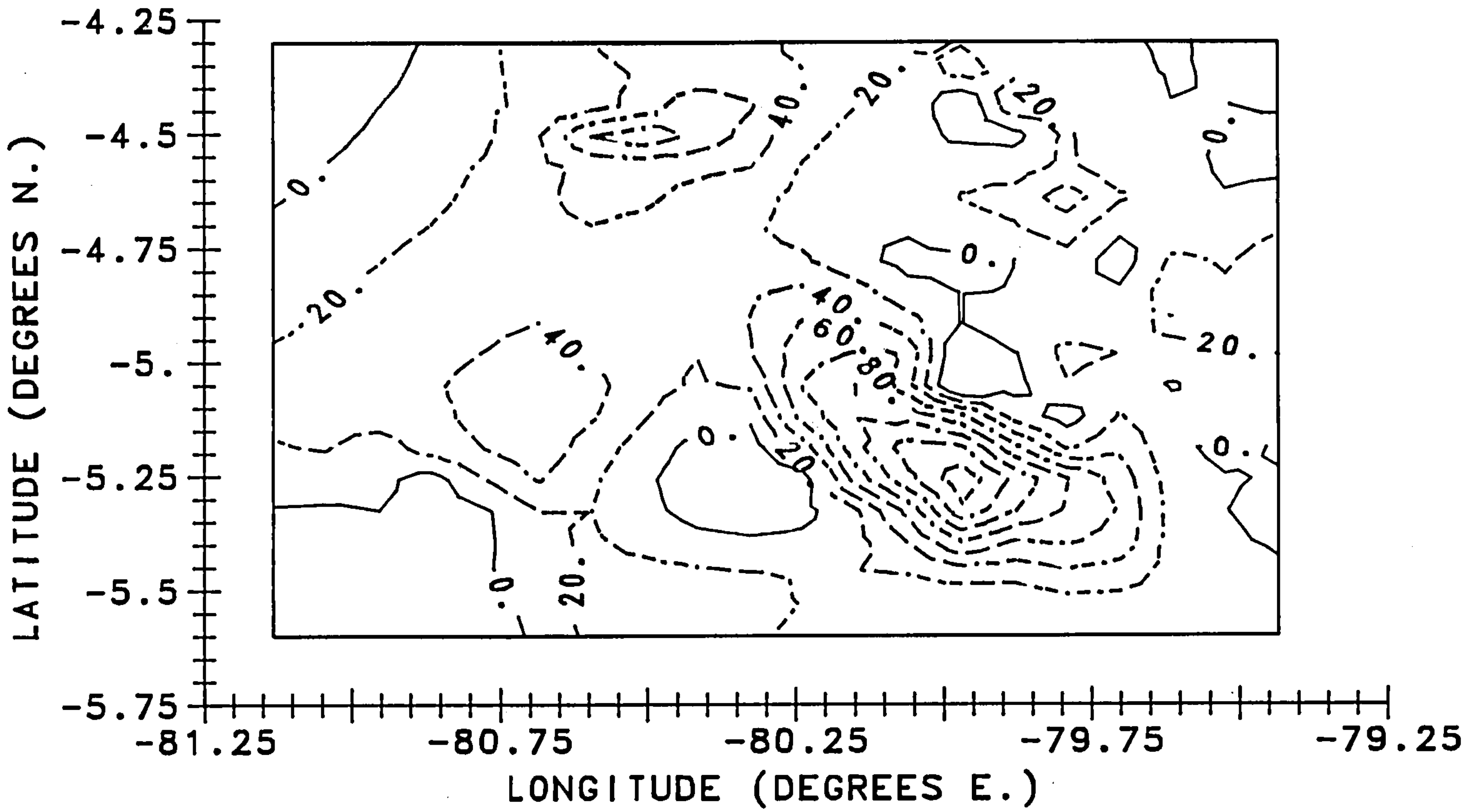
April83 PLOTTED BY PCDS ON 16-OCT-85

Rainfall Map for April 6, 1983

PERUVIAN (RAIN GAUGE) STATIONS DAILY RAINFALL DATA

THERE ARE 56 DATA VALUES USED OUT OF 1680 POSSIBLE VALUES

1983/04/06 00:00:00 < DATE TIME < 1983/04/06 00:00:00



STANDARD DEVIATION = 24.93

MEAN VALUE = 19.35

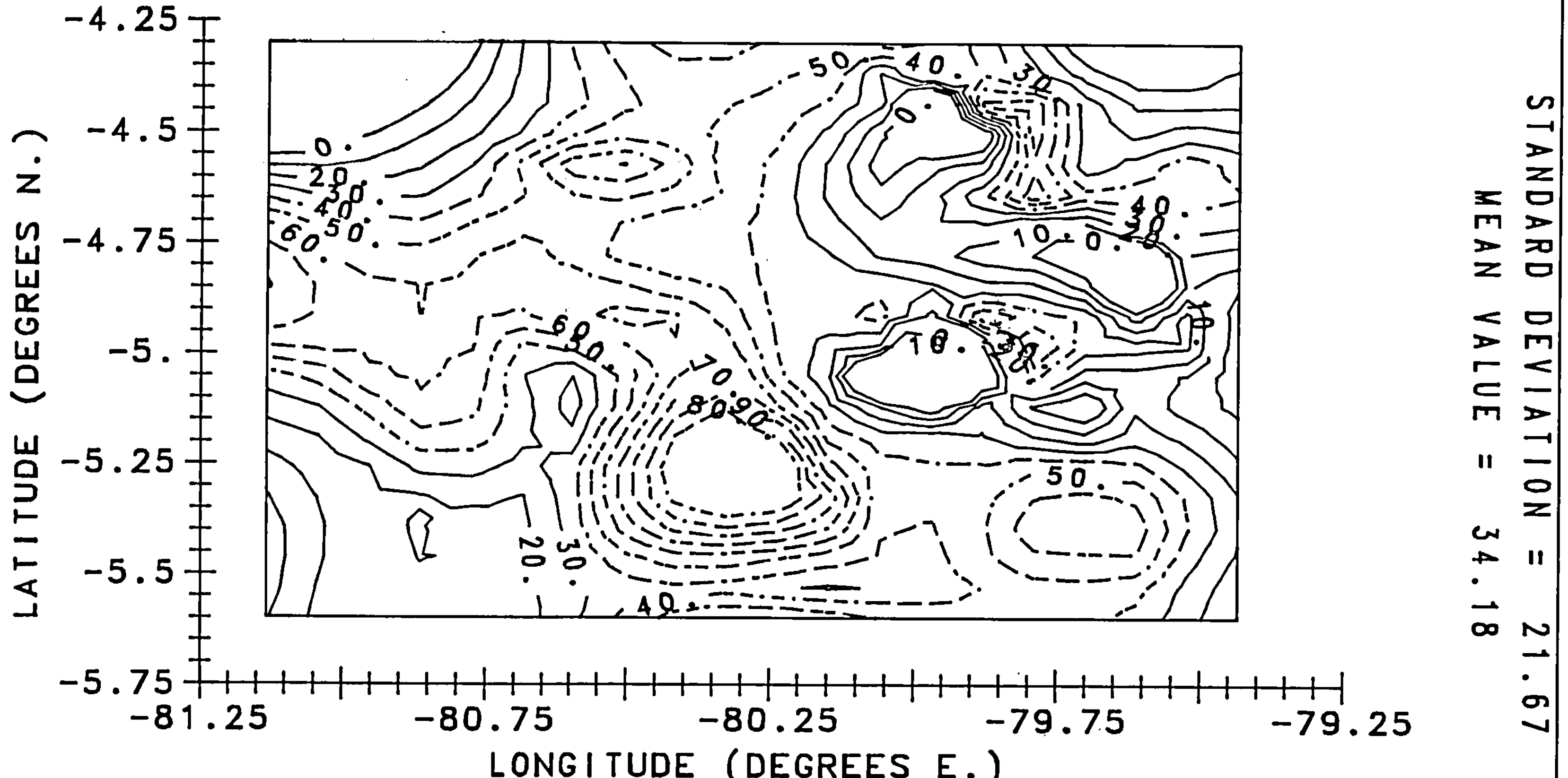
CONTOUR PLOT OF RAINFALL (MILLIMETERS)

9830406. < EPOCH (YYMMDD) < 9830406.

Apri183

PLOTTED BY PCDS ON 16-OCT-85

Rainfall Map for April 7, 1983
PERUVIAN (RAIN GAUGE) STATIONS DAILY RAINFALL DATA
THERE ARE 56 DATA VALUES USED OUT OF 1680 POSSIBLE VALUES
1983/04/07 00:00:00 < DATE TIME < 1983/04/07 00:00:00



CONTOUR PLOT OF RAINFALL (MILLIMETERS)

9830407. < EPOCH (YYYMMDD) < 9830407.

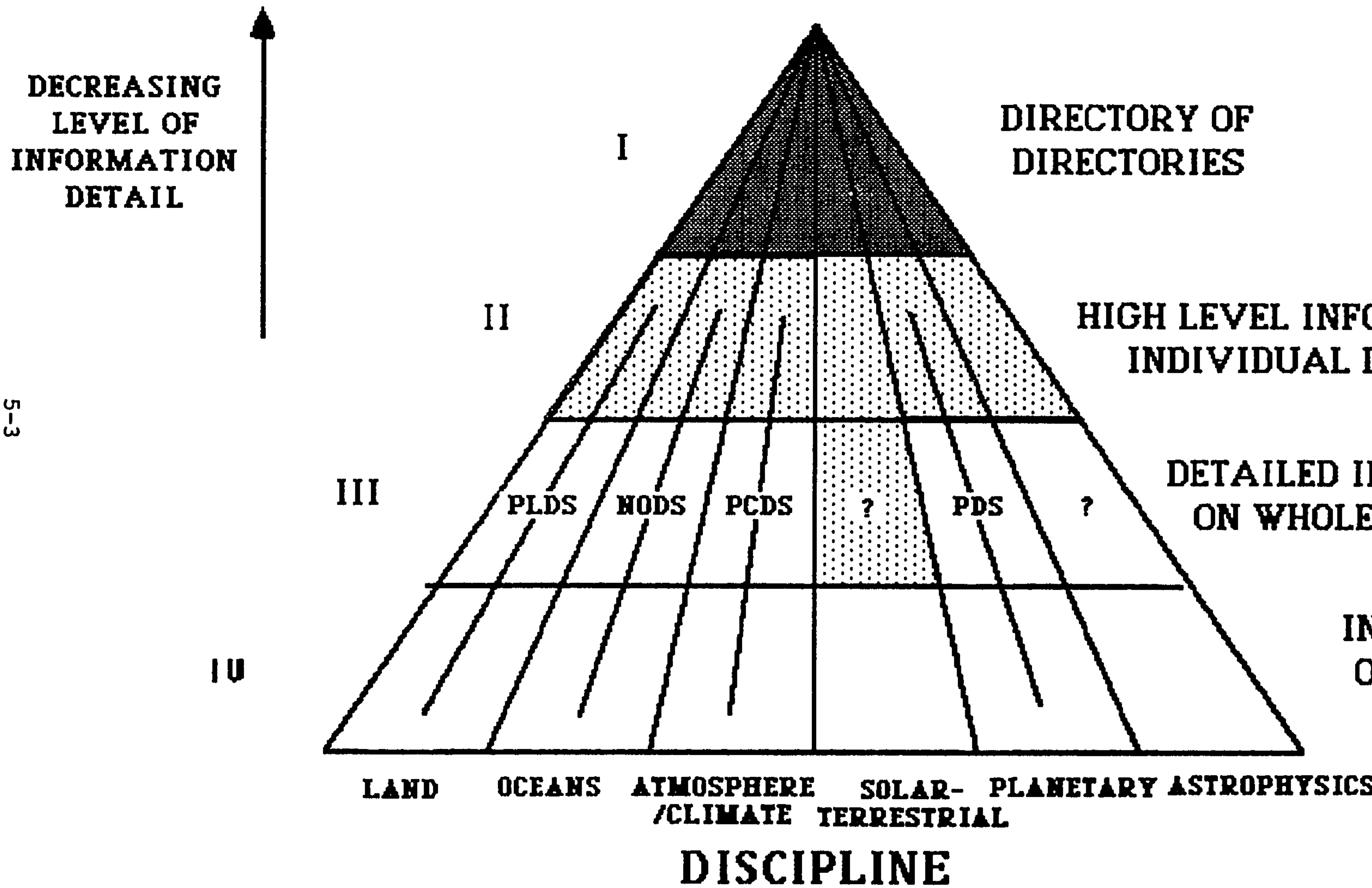
5. TECHNICAL PRESENTATIONS

CENTRAL ON-LINE DATA DIRECTORY

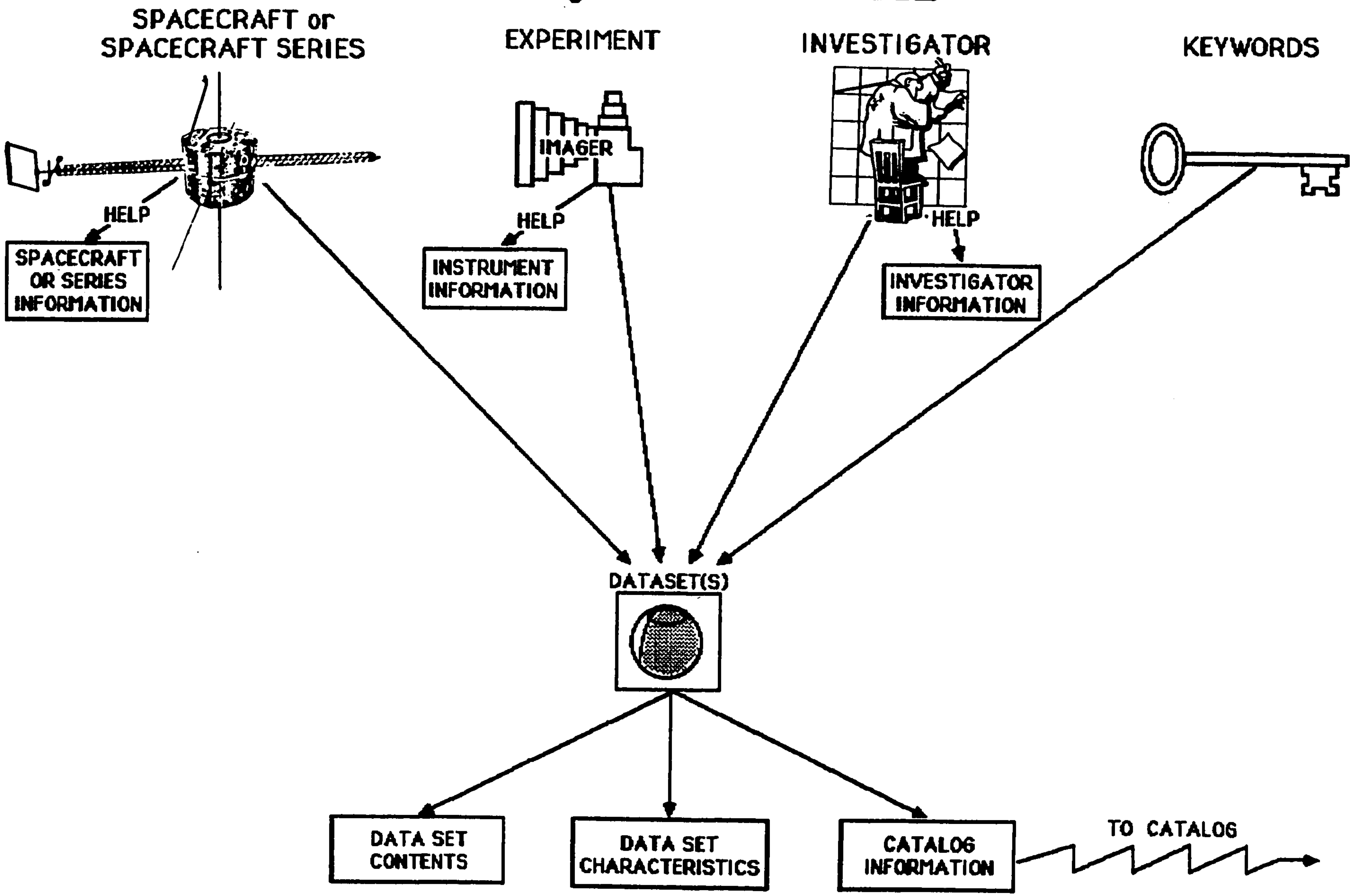
Dr. James Thieman
Central Data Services Facility
Goddard Space Flight Center
Greenbelt, Maryland 20771

The NSSDC Central On-line Data Directory (CODD), which allows the general scientist remote access to information about data sets available not only at NSSDC, but throughout the scientific community, was discussed. A user may search for data set information within CODD by specifying spacecraft name, experiment name, investigator name, and/or keywords. CODD will include information on atmospheric science data sets contained not only within the PCDS, but also within other data sets that are deemed important. Keywords to be used in locating these data sets are currently being formulated. The main type of keyword to be used for categorization of data sets will be discipline related. The primary discipline keyword for PCDS-type data sets would be "ATMOSPHERIC SCIENCE." A good set of subdiscipline keywords is needed under this discipline to subdivide the data sets. A sheet containing a strawman set of subdiscipline keywords was distributed, and a request was made for the knowledgeable scientists to modify or replace the proposed keywords. Suggested changes can be made on the distributed sheet (included with the viewgraph copies in this document) and mailed as indicated on the sheet.

NASA DATA DIRECTORY / CATALOG SYSTEM



CODD QUERY INTERFACE



ATMOSPHERIC SCIENCE KEYWORDS FOR CODD

THE NSSDC Central On-line Data Directory (CODD) allows a user to search for data sets of interest in several ways. One of them is to search for keywords appropriate for the scientific discipline or subdiscipline in which the data are studied. These keywords would lead the user to data systems such as the Pilot Climate Data Base and the data sets within it. We are interested in obtaining meaningful keywords for each of the scientific disciplines from experts in the field. The keywords should provide good categories for subdividing the data sets so that their use will significantly narrow the number of data sets to be further examined.

One of our present categories of scientific disciplines is ATMOSPHERIC SCIENCE. Below are listed a proposed set of subdisciplines that could be easily changed. We are looking for a set of approximately 6 to 12 subdiscipline keywords that would be as complete and mutually exclusive as possible, although we realize this may be impossible. We would appreciate your suggested changes to this list, including a complete new set (and even suggestions for subcategories to these words if possible). Please indicate your suggestions on this sheet and leave it in the front of the conference room or in the anteroom, or, if you wish to mail this in later, mail to:

Dr. J. Thieman
Code 633
NASA/GSFC
Greenbelt, MD 20771

You could also send messages via SPAN to NSSDC::THIEMAN.
Thank you for your assistance.

ATMOSPHERIC SCIENCE — Name______________________________

Exosphere ______________________________

Ionosphere ______________________________

Mesosphere ______________________________

Stratosphere ______________________________

Thermosphere ______________________________

Troposphere ______________________________

____

____

____

____

____

```
$ SET HOST NSSDC
Username: NSSDC

                    Welcome to NSSDC

         The following functions are available

         ?   -  Help information display.

         0   -  Exit from the NSSDC node.

         1   -  CDAW data access and display system.

         2   -  NSSDC Online Data Catalog System (NODCS)/
                Central Online Data Directory (CODD).

         3   -  Search interim NSSDC data set directory.

         4   -  OMNI database management system.

         5   -  Request data and/or information from NSSDC.

         6   -  SPAN information query and/or input.

* Which function do you wish to perform?
```

UNIVERSITY PARTICIPATION VIA UNIDATA
Part I

Professor John Dutton
Department of Meteorology
116 Deike Building
Pennsylvania State University
University Park, Pennsylvania 16802

The UNIDATA Project is a cooperative university project, operated by the University Corporation for Atmospheric Research (UCAR) with National Science Foundation (NSF) funding, aimed at providing interactive communication and computations to the university community in the atmospheric and oceanic sciences. The initial focus has been on providing access to data for weather analysis and prediction. However, UNIDATA is in the process of expanding and possibly providing access to the Pilot Climate Data System through the UNIDATA system in an effort to develop prototypes for an Earth science information system. The notion of an Earth science information system evolved from discussions within NASA and several advisory committees in anticipation of receiving data from the many Earth observing instruments on the space station complex (Earth Observing System).

Stimulated by the 1979 announcement of the government decision to distribute National Weather Service data for government purposes only, UCAR sought ways to provide weather data and computational capability to the university community. It formed the UNIDATA project, and preliminary plans were announced to representatives of 80 universities gathered for an organizational meeting held at the University of Wisconsin in Madison. A management structure was created that consisted of a steering committee, a management committee, and four working groups. As a result of the efforts of those within that management structure, a proposal was formulated and delivered to NSF. NSF appropriated funds for the proposed developmental phase that began over a year ago and included the determination of a set of functional requirements for system design, the investigation of communications architecture and system interfaces, the identification of components and methods of data acquisition, and, finally, the specification of an implementation plan.

OVR-2

UNIDATA BROAD OBJECTIVES

FURTHER EDUCATION AND RESEARCH IN THE ATMOSPHERIC SCIENCES VIA

ADVANCED COMMUNICATIONS
COMPUTER TECHNOLOGY
VIDEO DISPLAYS

SAVE EFFORT THROUGH COMMONALITY OF

APPLICATIONS SOFTWARE
SYSTEM SOFTWARE
INTERFACES
HARDWARE

Jan 85 – D. Fulker

OVR-3

UNIDATA BACKGROUND

EARLY '70s **– Interactive Processing and Graphics Refined for Atmospheric Study at a Few Institutions**

LATE '70s **– AMS/UCAR Attempt to Find Common Basis for Community Wide Utilization of Such Development**

EARLY '80s **– NOAA Decision on AFOS Creates Concern about Availability of Weather Data**

OCT 1982 **– UCAR UNIDATA Steering Committee Formed to Organize Community Action on Both Issues**

JUL 1983 **– Madison Workshop Endorses System Concept**

NOV 1984 **– NSF Approves Grant for UNIDATA Phase II**

Jan 85 – D. Fulker

OVR-4

UNIDATA SYSTEM FUNCTIONS
AS ENDORSED AT JULY '83 WORKSHOP

Transmit Broad Menu of Weather Data and Appropriate Satellite Imagery

Support Local Interactive Analysis

Provide Communications Between Local Systems (Workstations) and Major Computer Centers

Permit Remote Interaction with Field Experiments

Jan 85 - D. Fulker

UNIDATA COMMITTEES AND WORKING GROUPS

STEERING COMMITTEE

J Dutton (chair)	Penn State
E Agee	Purdue
D Johnson	Wisconsin
W Macintyre	NCAR
C Mass	Washington
R Serafin	NCAR
J Stephens	Florida State
V Suomi	Wisconsin/SSEC
T vonder Haar	Colorado State

MANAGEMENT ADVISORY COMMITTEE

J Dutton (chair)	Penn State
D Fulker (proj mgr)	UCAR
R Greenfield	NSF
R Orville	SUNY/Albany
S Ruttenberg	UCAR
D Sargeant	NOAA
V Suomi	Wisconsin/SSEC
R Wilhelmson	Illinois

+ 4 Working Group Chairs

COMMUNICATIONS WORKING GROUP

Chair: C Cooper, RAL

LOCAL DATA MANAGEMENT WORKING GROUP

Chair: R Hauser, Cal State/Chico

DATA ACCESS WORKING GROUP

Chair: C Mass, Washington

LOCAL HARDWARE & SOFTWARE SYSTEMS WG

Chair: E Agee, Purdue

Aug 85 – D Fulker

UNIDATA WORKING GROUP MEMBERSHIPS

COMMUNICATIONS

C Cooper (chair)	RAL
D Fulker	UCAR
K Hays	Florida State
R Pyle	SUNY/Albany
T Warner	Penn State

DATA ACCESS

C Mass (chair)	Washington
R Evans	Miami
R Jenne	NCAR
D Johnson	Wisconsin
T Schlatter	PROFS

LOCAL HARDWARE & SOFTWARE SYSTEMS

E Agee (chair)	Purdue
B Domenico	NCAR
R Hauser	Cal State/Chico
G Huffman	Maryland
K McIntyre	Florida State
R Pasken	Parks College
D Robertson	consultant
D Smith	Purdue
T Whittaker	Wisconsin/SSEC
R Wilhelmson	Illinois
L Wolfson	Scripps

LOCAL DATA MANAGEMENT

R Hauser (chair)	Cal St/Chico
J Anderson	Illinois
G Dengel	Wisconsin/SSEC
R Dengel	Wisconsin/SSEC
S Emmerson	Miami
D Fulker	UCAR
C Gautier	Scripps
D Joseph	NCAR
D Leserman	consultant
J Moore	Saint Louis

Aug 85 – D Fulker

UNIDATA – MAJOR PHASE II DECISIONS

A. Local Configuration Based on LAN Technology (Primarily Ethernet)

B. Separate Weather Data Broadcast and Long-Haul Computer-to-Computer Communications

C. Develop Local System Via Two Paths

1. VAX and MicroVAX Class Computers, Running VMS or UNIX Operating Systems: NASA´s GEMPAK/GEMPLT/TAE and NCAR GRAPHICS
2. IBM PC/AT Class Computers, Running MSDOS Operating System: Wisconsin´s McIDAS and NCAR GRAPHICS

D. Establish UNIDATA Project Office

Oct 85 – S Kassinger

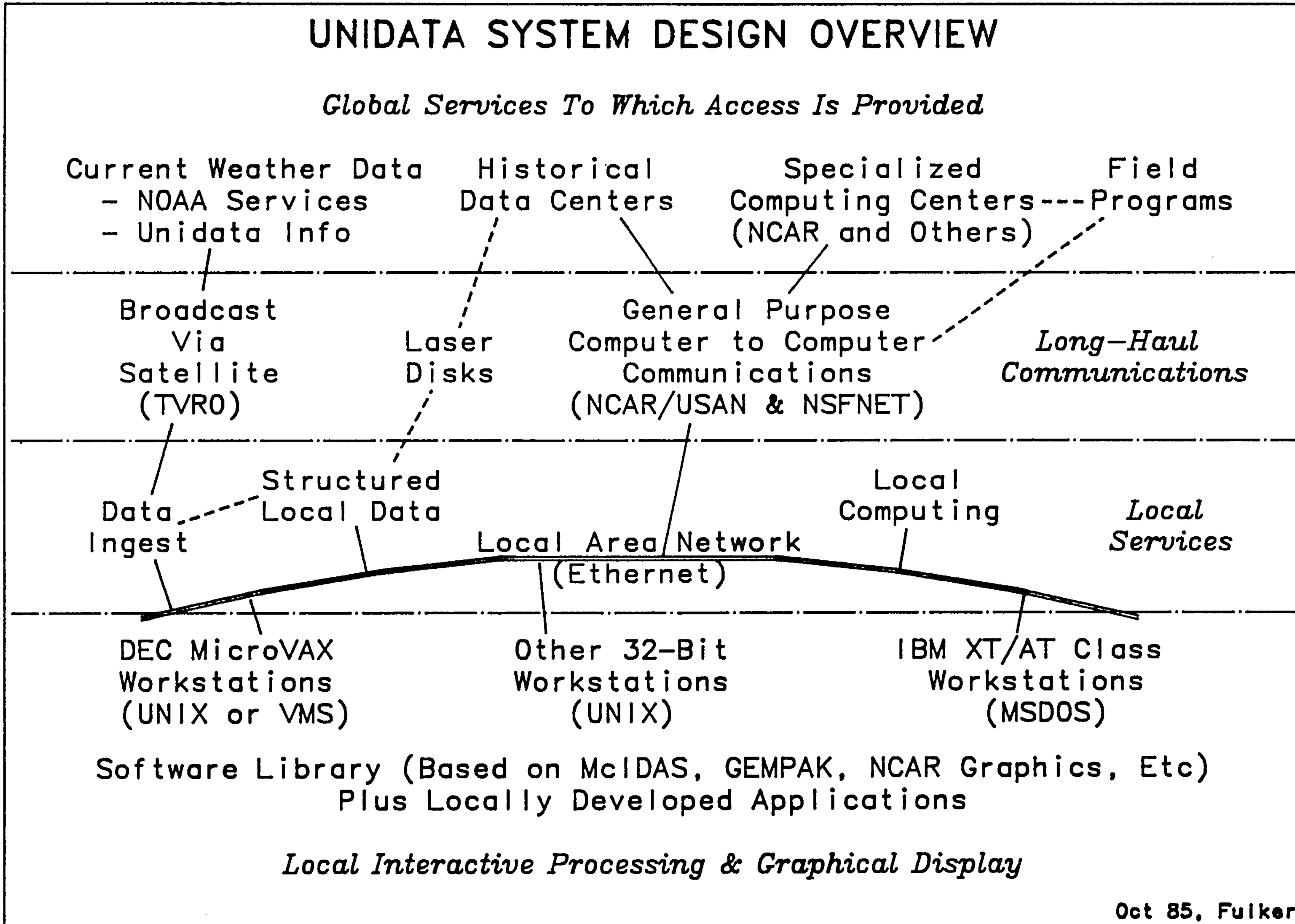
UNIVERSITY PARTICIPATION VIA UNIDATA
Part II

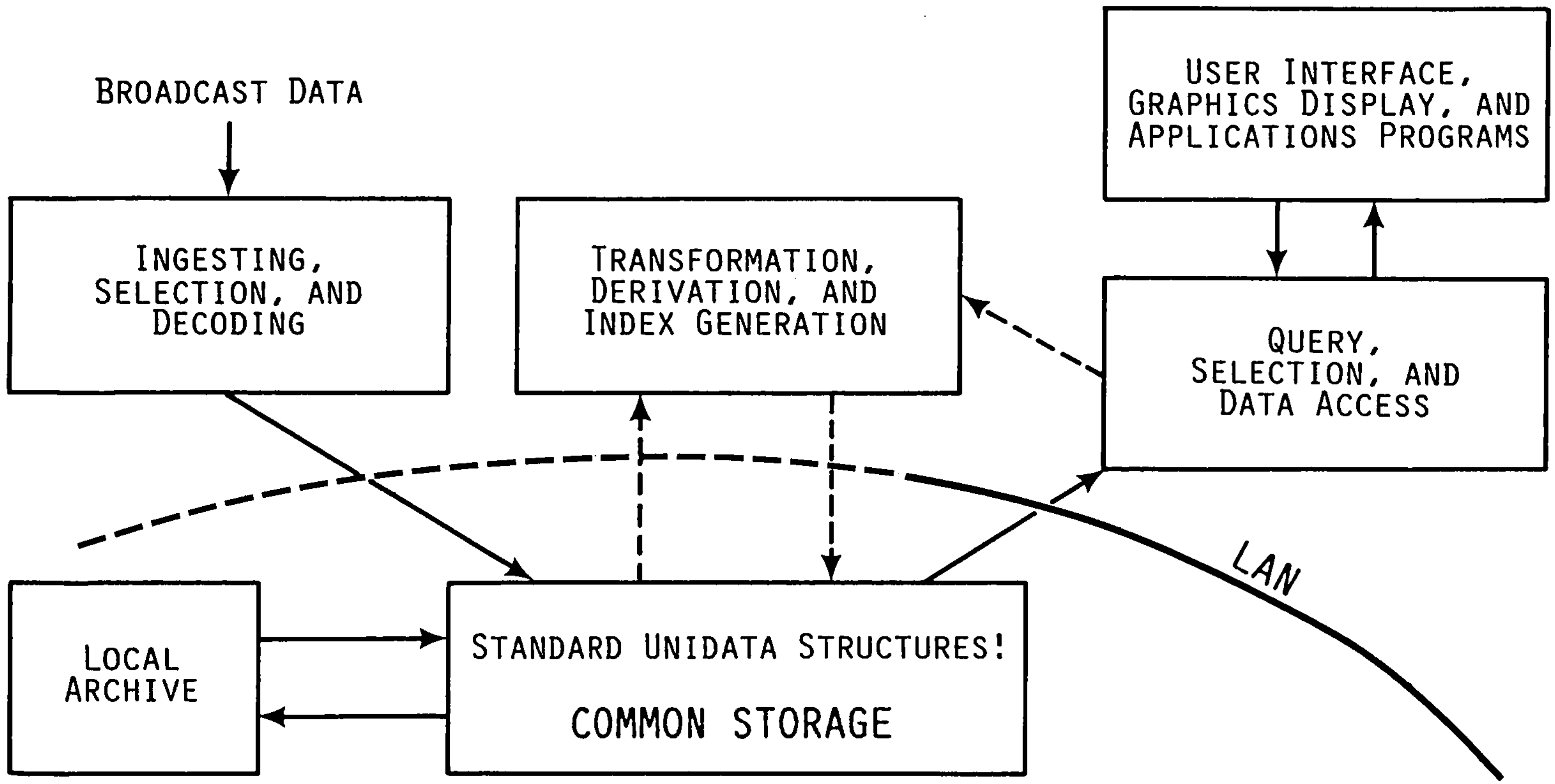
Mr. David W. Fulker
UNIDATA Project Manager
UCAR Projects Office
P.O. Box 3000
Boulder, Colorado 80307

The University Corporation for Atmospheric Research (UCAR) is presently completing UNIDATA, Phase II, considered to be the design phase of the UNIDATA Project. The four major components of the UNIDATA System are: 1) global services to which access is provided, 2) long haul communication for providing that access, 3) local services for providing access and local management of acquired data, and 4) local interactive processing and graphical display. In this presentation, each component was described in detail with linkages among the components elucidated.

Within this framework, access to the PCDS was discussed. It was pointed out that access to the PCDS could occur via general purpose computer-to-computer communications providing remote log on to the system. The UNIDATA System could also be used to transfer information from the PCDS, provided the appropriate software is available to receive the data. Both of these scenarios require agreements on the access protocols and appropriate physical connections.

One of the dominant driving forces behind the UNIDATA movement was the recognition that work stations and small (personal) computers have reached the point where they can be used significantly in the university atmospheric science setting. Another motivating factor was the universities' needs for weather information on a near real-time basis, and UNIDATA has already established a satellite broadcast data service for this purpose. Although only in the developmental stage, a model based on local area network (LAN) technology with common storage (or file server) has been proposed for a Local Data Management (LDM) Subsystem. Phase III of the UNIDATA Project will include a prototype implementation of this Local Data Management Subsystem. A proposal has been submitted to NSF to fund Phase III, which includes Beta testing in actual university settings of all UNIDATA components. Extending the broadcast data system, establishing a formal software library, establishing a support office, and preparing system and user documentation are also goals of Phase III. In addition, a Phase IV that calls for community wide implementation is being planned.


UNIDATA SYSTEM DESIGN OVERVIEW
Global Services To Which Access Is Provided
Current Weather Data
- NOAA Services
- Unidata Info
Historical
Data Centers
Specialized
Computing Centers
(NCAR and Others)
Field
Programs
Broadcast
Via
Satellite
(TVRO)
Laser
Disks
General Purpose
Computer to Computer
Communications
(NCAR/USAN & NSFNET)
Long-Haul
Communications
Data
Ingest
Structured
Local Data
Local Area Network
(Ethernet)
Local
Computing
Local
Services
DEC MicroVAX
Workstations
(UNIX or VMS)
Other 32-Bit
Workstations
(UNIX)
IBM XT/AT Class
Workstations
(MSDOS)
Software Library (Based on McIDAS, GEMPAK, NCAR Graphics, Etc)
Plus Locally Developed Applications
Local Interactive Processing & Graphical Display
Oct 85, Fulker



LOCAL DATA MANAGEMENT (LDM) SUBSYSTEM

NETWORK ACCESS TO PCDS (SPAN, ESN, SESNET, ARPANET)

Dr. James Green
Director, National Space Science Data Center
Goddard Space Flight Center
Greenbelt, Maryland 20771

One of the major goals of the National Space Science Data Center is to increase access to NASA data systems by enhancing networking activities. The activities are centered around three basic networking systems: the Space Physics Analysis Network (SPAN); the Earth Science Network (ESN); and the NASA Packet Switched System (NPSS). In this presentation, each system was described, linkages among systems were explained, and future plans were announced. The inclusion of several new climate nodes on SPAN or ESN was also mentioned. Presently, the Pilot Climate Data System is accessible through SPAN and will be accessible through NPSS by summer and ESN by the end of 1986.

Ambitious plans for implementation are underway. The implementation of these plans will represent a major advance in the utilization and accessibility of data worldwide. The interdisciplinary opportunities afforded for correlative studies will further expand the nature and scope of future research using NASA data.

Copies of the SPAN technical memorandum, TM-86499, and of the "First Earth Science Pilot Coordination Meeting" minutes are available on request from NSSDC.

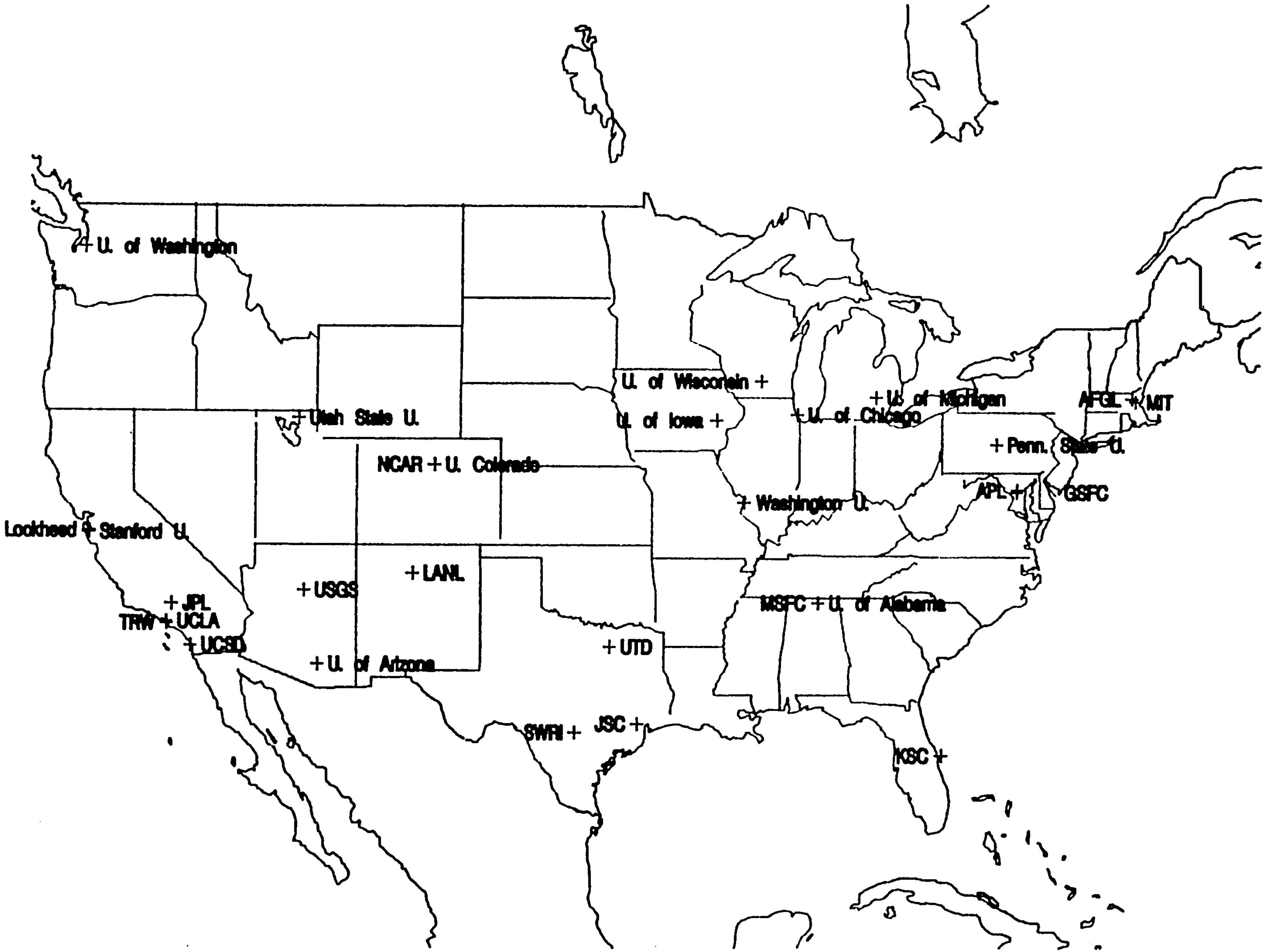
NSSDC NETWORK INVOLVEMENT

- o SPACE PHYSICS ANALYSIS NETWORK (SPAN)
  - OPERATIONAL (120 COMPUTER NODES)
  - MAJOR REDESIGN UNDERWAY
  - COMBINES SPACE PHYSICS, ATMOSPHERIC, PLANETARY, AND OCEANS (FUTURE) NODES
  - GSFC, PENN STATE, U OF MICHIGAN, MIT & NCAR
- o EARTH SCIENCE NETWORK (ESN)
  - MAJOR DEVELOPMENT UNDERWAY
  - EXPECT PARTIAL OPERATIONS BY SEPTEMBER
  - FULL OPERATION BY DECEMBER 86
- o NASA PACKET SWITCHED SYSTEM (NPSS)
  - EXCELLENT TELENET CONNECTION
  - HAS SPAN GATEWAY AT MSFC
  - EXPECT NSSDC GATEWAY BY JULY
  - PRIMARY TERMINAL TRAFFIC
  - NPSS PART OF NASA'S PROGAM SUPPORT COMMUNICATION (PSC) HIGHWAY
- o NEED TO IDENTIFY MAJOR CLIMATE NETWORK NODES FOR SPAN OR ESN

WHAT IS THE SPACE PHYSICS ANALYSIS NETWORK (SPAN)

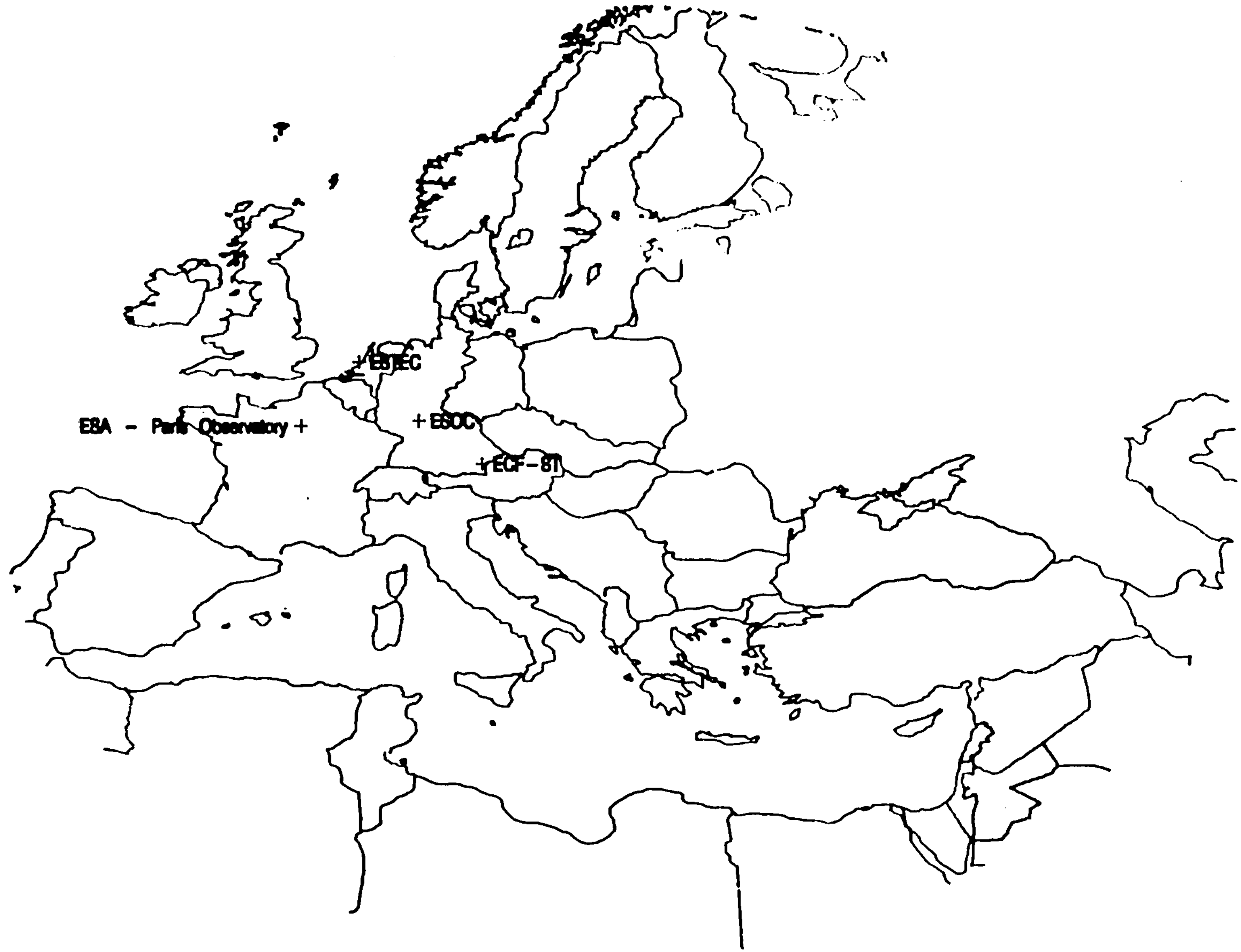
- SPAN DESIGN STARTED IN 1980; SPAN OPERATION STARTED IN 1981
- SPAN IS A MULTI-MISSION, CORRELATIVE DATA COMPARISON NETWORK
- SPAN IS "RUN" BY THE USERS (DATA SYSTEMS USERS WORKING GROUP)
- SPAN IS A COMPUTER-TO-COMPUTER COMMUNICATION SYSTEM (DECNET)
- SPAN UTILIZES MUCH OF THE ALREADY PAID FOR NASA EQUIPMENT
- NSSDC HAS BEEN A SPAN NODE SINCE OCTOBER 1984

SPAN Nodes as of January 1986

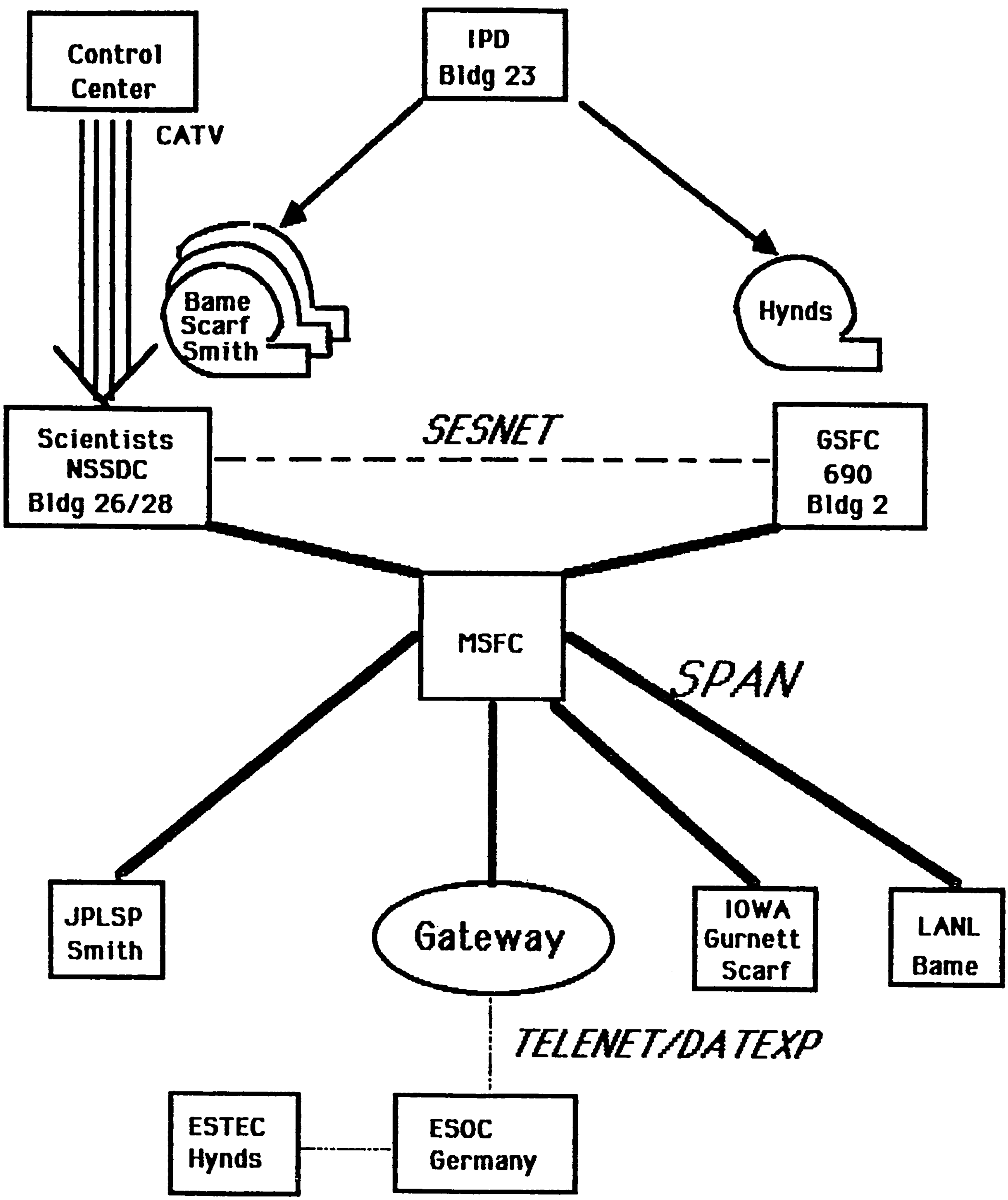


5-23

European Nodes Connected to SPAN



ICE Communication Support

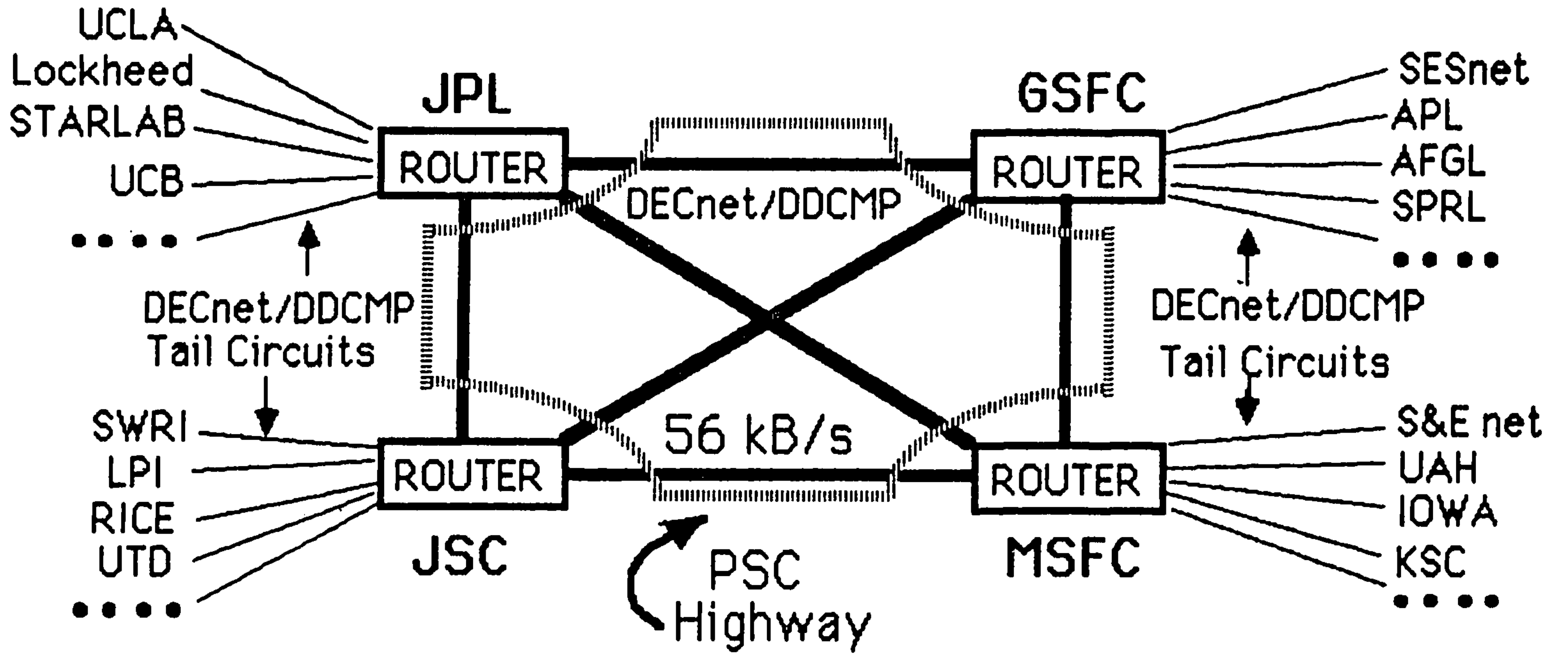


NSSDC
SEPT 12/85

FUTURE GOALS OF NSSDC/SPAN

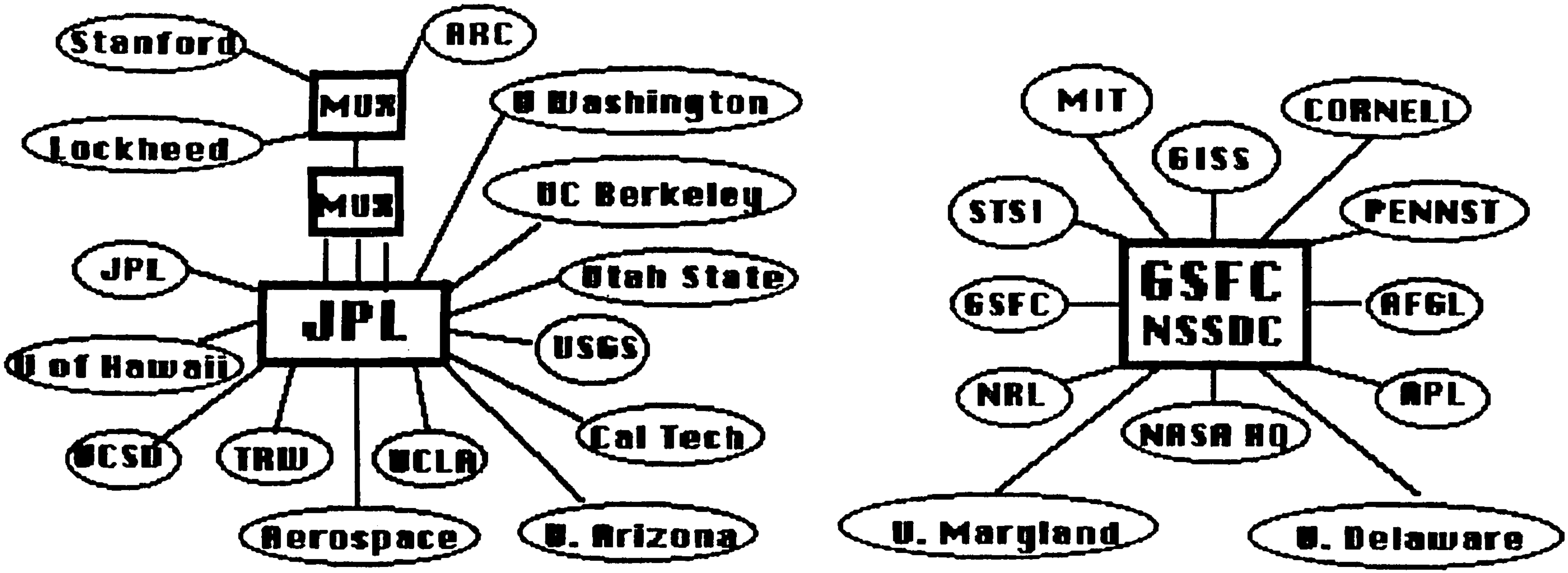
- "OPEN UP" NSSDC RESOURCES TO ELECTRONIC ACCESS
  - PCDS, PLDS
- DATA CATALOGS AND DIRECTORIES ONLINE
  - "ROAD MAP" FOR SPACE AND EARTH SCIENCE DATA
- SERVICE REQUEST
  - NSSDC::REQUEST
  - NETWORK DESIRED DATA (SMALL AMOUNTS, DOCUMENTATION, PLOT FILES, ETC.)
- NSSDC FACILITIES TO COME ON SPAN
  - ASTRONOMICAL DATA CENTER
  - CDAWS AND SSC
- PSC WILL PROVIDE THE LINES (MARCH/APRIL 86)
  - REDESIGN SPAN WITH HIGHER (DYNAMIC) BANDWIDTHS
- MAJOR LINES TO EUROPE AND JAPAN
- DEVELOP GATEWAYS TO OTHER NETWORKS (NPSS, ESN, SESNET, ETC.)

SPAN Use Of PSC

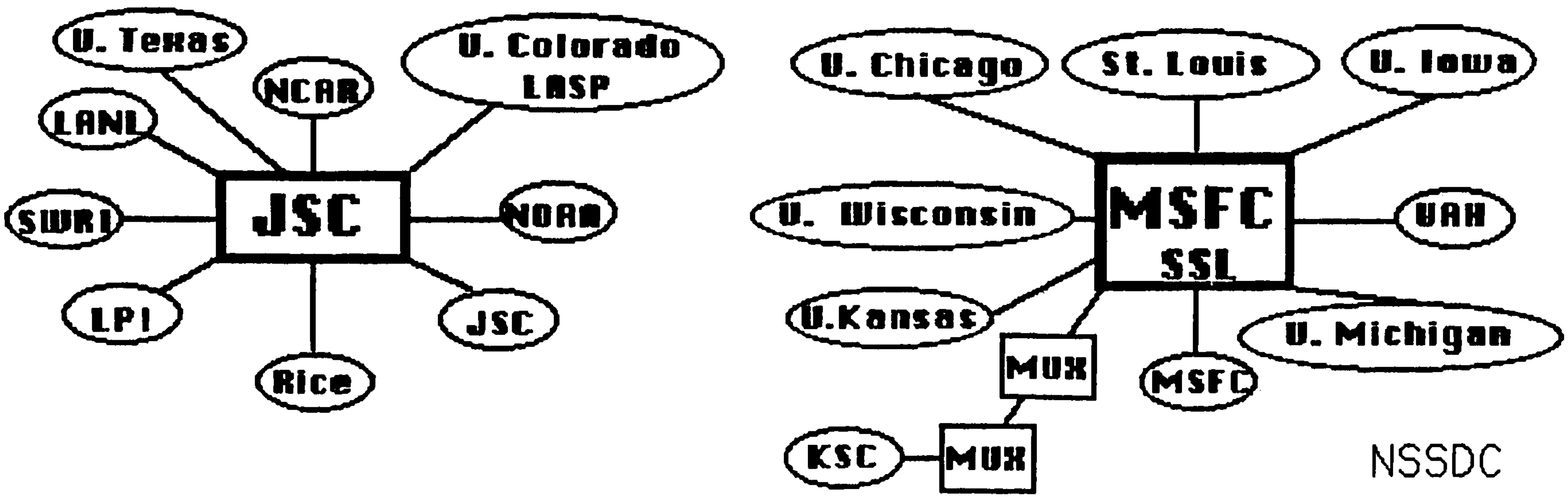


5-27

NSSDC
SEPT 11/85



SPAN CONFIGURATION



NSSDC

Nov 15/85-3

RECENT REFERENCES ABOUT SPAN

D.N. BAKER, R.D. ZWICKL, AND J.L. GREEN, THE NASA DATA SYSTEMS USERS WORKING GROUP: RECOMMENDATIONS FOR IMPROVED SCIENTIFIC INTERACTIONS EOS (MEETING REPORT) 65, 46, 1984.

SPAN PILOT PROJECT REPORT, EOS (MEETING REPORT), 65, 111, 1984.

J.L. GREEN, SPACELAB DATA ANALYSIS USING THE SPAN SYSTEM, IN THE NATIONAL SYMPOSIUM AND WORKSHOP ON OPTICAL PLATFORMS, PROC., SPIE 493 (C. WYMAN EDITOR), 370, 1984.

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J.L. GREEN, AND R.D. ZWICKL, DATA SYSTEMS USERS WORKING GROUP ACCEPTED IN EOS, NOVEMBER 1985.

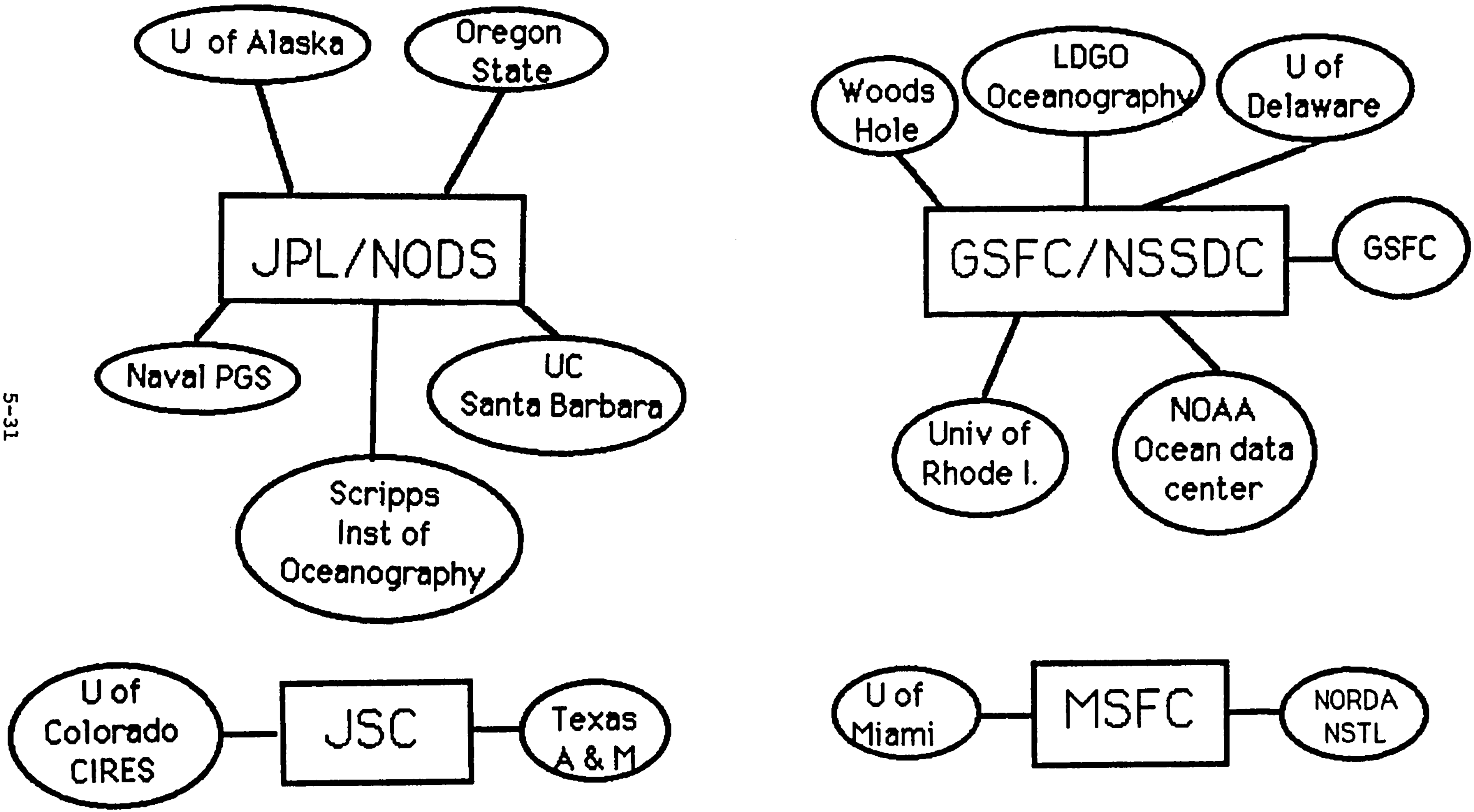
T. SANDERSON, S. HO, N. HEIJDEN, E. JABS, AND J.L. GREEN, NEAR-REALTIME TRANSATLANTIC TRANSMISSION OF ICE SPACECRAFT DATA USING THE SPAN NETWORK: THE COMET GIACOBINI-ZINNER ENCOUNTER, ACCEPTED IN THE ESA BULLETIN, DECEMBER 1985.

J.L. GREEN, AND J.H. KING, BEHIND THE SCENES DURING A COMET ENCOUNTER, ACCEPTED IN EOS, DECEMBER 1985.

EARTH SCIENCE NETWORK (ESN)

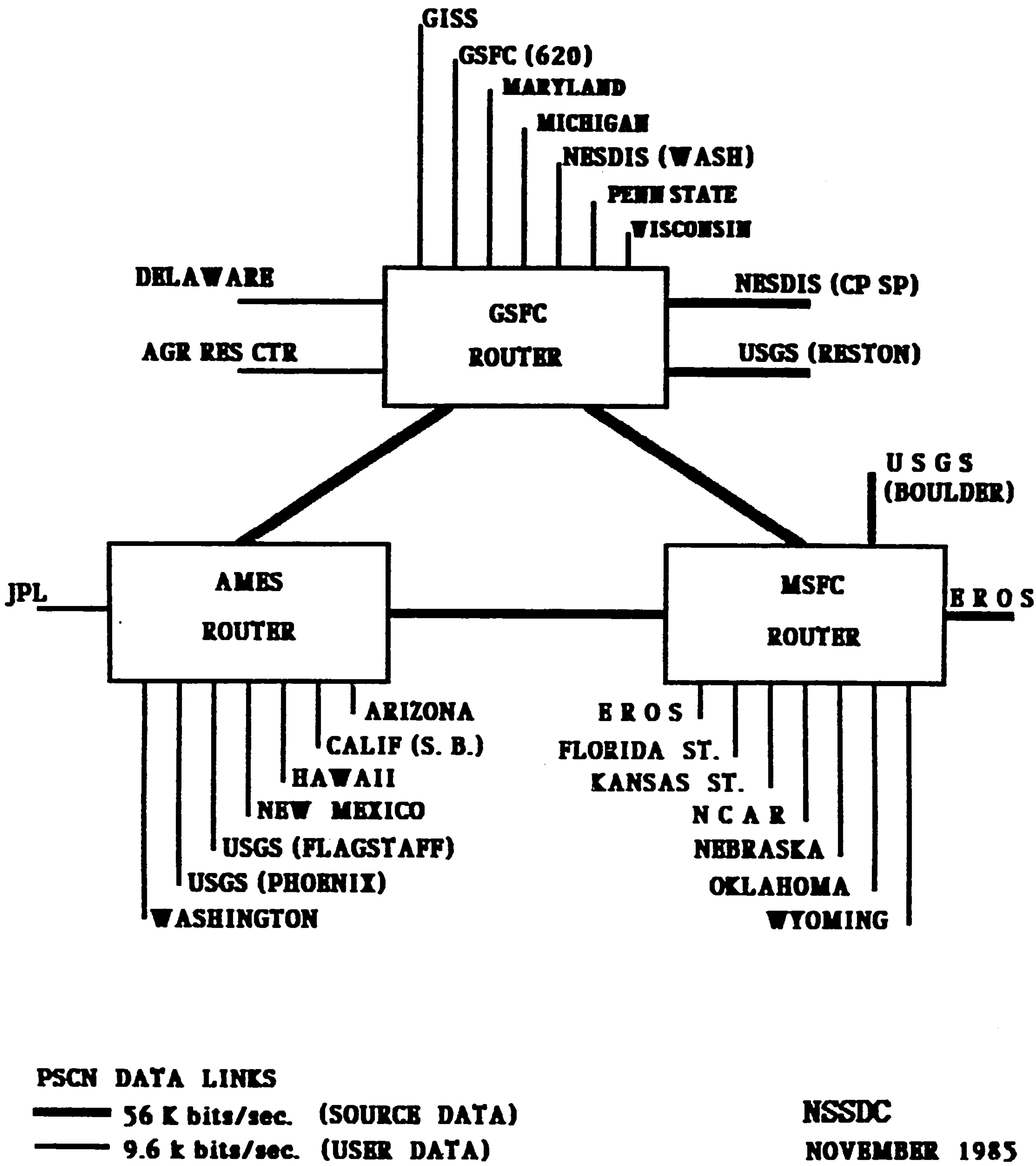
- BASED ON PILOT LAND AND OCEANS COMMUNICATIONS REQUIREMENTS
- PSC WILL PROVIDE THE LINES (AUGUST/SEPTEMBER 86)
- PROTOCOL CHOSEN TCP/IP AND DECNET
- CURRENT DESIGN SIMILAR TO SPAN
  - USE 56 KB/S BACKBONE
  - TAIL CIRCUITS CONNECTED TO ROUTING CENTERS AT 9.6 KB/S
  - PROPOSED ROUTING CENTERS GSFC, MSFC, JPL, AND AMES
- SOFTWARE/HARDWARE TO BE DETERMINED AND PROCURED
  - ROUTERS
  - INTERFACE

SPAN/OCEAN NETWORK



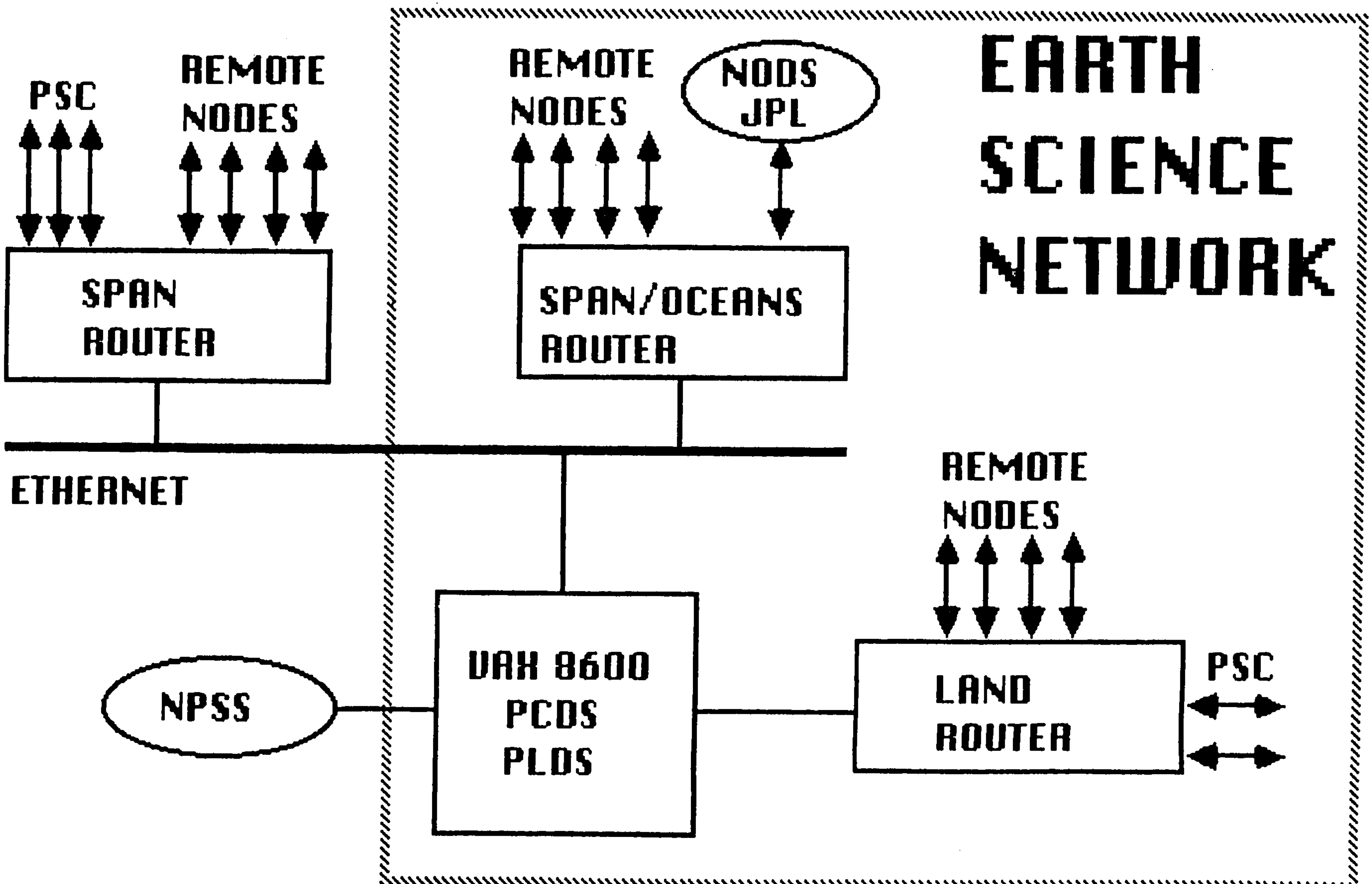
NSSDC
DEC 19/85

EARTH SCIENCE NETWORK



NSSDC
NOVEMBER 1985

NSSDC NETWORK ACTIVITIES

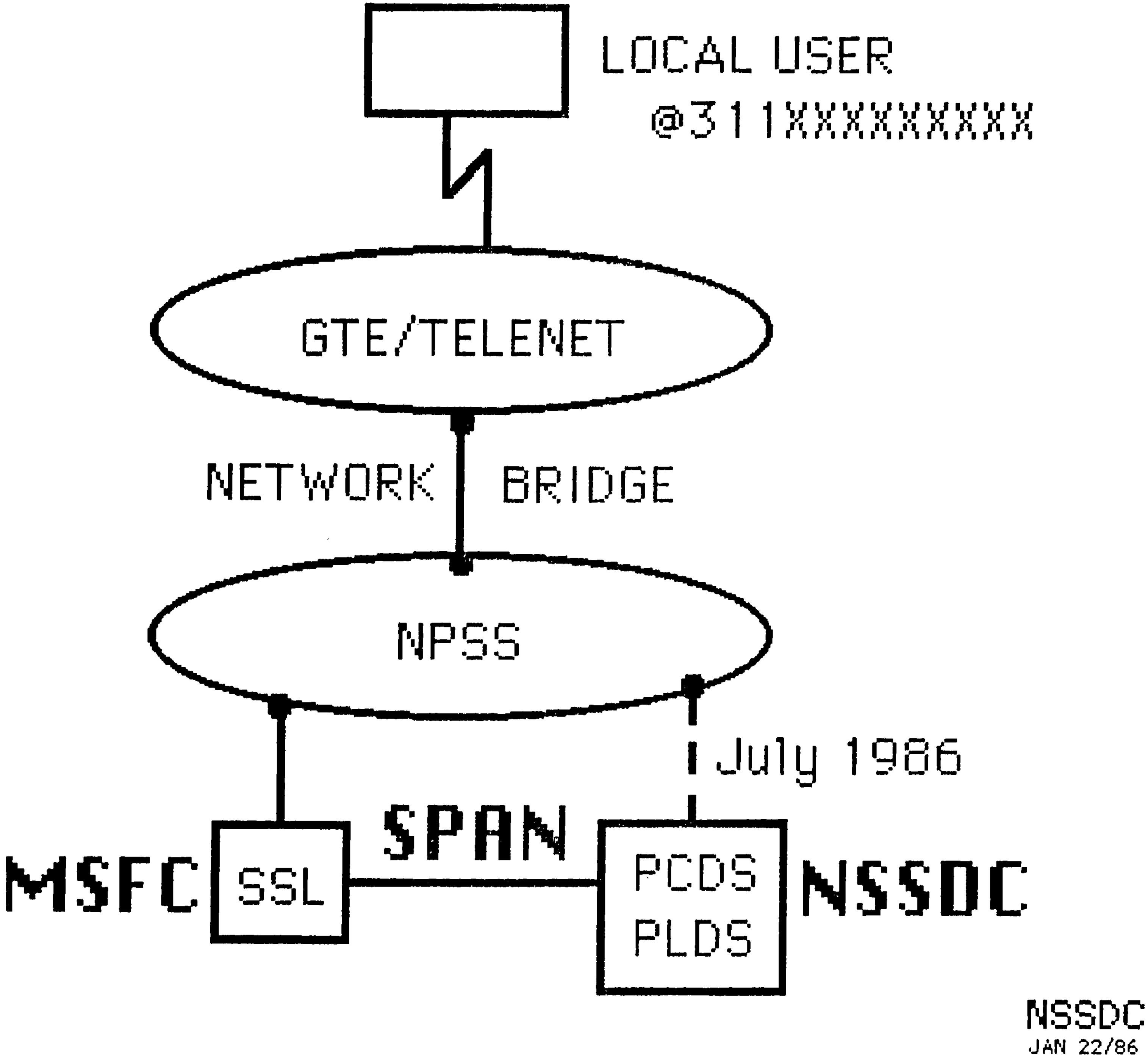


NSSDC

Dec 9/85

NPSS ACCESS TO NSSDC

- o CURRENT NPSS CONNECTION AT MSFC
  - GTE/TELENET TRANSPARENT
  - MUST LOGON TO SSL
  - USE SPAN TO GET TO NSSDC
- o NSSDC/NPSS CONNECTION OPERATIONAL BY JULY 86
  - PROVIDE TERMINAL ACCESS
  - LIMITED FILE TRANSFER
- o NASA PAYS TELENET BILL


LOCAL USER
@311XXXXXXXXX
GTE/TELENET
NETWORK BRIDGE
NPSS
July 1986
SPAN
MSFC
SSL
PCDS
PLDS
NSSDC
NSSDC
JAN 22/86

FUTURE GOALS

- ADD PCDS SPECIFIC NODES TO SPAN OR ESN
- LOOK FOR WAYS TO MERGE SPAN AND ESN INTO A UNIFIED NASA SCIENCE NETWORK

MSFC Routing Center Location

SSL	Discipline: Solar Terr.,Planetary
Dennis Gallagher	Machine : SSL
Mail Code ES01	Bldg. : 4481
Marshall Space Flight Center	Rm. : 303
Huntsville, Alabama 35812	
205/453-0108	

MSFC PSCN Tail Circuits

UAH	Discipline: Solar Terrestrial
J. R. Sisk	Machine : UAH
Roy Torbert (Alt)	Bldg. : Research Institute
Research Institute Bldg.	Rm. : D14
The University of Alabama in Huntsville	
Huntsville, Alabama 35899	
205/895-6318	
205/895-6417 (Alt)	

U OF KANSAS	Discipline: Solar Terrestrial
Rick Desko	Machine : KUPHSX
University of Kansas	Bldg. : Malott Hall
Department of Physics and Astronomy	Rm. : B096
Lawrence, Kansas 66045	
913/864-3610	

IOWA	Discipline: Solar Terr.,Planetary,Astrophysics
Larry H. Schroeder	Machine : VAX-11/780
Room 114 VAN	Bldg. : Van Allen Hall
Department of Physics and Astronomy	Rm. : 209
University of Iowa	
Iowa City, IA 52242	
319/353-5693	
319/353-5148	

SPRLA	Discipline: Atmospheric,Astrophysics
Salim Linggi	Machine : SPRLA
Space Physics Research Lab.	Bldg. : Space Physics Research Lab
University of Michigan	Rm. : 2136
2455 Hayward, Ann Arbor	
Michigan 48109	
313-763-6229	

UNIVERSITY OF MIAMI

Discipline: Oceans

Robert A. Evans
RSMAS/MPO
4600 Rickebacker Cswy
Miami, FL 33149
305/361-4018

Machine: VAX-11/780
Bldg. : Marine Science Center
Rm. : 222

NAVY NORDA

Discipline: Oceans

John Schmidt
NORDA
Code 321
NSTL, Miss. 39529
601/688-5266
FTS (494-5266)

Machine: VAX 8600
Bldg. : 1105
Rm. : 604

WASHINGTON UNIVERSITY

Discipline: Planetary

Susan Slavney
Washington University
St. Louis, MO 63130
314/889-5493

Machine : WURST
Bldg. : Wilson Hall
Rm. : 10

CHICAGO

Discipline: Astrophysics

Gordon Lentz
Laboratory for Astrophysics and Space Research
Enrico Fermi Institute
The University of Chicago
933 East 56th Street
Chicago, Illinois 60637
312/962-7836

Machine : PDP-11/44
Bldg. : Lab for Astrophysics and Space Research
Rm. : 52

UNIVERSITY OF WISCONSIN

Discipline: Astrophysics

Chris Anderson
University of Wisconsin
Madison, WI 53706
608/262-0492

Machine : VAX-11/780
Bldg. : Sterling Hall
Rm. : 5507

MIPS1 (MSFC/HOSC)

Discipline: Spacelab, Space Station

Harrell Phillips
Mail Code EL23
Marshall Space Flight Center
Huntsville, Alabama 35812
205/453-2617
205/453-2850

Machine : TMIS VAX
Bldg. : 4663
Rm. : A109

KSC

Discipline: Spacelab, Space Station

Mark Juhr
MS/PRC 2204
Kenedy Space Center, FL 32899
305/823-3180

Machine :
Bldg. : Hq. Building
Rm. : 3468

GSFC Routing Center Location

NSSDC — Discipline: All

Lee Foster
Code 633
GSFC
Greenbelt, MD 20771
(301) 344-5574

Machine : NSSDC
Bldg. : 26
Rm. : 121

GSFC PSCN Tail Circuits

NASA/HQ — Discipline: All

Dave Lavery
NASA Headquarters
Washington, DC 20546
202/453-1772

Machine : POLLUX
Bldg. : FOB10B
Rm. : A13

ESOC — Discipline: All

Robert Bosch
ESOC
6100 Darmstadt
West Germany
49-6151-886-659

Machine :
Bldg. : Meteorsat Bldg.
Rm. : 190 (2nd floor)

AFGL — Discipline: Solar Terr.

Donna Pelekasis
Air Force Geophysical Laboratory
Hanscom AFB, MA
617/861-241

Machine : AFGL
Bldg. : 1107
Rm. : 120

BARTOL RESEARCH FOUNDATION — Discipline: Solar Terr.

William Matthaeus
University of Delaware
Bartol Research Foundation
Newark, Delaware 19716
302/451-8111

Machine :
Bldg. : Sharp Lab
Rm. : 217

U of Maryland — Discipline: Solar Terr.

Dr. Chuck Goodrich
Dept of Physics and Astronomy
University of Maryland
College Park, MD 20742
301/454-5938

Machine :
Bldg. : Space Sciences Bldg.
Rm. : 1235

NRL

Dr Paul Rodriguez
David Walker (Alt)
Code 4706
NRL
Plasma Physics Division
455 Overlook Ave.
Washington, DC 20375
FTS 767-3844
FTS 767-3329 (Alt)

Discipline: Solar Terr.

Machine :
Bldg. : 209
Rm. : 320A

APL

Lora Suther 2-150
JHU APL
Johns Hopkins Rd.
Laurel, MD 20707
(301) 953-5000 x84

Discipline: Solar Terr., Planetary

Machine : S1PVAX
Bldg. : 2
Rm. : 50

Goddard Institute of Space Studies

Sol Broder
Rm. 210
Goddard Institute for Space Sciences
NASA
2880 Broadway
New York, NY 10025
FTS (664-5500)

Discipline: Atmospheric

Machine :
Bldg. : 26
Rm. : 132

PENNST

Jim Breon
Penn State University
423 Walker Building
University Park, PA 16802
814/865-9495

Discipline: Climate

Machine : PENNST
Bldg. : Walker Bldg.
Rm. : 616

MIT

John Richardson
MIT
Cambridge, MA 02139
617/253-6112

Discipline: Planetary

Machine :
Bldg. : 37
Rm. : 685

Cornell University

Phillip Nicholson
Dr. Peter Gierasch (Alt)
Space Sciences Bldg.
Cornell University
Ithaca, NY 14853
607/255-8543 (Exchange converts from 256 to 255 on March 3, 1986)
607/255-8544 (Alt)

Discipline: Planetary

Machine : Astronomy Dept. VAX-11/750
Bldg. : Space Sciences Bldg.
Rm. : 310

LAMONT-DOHERTY

Bruce Huber
LDGO - Oceanography
Palisades, NY 10964
914/359-2900

Discipline: Oceans

Machine : VAX-11/780
Bldg. : Oceanography Bldg.
Rm. : 202B

WOODS HOLE OCEANOGRAPHIC INSTITUTE

Andy Maffil
Woods Hole Oceanographic
Clark 1
Woods Hole, MA 02543
617/548-1400 (X2759)

Discipline: Oceans

Machine : VAX-11/780
Bldg. : Clark Laboratory
Rm. : 128

SPACE TELESCOPE INSTITUTE

Dr. Peter Shames
Space Telescope Institute
3700 San Martin Drive
Homewood Campus
Baltimore, MD 21218
301/338-4748

Discipline: Astrophysics

Machine :
Bldg. : ST Science Institute Bldg.
Rm. : 128

UNIVERSITY OF DELAWARE

Ferris Webster
College of Marine Studies
University of Delaware
Lewes, DE 19958
302/645-4266

Discipline: Oceans

Machine : MicroVAX II
Bldg. : Cannon Bldg.
Rm. : 205

NOAA - NODC

Robert Fish
National Oceanogr. Data Center
2001 Wisconsin Ave., NW
Washington, DC
202/634-7479
FTS (634-7479)

Discipline: Oceans

Machine : VAX-11/750
Bldg. : Universal-South Bldg.
Rm. : Unknown before 2/86

UNIVERSITY OF RHODE ISLAND

Peter Cornillon
Grad. School of Oceanography
Kingston, RI 02882
401/792-6283

Discipline: Oceans

Machine : VAX-11/750
Bldg. : Watkins
Rm. : 1st floor computer room

JPL Routing Center Location

PPDS and JPLnet

John Piotrowski M/S 264/786
Jet Propulsion Lab
4800 Oak Grove Drive
Pasadena, CA 91109
(818) 354-5491

Discipline: Solar Terr., Planetary, Earth Science
Machine :
Bldg. : 171
Rm. : B5

JPL Tail Circuits

LOCKHD

Dayton Datlowe
O/91-20 B 255
Lockheed Palo Alto Research Laboratories
3251 Hanover Street
Palo Alto, Ca. 94304
415/424-3274

Discipline: Solar Terr.
Machine : LOCKHD
Bldg. : 255
Rm. : OE-105

UNIVERSITY of WASHINGTON

Douglas W. Potter
George Pitt (Alt)
Geophysics Program, AK-50
University of Washington
Seattle, Washington 98195
206/543-9055
206/543-0208 (Alt)

Discipline: Solar Terr.
Machine :
Bldg. : Johnson Hall
Rm. : 365

TRW

Sandra Chang
TRW
One Space Park
Bldg R1/1170
Redondo Bch, CA 90278
(213) 536-2017

Discipline: Solar Terr.
Machine : TRWATB
Bldg. : 01
Rm. : 1120

AEROSPACE

Dr. Joseph Fennell
Space Sciences Laboratory
The Aerospance Corporation
El Segundo, California, 90245
213-648-7075

Discipline: Solar Terr.
Machine :
Bldg. : 26
Rm. : 150

VXBMS (UCLA)

Discipline: Solar Terr.,Planetary

Nancy L. Keder
Molecular Biology Institute
UCLA
Los Angeles, CA 90024
(213) 825-8901

Machine : VXBMS
Bldg. : Slichter Hall
Rm. : 5880

LJSP01 and LJSP02 (UCSD)

Discipline: Solar Terr.,Astrophysics

Ed Hoopes
University of California San Diego
Center for Astrophysics and
Space Science
C-011
La Jolla, California 92093
(619) 452-4987

Machine :
Bldg. : AP & M
Rm. : 2839

UNIVERSITY OF CALIFORNIA, BERKELEY

Discipline: Solar Terr.

Dr. Forrest Mozer
David Curtis (Alt)
UC Berkeley
Space Science Laboratory
Berkeley, California 94720
415/642-0549
415/642-5998 (Alt)

Machine : VAX-11/750
Bldg. : Space Scienc Lab
Rm. : 240

USU

Discipline: Atmospheric

Prof. Joe R. Doupnik
Center for Atmospheric and
Space Sciences, UMC-34
Utah State University
Logan, Utah 84322
(801) 750-2982

Machine : USU
Bldg. : Lund Hall
Rm. : 101

STAR

Discipline: Solar Terr.,Atmospheric,
Spacelab

Dr. Calvin C. Teague
Center for Radar Astronomy
Durand Building, Room 229
Stanford, California 94305
415-497-3596

Machine : STAR
Bldg. : Durand
Rm. : 216

ARIZONA

Discipline: Planetary

Joe Gotobed
Lunar and Planetary Lab
The University of Arizona
Tucson, AZ 85721
602/621-4021

Machine : MicroVAX II
Bldg. : 92
Rm. : 429

University of Hawaii

Discipline: Planetary

Karl Hinck
University of Hawaii
Planetary Geosciences
2525 Correa Road
Honolulu, Ha 96822
(808) 948-6321

Machine : UHPGVX2
Bldg. : Sinclair Library
Rm. : 6

Cal Tech

Discipline: Planetary, Astrophysics

Ed Danielson
California Institute of Technology
Geology and Planetary Science
169D S. Mudd
Pasadena, Ca 91125
(818) 356-6861

Machine : JUPIT1
Bldg. : South Mudd
Rm. : 169D

UC SANTA BARBARA

Discipline: Oceans

Ray Smith
Geography Dept.
University of California
Santa Barbara, CA
805/961-2618

Machine : VAX-11/750
Bldg. : Engineering Bldg. 1
Rm. : 3152

OREGON STATE U.

Discipline: Oceans

Dudley Chelton
College of Oceanography
Oregon State University
Corvallis, OR 97331

Machine : MicroVAX II
Bldg. : Oceanography Bldg. 1
Rm. : 444
Discipline: Planetary, Earth Science

JPL

Discipline: Oceans

Burt Goldstein
Mail Stop 202-101
4800 Oak Grove Drive
Pasadena, CA
408/354-7452
FTS (792-7452)

Machine : VAX-11/780
Bldg. : 202
Rm. : 101

NAVY POST GRAD SCHOOL

Discipline: Oceans

James Mueller
Dept. of Oceanography
Naval Post Graduate School
Montery, CA 93943-5100
408/646-3266

Machine : VAX System
Bldg. : Root Hall
Rm. : 123

UNIVERSITY OF ALASKA

Discipline: Oceans

David Fritts
Geophysical Institute
University of Alaska
Fairbanks, AK 99775-6800

Machine : VAX-11/780 or VAX-11/785
Bldg. : Elvey Bldg.
Rm. : 219

SCRIPPS INST. OF OCEANOGRAPHY

Discipline: Oceans

Mark Abbott
Scripps Inst. of Oceanography
University of California, A-002
La Jolla, CA 92093
619/452-4791

Machine : MicroVAX II
Bldg. : Scripps Satellite Oceanographic
Rm. : Facility in trailers

Eric Eliason
United States Geological Survey
Astrogeology
2255 N. Gemini Drive
Flagstaff, Az 86001
(602) 527-7113

Machine : ASTOG
Bldg. : 4
Rm. : 40

AMES

Discipline: Earth Science

Maureen Ockert
Ames
Mail Stop 245-3
Moffet Field, California 94035
414/694-5593
FTS (464-5593)

Machine :
Bldg. : 240
Rm. : 111

JSC Routing Center Location

Johnson Space Center *

Dan Anderson
JSC
Code SN
Houston, TX 77058
FTS (525-4464)
713/483-4464

Discipline: Planetary

Machine : SN
Bldg. : 31
Rm. : 262A

JSC Tail Circuits

ESSDP1 and ESSDP2 (LANL)

Steve Blair
Mail Stop D440
Los Alamos National Laboratory
P.O. Box 1663
Los Alamos, NM 87545
Office: (505)667-9211 FTS (843-9211)
Group Office: (505)667-9268 FTS (843-9268)

Discipline: Solar Terr.

Machine : ESSDP2
Bldg. : SM40
Rm. : N114A

Rice University

Professor Patricia Reiff
Rice University
Dept. of Space Physics and
Astrophysics
P.O. Box 1892
Houston, Texas 77251
713/527-8101, ext. 2650

Discipline: Theory Solar Terr.

Machine : MicroVAX II
Bldg. : Space Science Bldg.
Rm. : 263

UTD

Bob Power
Center for Space Sciences,
M.S. F02.2
University of Texas at Dallas
P.O. Box 830688
Richardson, TX 75083-0688
214-690-2852

Discipline:Solar Terr.,Atmospheric

Machine : PDP-11/23
Bldg. : Founders Building
Rm. : F01.604

SWRI

Ron Janetzke
Southwest Research Institute
Division 15
P. O. Drawer 28510
San Antonio, Texas 78284
(512) 684-5111 ext.-3318

Discipline: Solar Terr.,Atmospheric,
Spacelab
Machine : VAX-11/750
Bldg. : 68
Rm. : F9

NOAA

Joe H. Allen
National Oceanic and Atmospheric
Administration
325 Broadway
Boulder, Colorado 80303
303/497-6323
FTS 320-6323

Discipline: Solar Terr., Space Environment

Machine : VAX-11/750
Bldg. : Research Lab Bldg. #3
Rm. : 138

NCAR

Barb Emery
NCAR
P.O. Box 3000
Boulder, CO 80307
303/497-1596

Discipline: Atmospheric

Machine : Micro PDP-11
Bldg. : Mesa Lab
Rm. : 498

UNIVERSITY OF COLORADO AT BOULDER

Randy Davis
University of Colorado
Boulder Colorado 80309
303/492-6867
303/492-5440 (Alt)

Discipline: Atmospheric, Astrophysics

Machine : LASP DECnet router
Bldg. : Duane Physics Complex
Rm. : D322

Lunar and Planetary Institute

Kinpong Leung
McGetchin Hall
3303 NASA Rd. 1
Houston TX 77058
713/486-2165

Discipline: Planetary

Machine : VAX-11/780
Bldg. : McGetchin Hall
Rm. : M203

UNIVERSITY OF COLORADO

Vince Troisi
CIRES, Campus Box 449
University of Colorado
Boulder, CO 80309
303/497-5311
FTS (320-5311)

Discipline: Oceans

Machine : RSC Bldg. 2
Rm. : 261

TEXAS A & M

Steven J. Worley
Oceanogr. & Meteorology Bldg.
Room 602
Texas A & M
College Station, TX 77843
409/845-4014

Discipline: Oceans

Machine : VAX-11750
Bldg. : Oceanogr. & Meteor. Bldg.
Rm. : 617

METHODS OF DOWNLOADING TO USER INSTITUTIONS

Mr. Lloyd Treinish
Data Management Systems Facility
Goddard Space Flight Center
Greenbelt, Maryland 20771

The PCDS not only supports the ability to output data in a uniform structure via the Common Data Format (CDF) but also supports the ability to provide data in native format for any data set supported by the PCDS. Methods were discussed for acquiring data in either format from the PCDS for further work at remote sites. Four levels of remote utilization were defined, based on the extent of offloading the NSSDC computer and local PCDS processing. Characteristics of each level were thoroughly explained in the presentation, including details of information and data transfers, downloading, uploading, and offloading of the NSSDC computer. Only the levels themselves are specified here. The characteristics can be found in the accompanying viewgraphs.

The first level defined is that of a network-based distributed PCDS. A subset of the PCDS software is ported to another VAX and made available on a network (i.e., SPAN) node. There is no subset of the PCDS at the second level, but it is also network based. Non-network utilization of the PCDS, requiring dial-up log on, is denoted as a third level. Finally, at the fourth level, personal computer utilization of the PCDS through dial-up log on with proper terminal emulation is defined.

Methods of Downloading Data from the PCDS to User Institutions

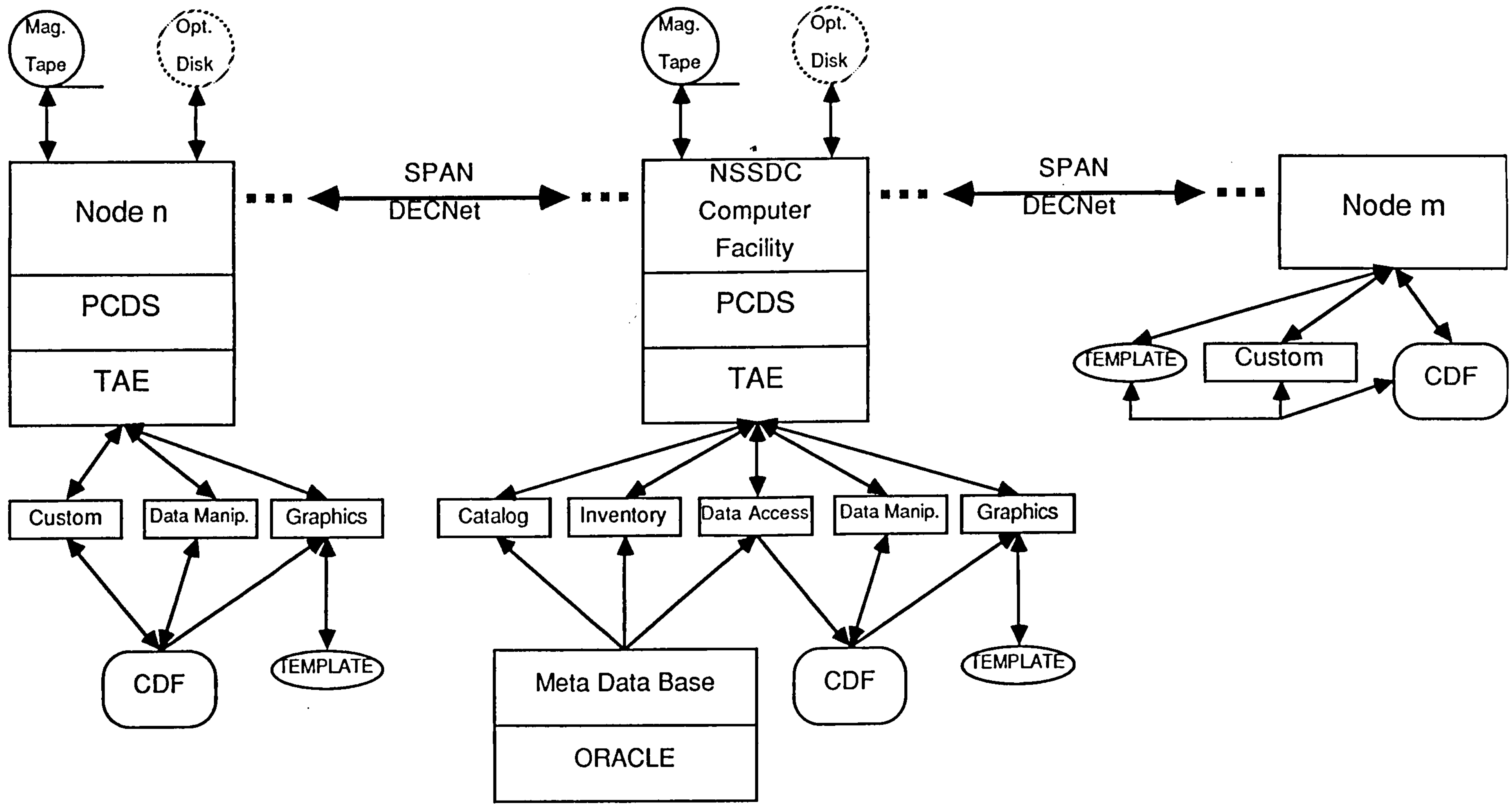
Lloyd A. Treinish
National Space Science Data Center
NASA/Goddard Space Flight Center

Levels of Remote

PCDS Utilization

- 0 Distributed Processing Concepts
- 0 Network Utilization
- 0 Non–Network Utilization
- 0 Personal Computer Utilization

Network-Based PCDS Processing Concepts



Distributed Processing Concepts

under PCDS Version 4.0

- NSSDC-Based Centralized Meta Data Base & Data Archive
- Remote PCDS Subset on SPAN Nodes (>= DEC MicroVAX II):
  - Graphics
  - Data Manipulation
  - [CDF, TEMPLATE & TAE]
- DECNet Logon (SET HOST) for the PCDS at NSSDC
- Meta Data Transfers in ASCII Files:
  - Catalog Sections for Verification, Update & Remote Printing
  - Inventory Reports for Remote Printing
- Download CDFs for Remote Processing:
  - Graphics
  - Data Manipulation
  - Listings
  - Custom Analysis
  - Creation of "Value-Added" Data

Distributed Processing Concepts under PCDS Version 4.0 (Continued)

- Upload New Data in CDF for Full NSSDC Support:
  - Producer Provides Catalog Information
  - "Automated Ingest" into Inventory
  - Data Access, Data Manipulation & Graphics by Default

- Upload and Download Graphics:
  - TEMPLATE "Pseudo-Device" Files
  - TAE "Macro" Meta Descriptions
  - Take Advantage of Special Remote Hardware

- File Transfers to and from NSSDC:
  - Small Volume -- DECNET
  - Moderate to Large Volume -- Magnetic Tape
  - Large Archival Volume -- Optical Disk

- Significant Off-loading of Processing & Storage from the NSSDC

Network Utilization of the PCDS

- DECNet Logon (SET HOST) for the PCDS at NSSDC
- Meta Data Transfers in ASCII Files:
  - Catalog Sections for Verification, Update & Remote Printing
  - Inventory Reports for Remote Printing
  - CDF Listings for Remote Printing
- Download Graphics:
  - Device-Dependent Protocols via TEMPLATE
  - TEMPLATE "Pseudo-Device" Files (if TEMPLATE Installed)

Network Utilization of the PCDS (Continued)

- Download and Upload Data in CDF (if CDF Installed):
  - Custom Analysis
  - Creation of "Value-Added" Data
  - Producer Provides Catalog Information
  - "Automated Ingest" into Inventory
  - Data Access, Data Manipulation & Graphics by Default

- File Transfers to and from NSSDC:
  - Small Volume -- DECNET
  - Moderate to Large Volume -- Magnetic Tape
  - Large Archival Volume -- Optical Disk

- Some Off-loading of Processing & Storage from the NSSDC

Non-Network Utilization of the PCDS

- Dialup Logon for the PCDS at NSSDC
- Meta Data Transfers in ASCII Files:
  - Catalog Sections for Verification & Remote Printing
  - Inventory Reports for Remote Printing
  - CDF Listings for Remote Printing
- Download Graphics in Device-Dependent Protocols via TEMPLATE
- Download and Upload Data in CDF (If CDF Installed):
  - Custom Analysis
  - Creation of "Value-Added" Data
  - Producer Provides Catalog Information
  - "Automated Ingest" into Inventory
  - Data Access, Data Manipulation & Graphics by Default
- File Transfers to and from NSSDC:
  - Very Small Volume -- Phone Line
  - Small to Large Volume -- Magnetic Tape
- Minimal Off-loading of Processing & Storage from the NSSDC

Personal Computer Utilization of the PCDS

- Dialup Logon for the PCDS at NSSDC

- Terminal Emulation/Data Transfer/Communications Examples:
  - IBM PC without graphics -- VT-100 Emulation
    Printer Output
  - IBM PC with standard graphics -- VT-100/Tektronix 4010 Emulation
    Printer/Plotter Output
  - IBM PC with enhanced graphics -- Tektronix 4105/4107 Emulation
    MicroTEMPLATE
    Printer/Plotter Output
  - Apple Macintosh -- VT-100/Tektronix 4010 Emulation
    Printer/Plotter Output
    MacPaint/MacDraw

- Meta Data Transfers in ASCII Files:
  - Catalog Sections for Verification & Remote Printing
  - Inventory Reports for Remote Printing
  - CDF Listings for Remote Printing

- Download Graphics in Device-Dependent Protocols via TEMPLATE

- Negligible Off-loading of Processing & Storage from the NSSDC

OPTICAL DISKS

Mr. Brian Lopez-Swafford
Sigma Data
Program and System Development
Goddard Space Flight Center
Greenbelt, Maryland 20771

A comprehensive overview of the different types of optical storage technology was presented. Research efforts to integrate this technology into the VAX/VMS environment were then discussed. In addition, plans for future applications of optical disk technology were described. The applications should prove to be beneficial to the NSSDC user community as a whole. Of particular interest is the concentration on the collaboration with the Dynamics Explorer project.

Brian Lopez-Swafford
Jan 30, 1986

Topics

- o Overview of optical storage technology

- o NSSDC's work in optical storage

- o Future applications

Optical Storage Devices

- Compact Disk - Read Only Memory (CD-ROM)

- Write Once Disks

- Write Once Tapes

- Erasable Optical Disks

CD-ROM

- Read only. Data must be sent to manufacturer to be written to disk.
- Media is extremely durable and not susceptible to forms of corrosion.
- Capacity - 600 Mbytes.
- Cost:

  drive - $1500
  master disk - $5000
  extra disk - $30

Write Once Disks

- o User can write to disk online.
- o Media has an advertised life expectancy of about ten years.
- o Capacities:

  5 1/4" 200Mbytes
  12" 1Gbyte

- o Cost:

5 1/4"	drive - $5000 media - $150
12"	drive - $11000 media - $400

Write Once Tapes

- o Advertised life expectancy of >50 years.
- o Capacity - 4 Gbytes.
- o 5 1/4" tape cartridges.
- o Not yet commercially available.

Erasable Optical Disks

- o Media is erasable not updatable.
- o Same data densities as write once drives.
- o Not yet commercially available.

What makes optical storage so attractive?

- Ultra-high data densities on a small light weight disk or tape.
- The media is removable so one drive has access to many large datasets.
- Disks are random access.

Role in DP environment?

- Optical media will not replace magnetic disks because of their non-updatable nature.
- It will replace tapes as a fast access archival media.

Development at NSSDC

- o The goal is to integrate the write once drives into the DEC environment as native peripherals.

  1> University of Texas at Dallas (UTD) delivered a write once optical subsystem for RSX-11M to NSSDC in summer 85.

  2> Building on the UTD approach, NSSDC is developing a VMS device driver for the optical subsystem.

- o Extensive testing is being conducted at NSSDC to measure the reliability of the optical disk drive.

- o NSSDC is collaborating in a study by NBS to determine media reliability.

Plans for the Future

- o NSSDC and the Dynamics Explorer (DE) project will initiate an RFP for approximately 20 of the write once disk drives in March 1986.

- o The DE investigators will supply data to the NSSDC on optical disk in the CDF format.

- o Valuable NSSDC holdings (eg. frequently used PCDS datasets) will also be written to optical disks for fast access either locally or over the network.

THE CDF SOFTWARE PACKAGE

Mr. C. Edwin Wilson
Science Applications Research
Goddard Space Flight Center
Greenbelt, Maryland 20771

This presentation outlined the concepts that are fundamental to the new Common Data Format. With PCDS Version 4.0, the Common Data Format (CDF) will supersede the Climate Data File (also CDF) of earlier versions. This new format incorporates generalizations in both design and terminology that make it applicable to multidisciplinary data sets. Furthermore, the new CDF will be made available to programmers as a software package that shields them from the low-level details of file formats.

The CDF interface routines create an abstract conceptual environment for the scientific programmer. The principle concept for "visualizing" a CDF is known as the "basic grid." A basic grid is an n-dimensional block by means of which a CDF is constructed. The size of the block may vary from one CDF to another, but is constant within any individual CDF. Thus, the basic grid serves as a fundamental uniform building block for a CDF. The number of grid dimensions and the size of each dimension are chosen by the scientist/programmer to represent the patterns by which data are structured. For example, each cyclic independent variable would typically give rise to a basic grid dimension with size equal to the number of distinct values in the variable's cycle.

The uniform grid structure appears to the programmer to be propagated into each record for each variable. The CDF stores a variable value for each lattice point of the grid for each record. These data values are inserted and retrieved simply by specifying the variable's identifier, a record number, and the indices that specify the lattice point of interest. The CDF creation routines allow the programmer to specify which variables remain invariant with respect to each grid dimension or the record number. The software uses this information to avoid redundant storage of repeated data values.

THE COMMON DATA FORMAT (CDF)

- MAKES FEASIBLE THE DISTRIBUTION OF DATA-SET-INDEPENDENT SOFTWARE TOOLS FOR ANALYSIS AND DISPLAY

- PROVIDES A COMMON STRUCTURE FOR ACQUISITION AND DISTRIBUTION OF DATA

HIGHLIGHTS OF THE CDF SOFTWARE PACKAGE

- SOFTWARE FOUNDATION FOR DATA MANAGEMENT AND ANALYSIS
- DATA SET INDEPENDENCE
- READILY APPLICABLE TO INTERDISCIPLINARY STUDIES
- SINGLE MECHANISM FOR ORGANIZING DATA INTO MULTIDIMENSIONAL STRUCTURES CONSISTENT WITH SCIENTIFIC INTERPRETATION
- SIMPLE ABSTRACT CONCEPTUAL ENVIRONMENT FOR SCIENTIFIC APPLICATIONS PROGRAMMER

USING THE CDF SOFTWARE PACKAGE

YOU DON'T HAVE TO:

- WRITE MESSY FORTRAN FORMAT STATEMENTS
- DO MESSY RECORD NUMBER CALCULATIONS TO FIND LOCATION OF AN ARRAY VALUE

ALL YOU HAVE TO DO IS:

- LEARN A FEW SIMPLE CONCEPTS AND APPLY THEM TO CALLING THE CDF INTERFACE ROUTINES

FUNDAMENTAL CDF CONCEPTS

- DATA ELEMENT
- DATA RECORD
- CDF BASIC GRID
- CDF RANK
- VARIABLE

SAMPLE DATA ELEMENT DESCRIPTION

ELEMENT MNEMONIC:	TEMP
ELEMENT NAME:	TEMPERATURE
UNITS:	DEG. K
DATA TYPE:	REAL
RESOLUTION:	0.6
DISPLAY FORMAT:	F7.3
VALID RANGE:	170. TO 290.

DATA RECORDS IN SAMPLE DATA ENSEMBLE

ELEMENT:	TIME	LONG	LAT	TEMP
DATA RECORD #1	0100	150 W	30 N	200
#2	0100	150 W	40 N	195
#3	0100	165 W	30 N	196
#4	0100	165 W	40 N	190
#5	0130	150 W	30 N	203
#6	0130	150 W	40 N	194
#7	0130	165 W	30 N	195
#8	0130	165 W	40 N	197

ATTRIBUTES OF SAMPLE DATA ENSEMBLE

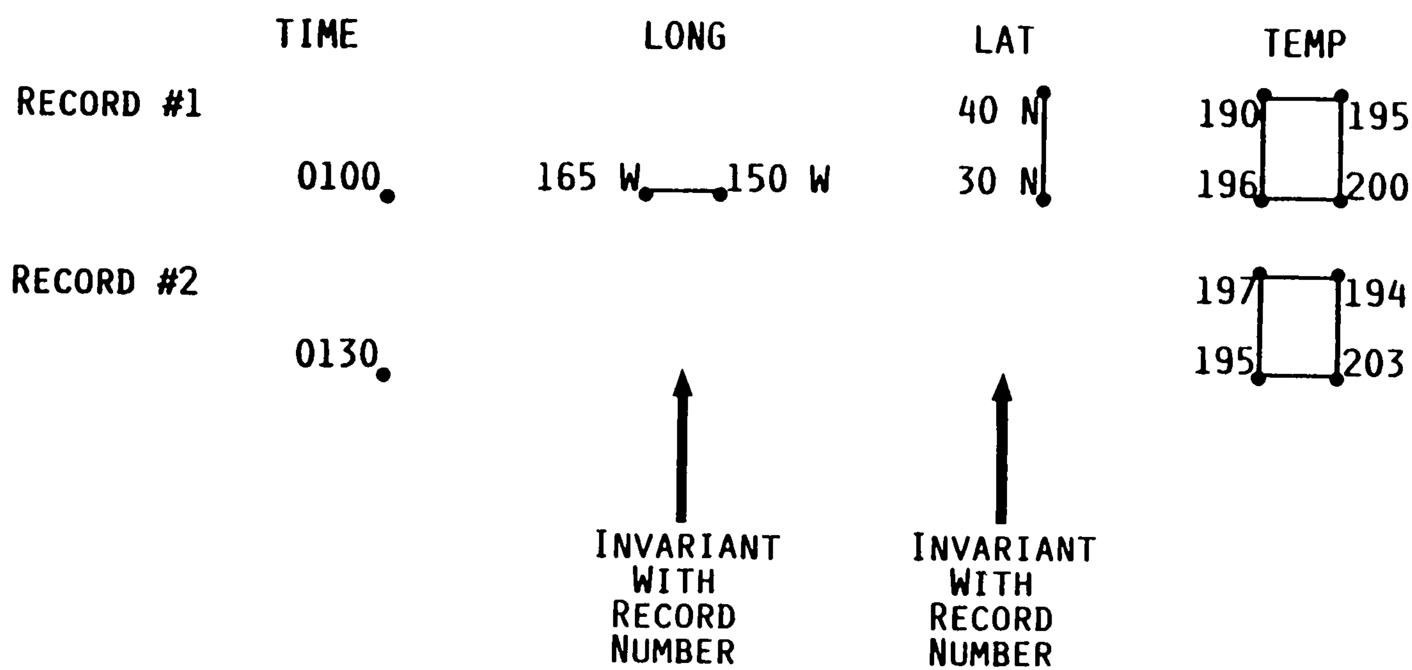
TIME	LONG	LAT	TEMP
BLOCKS OF 4 IDENTICAL VALUES	CYCLIC 2 FIXED VALUES (165 W, 150 W)	CYCLIC 2 FIXED VALUES (30 N, 40 N)	VARIES WITH TIME, LAT, LONG

THERE IS A 2-BY-2 GRID OF TEMPERATURE VALUES FOR EACH OBSERVATION TIME.

LONG "GENERATES" ONE GRID DIMENSION.

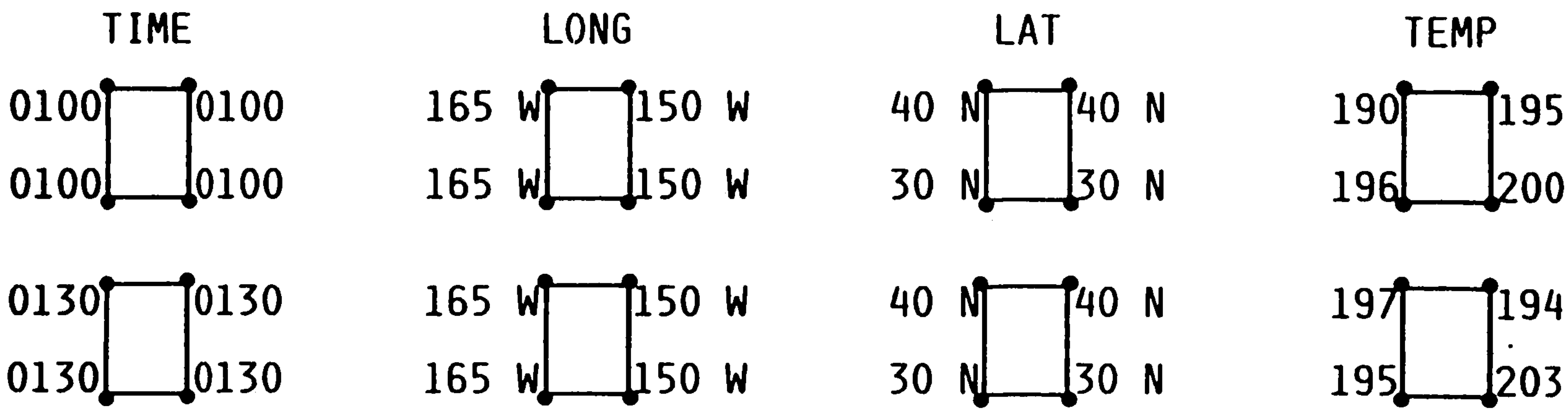
LAT "GENERATES" SECOND GRID DIMENSION.

SAMPLE DATA ENSEMBLE RESTRUCTURED



SAMPLE DATA ENSEMBLE
CDF PROGRAMMER'S VIEW

CDF BASIC GRID IS A 2-BY-2 BLOCK.



VALUES OF ELEMENTS THAT ARE INVARIANT WITH RECORD NUMBER APPEAR TO BE DUPLICATED FOR SUCCESSIVE RECORDS.

VALUES OF ELEMENTS THAT ARE INVARIANT WITH RESPECT TO A BASIC GRID DIMENSION APPEAR TO BE DUPLICATED ACROSS THAT DIMENSION.

SAMPLE DATA ENSEMBLE
CDF SPECIFICATIONS

CDF RANK = DIMENSIONALITY OF BASIC GRID = 2

	VARIABLES			
ELEMENT:	TIME	LONG	LAT	TEMP
1ST DIMENSION VARIANCE: (→)	FALSE	TRUE	FALSE	TRUE
2ND DIMENSION VARIANCE: (↑)	FALSE	FALSE	TRUE	TRUE
RECORD VARIANCE:	TRUE	FALSE	FALSE	TRUE

CDF DATA INSERTION, ACCESS, AND UPDATE

TWO FORTRAN-77 ROUTINES:

CDF_PUT (CDF_ID, VARIABLE_NUMBER, RECORD_NUMBER, BASIC_GRID_INDICES, DATA_VALUE, RETURN_STATUS_CODE)

CDF_GET (CDF_ID, VARIABLE_NUMBER, RECORD_NUMBER, BASIC_GRID_INDICES, DATA_VALUE, RETURN_STATUS_CODE)

ONCE DATA ELEMENT DICTIONARY IS DEFINED AND DATA ENSEMBLE STRUCTURE SPECIFIED; PROGRAMMER DOES NOT NEED TO KEEP TRACK OF DIMENSION AND RECORD VARIANCES.

CDF DATA ABSTRACTION
SUMMARY

CDF DATA ENSEMBLE APPEARS TO BE BUILT FROM MULTIPLE OCCURRENCES OF A SINGLE N-DIMENSIONAL BLOCK THAT IS CONSISTENT WITH THE SCIENTIFIC INTERPRETATION OF THE DATA.

VALUES FOR DIFFERENT DATA ELEMENTS ARE CORRELATED SIMPLY BY USE OF IDENTICAL RECORD NUMBERS AND BASIC GRID INDICES.

REDUNDANT PHYSICAL STORAGE OF DATA FOR CYCLIC VARIABLES IS ELIMINATED BY SPECIFICATION OF RECORD AND GRID DIMENSION VARIANCES.

6. USER DISCUSSION AND RECOMMENDATIONS

6. USER DISCUSSION AND RECOMMENDATIONS

Although the recommendations summarized here have been drawn from sessions throughout the workshop, they come primarily from the "Discussion of New Data Sets and New Capabilities" and from Dr. Ferdinand Baer's session on formalizing workshop recommendations. Most of the recommendations seem to logically fall into five major categories. They are listed by these categories in the following subsections to facilitate interpretation. Occasionally, contradictory statements occur because this listing attempts to be comprehensive, and no determination of the desirability of implementing particular recommendations was made. We sincerely thank Dr. Baer for his contribution in chairing the session in which the recommendations were formalized.

Some of the recommendations presented extend beyond the present scope of PCDS. Action has already been taken on others, and others have been minimally addressed.

6.1 INFORMATION DISSEMINATION

- Develop an on-line "electronic" newsletter.
- Provide an on-line capability for user comments and requests.
- Provide more PCDS news in the NSSDC Newsletter.
- Develop additional tutorials to train new users on the system.
- Provide continued consultation for "hands-on" training.
- Recommend graphics software packages to users whose needs extend beyond the capabilities of PCDS.
- Provide an "800" number for long-distance users.
- Expand the number of nodes on telecommunications networks to provide system access to remote users through SPAN, ARPANET, NPSS, ESN, SESNET, NOAANET, BITNET, NSFNET, ETHERNET, UNIDATA, etc.

6.2 OPERATIONS/SYSTEMS ACCESS

- Continue to provide access 24 hours a day (except for necessary backups), extending operator support by 1 to 2 hours to remove "east coast" bias.
- Provide user access to enough disk space to allow transfer of data from operator-mounted tapes to scratch disks during attended operation hours so that work can continue late at night or on weekends.
- Provide enough tape drives to give current users easy access to tape data.

- Establish criteria for system access by identifying the NASA community versus the outside user community.

- Establish criteria for non-NASA agencies to access PCDS for such purposes as technical exchanges, etc.

- Make decisions about "time" restrictions, allocation of user disk space, and allocation of specific tape drives for different users.

- Arrange for the appointment of a board or committee to help define guidelines for hardware acquisition and system configuration to support user demands.

6.3 DATA SET SUPPORT

- Establish a committee to recommend new data sets in anticipation of project needs.

- Establish priorities for inclusion of data sets.

- Establish priorities for maintenance of data sets based on use and need.

- Include the entire NMC analysis data in PCDS.

- Make a commitment to support entire data sets continuously to provide long-term records needed by climatologists.

- Prioritize correlative or value-added data sets for inclusion in PCDS, and minimally archive these correlative or value-added data sets.

- Establish the "common data format" (CDF) as a standard and distribute the CDF software.

- Require data suppliers to provide complete and accurate documentation with each data set.

- Incorporate current releases of data bases when errors are discovered and revisions become available.

- Support the TOVS data bases.

- Define more clearly and/or conclude whether PCDS is an archive or an analytical service.

6.4 CATALOG

- Make the on-line catalog available to everyone, regardless of affiliation.

- Provide access to other catalogs and direct users to other appropriate catalog sources where needed.

- Assist in determining the scope of new catalogs that plan to include complementary or overlapping entries by deciding upon the breadth and depth of information to be captured about a particular data set.

6.5 SOFTWARE CAPABILITIES

- Provide mathematical analysis tools (e.g., Fourier analysis).
- Provide statistical analysis capabilities (e.g., regression).
- Provide more detailed base maps.
- Provide global grid overlays.
- Provide nonproprietary software and guidance for implementation of such on other systems.
- Focus on the ability of PCDS to provide browsing of data in order for a user to choose the tapes of value for his/her particular research.

7. SUMMARY AND CONCLUSIONS

SUMMARY AND CONCLUSIONS

The second PCDS Workshop enhanced information exchange, encouraged university participation, provided an understanding of network access potentials, facilitated data and information distribution discussion, provided "hands-on" experience, and provided the medium for the development of specific recommendations that appear in this document.

The next workshop is tentatively planned for late October or early November of 1986. The format will provide for even more "hands-on" experience, for more scientific presentations, user participation, and information exchange.

8. ADJOURNMENT

ADJOURNMENT MESSAGE

Dr. Milton Halem
Chief, Space Data and Computing Division
Goddard Space Flight Center
Greenbelt, Maryland 20771

In an adjournment message, Dr. Milton Halem noted the interest and positive response from a growing group of workshop participants (more than 100 registered participants representing 33 organizations). He confirmed the commitment from Headquarters for the continued support of the PCDS and commented on the possibility of the PCDS serving as groundwork for a future Earth Observing Information System. In addition, Dr. Halem communicated Headquarters' continued support of remote university access to the PCDS and of introducing it as a classroom tool for graduate space data research studies. Presently, two major university meteorology departments are offering graduate climatology courses where the PCDS is an integral part of the curriculum, and NASA is prepared to initiate and support several more this year.

Dr. Halem remarked that the PCDS has reached "a new level of capability in terms of research support and data holdings that should make it even more valuable to investigators." He expects to see a major performance increase in the responsiveness of the PCDS as a result of significant increases in computing resources and the introduction of exciting new data holdings. He looks forward to next year's workshop where greater emphasis will be placed on the research accomplishments using PCDS data sets.

APPENDIX A:

NASA HEADQUARTERS STAFF

APPENDIX A

NASA HEADQUARTERS SPONSORS

Dr. Caldwell McCoy, Jr.
Manager, Information Systems Office
Code EI

Ms. Ai Fang
Program Manager, Data Analysis Program
Code EI

Dr. Shelby Tilford
Director, Earth Science and Applications Division
Code EE

Dr. John Theon
Chief, Atmospheric Dynamics and Radiation Branch
Code EET

Dr. Robert Schiffer
Program Manager, Climate Research Program
Code EET

APPENDIX B:

PCDS DEVELOPMENT TEAM

APPENDIX B

PCDS DEVELOPMENT TEAM

Data Management Systems Facility:

Dr. Paul Smith, Acting PCDS Project Manager
Ms. J. Elizabeth Cleveland
Ms. Mary Ford
Mr. Gregory Goucher
Ms. Mary Grace Reph
Ms. Regina Sylto
Mr. Lloyd Treinish

Science Applications Research:

Mr. Ernest Daddio
Mr. Michael Gough
Ms. Shirley Krenzler
Ms. Lola M. Olsen
Ms. Shelly Peebles
Mr. Charles Reams
Ms. Lydia Smirnova
Ms. Tamara Weaver
Mr. C. Edwin Wilson

Business and Technological Systems, Inc.:

Dr. Blanche Meeson

Republic Management Systems:

Mr. Douglas Bennett
Ms. Charlotte Griner
Ms. Elizabeth Ramey

APPENDIX C:

LIST OF PARTICIPANTS

APPENDIX C

PARTICIPANTS

Associated Weather Services, Inc.:

Bruce Bailey
Dave Smalley
Ronald Stewart

Business and Technology Systems:

Dr. Blanche Meeson

California Institute of Technology:

Ted Sesplaukis
Dennis Wittman

Computer Technology Associates:

Chieh-San Cheng

Ford Aerospace and Communication Corporation:

Dr. Ranjit Dasgupta

General Software Corporation:

Barbara Kaufman

Georgia Institute of Technology:

Dr. C. Justus

Geosat Committee:

Dr. Frederick Henderson

Goddard Institute for Space Studies:

Dr. William Rossow

Goddard Space Flight Center:

William Bandeen
Dr. Don Cavalieri
Hong-Yee Chiu
Dr. Joey Comiso
Dr. Igor Eberstein
Dr. Richard Goldberg
Greg Goucher
Dr. James Green
Ernest Hilsenrath
Robert Hudson
Dr. Ed Hurley
Dr. Paul Hwang
Dr. Eugenia Kalnay
Dr. Joseph King
Barbara Lowrey
Dr. Eugene Maier
Dr. E. Mollo-Christensen
Charles Murray, Jr.
Ernest Neil
Dr. Carl Reber
Mary Reph
Dave Short
Dr. Paul Smith
Regina Sylto
Dr. James Trainor
Lloyd Treinish
Karen Weiler
Dr. W. Wiscombe

NASA Headquarters:

Dr. Robert Curran
Dr. James Dodge
Ms. Ai Fang
Dr. Dudley McConnell
Dr. Robert Schiffer
Ms. Diane Wickland
Dr. John Wilson

Institudo Nacional de Investigacion

Ing. Gilberto Tisnado

International Geographical Union:

Dr. Duane Marble

Iowa State University

Warren Heilman

Jet Propulsion Laboratory:

Tom Duxbury
Beth Martin
Dr. David Nichols
Sandy Winterhalter

Joint Oceanographic Institute:

H. Frank Eden

Kansas State University:

Chassem Asrar

Langley Research Center:

Joseph Drewry
Robin Link
David McDougal
Charles Woerner
Mary Alice Woerner

Massachusetts Institute of Technology:

James Risbey

Michigan State University:

John Bartholic
Dr. Kyle Kittleson

National Center for Atmospheric Research:

Patrick Kennedy

National Climate Program Office:

William Sprigg

National Climatic Data Center:

Danny Fulbright

National Science Foundation:

Guy Guthridge
Vaury Lee
Pamela Stephens
Hassan Virji

NOAA/Climate Analysis Center:

David Rodenhuis
Phillip Arkin

NOAA/DOC/NOS:

Dr. Robert J. Miller

NOAA/ERL Climate Research Program:

Scott Woodruff

NOAA/National Meteorological Center:

Lawrence Sager

NOAA/NESDIS:

Hilda Gohrband
Dr. Joan Hock
Dr. Herbert Jacobowitz
Bruce Needhan
Dr. George Ohring
Dr. Larry Stowe

NOAA/NESDIS Satellite Applications Lab:

Dr. Krishna Rao

NOAA/NESDIS/NCDC

Michael Mignogno

NOAA/NESDIS/NODC:

Janet Burton
Philip Hadsell
Gregory Withee

NOAA/NODC:

Jim Audet
Yu-Jean Liang
Dr. Steven Patterson
Mike Simmons

Office of Naval Research:

Dr. Thomas Curtin

Pacific Northwest Laboratories:

Erik Pearson

Penn State University:

Dr. John Dutton
Paul Sharum

Republic Management Systems Technologies, Inc.:

Charlotte Griner
Liz Ramey

Science Applications Research:

Richard Bishop
Ernest Daddio
Michael Gough
Dan Grogan
Carol Hoxie
Karl Leiderman
Robert Lutz
Sam Mathews
Kenneth McDonald
Jim Mooney
Lola Olsen

Shelly Peebles
Frank Porto
Charles Reams
Mary-Louise Schein
Lydia Smirnova
Mike Snyder
Tamara Weaver
Ed Wilson

SASC Technologies:

Winthrop Johnson
Dr. Ashok Kaveeshwar
Dr. Ken Klenk
Charles Wellemeyer
Dr. Surendra Ray

Science and Technology Corporation:

Dr. Edward Burlbaw
Dr. Roger Davis
Dr. Adarsh Deepak
Ravi Govindaraju
Karl Johannessen
Dr. Sastri Vemury

Science Applications International Corp.:

Carroll Hood

Sigma Data:

Dr. Kent Hills
Carolyn Ng
Brian Lopez-Swafford

Smithsonian Institution Environmental Research Center:

Dr. Bernard Goldberg

State University of NY at Purchase:

Joel Tenenbaum

Technology Applications:

James Koziana

Texas Instruments:

Marvin Conrad
Kathleen Whitfield

United States Geological Survey:

Larry Pettinger

University of Colorado, Cires:

James Maslanik

University of Delaware:

Dr. Ikram Abdou
Dr. James Churgin

University of East Anglia Climatic Research Unit:

Dr. P. Kelly

University of Maryland:

Dr. F. Baer
Norman Canfield
George Huffman
Dr. Alan Robock
Dr. Jayanta Sircar
Dr. Anandu Vernekar

University of Michigan:

Dr. Vincent Abreu

University of Texas at Austin:

Dr. Melba Crawford
Dr. Byron Tapley

University of Washington:

James Tillman

University of Wisconsin:

Pat Behling

University of Wyoming:

David Hofmann

USDA/BARC-West/Hydrology Lab:

Jane Thurman

Virginia Institute of Marine Science:

Dr. Brenda Norcross

Please Note: Participants have been listed with or without titles as they registered for the workshop.

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16. Abstract

This publication contains the proceedings of the Second Pilot Climate Data System (PCDS) Workshop held January 29 and 30, 1986, at the Goddard Space Flight Center in Greenbelt, Maryland. The workshop was attended by over 100 scientists interested in the continued development and use of the PCDS, an interactive system for locating, accessing, manipulating, and displaying climate-research data. The objectives of the workshop were to enhance information exchange, encourage university participation, understand network potentials, discuss data and information distribution, provide "hands-on" experience with the PCDS, and develop specific recommendations for its future development. The proceedings are organized in a manner that reflects the major thrusts of the workshop: programmatic presentations and discussion, scientific presentations from system users, and technical presentations. Abstracts of each presentation and copies of the transparencies used in these presentations are included in this document, as well as, a section formalizing the user recommendations.

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