NSSDC
NATIONAL SPACE SCIENCE DATA CENTER

NEWS

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NSSDC Hosts Major Space Science Workshop

For the past 10 years, NSSDC has responded to correlating data requests from the solar-terrestrial community by developing software that plots and manipulates key data bases together for the purpose of understanding global magnetospheric phenomena. This activity culminates in a face-to-face workshop, or Coordinated Data Analysis Workshop (CDAW), at NSSDC where all have common access to the collected data base for analysis. The workshop just concluded was only one in a series on this topic.

The global dynamic behavior of the earth's magnetotail during magnetic substorms (represented by aurora borealis, or the "northern lights") is receiving the greatest attention in magnetotail research. The motivation for this intensive research investigation arises from new results by the ISEE 3 (International Sun-Earth Explorer) spacecraft while in the deep tail (800,000 miles behind the earth) and from observations of the first global auroral imager on board the DE 1 (Dynamics Explorer) spacecraft.

Two emerging theories have been proposed to explain how the earth's magnetotail responds to solar wind input and ultimately stores and then accelerates solar wind and lost ionospheric plasma, shooting it back toward the earth where it slams into the ionosphere, producing auroras. One school of thought expects that pinching of magnetic field lines behind the earth occurs during intense fluctuations in the solar wind input, causing a magnetic bubble or

see CDAW, *page 4*

George Siscoe reviews the current theories of the plasmoid and fireball models. He explains the scale, discusses the perplexing problem, and formulates a direction to pursue in analysis.

IN THIS ISSUE

Message from the Director

Pilot Program Initiated for Faster Data Access

The National Space Science Data Center is responsible for the long-term archive for all NASA processed data. The processed data from NASA missions are usually sent to NSSDC by the principal investigators, who are at a variety of universities, industry sites, and other NASA centers distributed all across the United States. These data products are valuable for future analysis and need to be preserved.

One such NASA mission, Dynamics Explorer (DE) 1 and 2, launched in 1981, has more than 15 principal investigators. They are preparing to send NSSDC the largest amount of data so far archived from a solar-terrestrial mission. In terms of data tapes, the estimate is in the 5,000 to 15,000 range (including telemetry).

NSSDC currently manages nearly 130,000 data tapes from all of the NASA missions dating back to 1960. Building 26 at GSFC is near capacity (30,000 magnetic tapes), and NSSDC officials have been notified that the Federal Record Center (the location of the rest of the NSSDC archive) is also nearly full.

NSSDC distributes its archived data to an international community of scientists who require rapid, and in some cases direct, data access. This direct access comes from users on the Space Physics Analysis Network (SPAN), which NSSDC manages, Telenet, and Arpanet. These networks allow a user to identify a data segment needed from NSSDC's online archive and copy the file to his or her institution within seconds.

In response to the user demand, NSSDC is working on ways to better manage its archive by moving some of the most requested data into online status. For example, nearly all of the eighth Coordinated Data Analysis Workshop (CDAW 8) data (see CDAW, page 1) is on line and has been used extensively. In the month of October alone (following the workshop), there were more than 180 CDAW data transactions combining local and remote access. At this stage in the game, users don't want more "facilities," they just need faster access to the data.

NSSDC currently has less than 1 gigabyte of storage on line (excluding the optical disk testing) but will be dramatically increasing this amount over the next year. One requirement of the online archived data is that it be in random access form in order for specific data segments to be identified and distributed easily. Without this capability, NSSDC can only identify the data by tape and, to satisfy a request, must copy the entire tape. The average time required for satisfying a request using magnetic tape is approximately one month. In contrast, the online NSSDC archived data are available nearly continuously 7 days a week and are not limited to the normal working day.

In 1984 NSSDC established a contract with the University of Texas at Dallas, or UTD (a major investigator group on DE), to study and demonstrate what optical disk mass storage devices could meet the archiving needs of NSSDC and the scientific community, which are linked together on the SPAN network. At that time it was not even certain that optical disk systems could be integrated into our existing systems. At the end of the study UTD had successfully integrated an optical disk system into their operations, demonstrating the feasibility and capabilities of this new mass storage technology.

The requirements of reducing our tape volume, continued archiving responsibility, having online data in random access form, and having a large volume of online data (that are also mailable) have led us to a procurement with the DE scientists for mass storage devices such as optical disk systems. Because NSSDC does not have the resources to commit large volumes of incoming data tapes to online random access form, it is necessary that the investigator send us the data in optical disk form. This additional constraint makes the procurement of distributed random access mass storage systems even more obvious.

The following test program is being initiated with the DE investigators based on the contractual needs for data archiving at NSSDC:

- *A bulk buy of archival mass storage systems for all DE investigators and NSSDC will take place.* These systems will include the computer hardware and software driver interfaces, should be able to provide a minimum of 2 gigabytes of storage on line in random access form, and should have a read/write capability with a read-only lock. Since the data are to be archived, a write once capability is ideal.

- *These mass storage devices will be distributed to all the DE principal investigators at their remote institutions.* All these investigators are on SPAN and require that DE data be on line and interactively retrievable.

- *All DE investigators will devote operations and programming effort to read their DE data to be archived from magnetic tapes and write them to the acquired random access mass storage medium.* It is essential to NSSDC that the ability to write the data on a transportable mass storage medium be at each DE investigator site.

- *In addition to the data, metadata or inventory information about the contents of data on the media will be supplied as an appended header to the data files or in an ancillary file on the disk.* This inventory will contain information such as file name, start and stop times of each file, and length of each logical record or file.

- *The resulting archived data and metadata will be sent to NSSDC for copying.* Documentation, read, write, and appropriate analysis software for these data will also be sent to NSSDC for archiving. Originals will be returned.

- *The incoming data will be cataloged using the inventory information.* The directory, catalog, and approximately 4 gigabytes of DE data will be placed on line for remote access. The remote access will be through a direct dial-up capability, SPAN, the NASA Packet Switched Network, GTE/Telenet, and Arpanet.

- *Normal mail and electronic requests for these new data sets (and their associated information and software) will be processed.* The data will be distributed on the new mass storage medium, magnetic tape, or electronically over the networks.

If the test program with the DE scientists as outlined above works out, we will be paving a new way for future projects to distribute data to their principal investigators and for the investigators to interact with NSSDC. We will keep you informed on what happens.

James L. Green

Around the Poles for 80 Days

PROMIS Collects Coordinated Data of Magnetosphere

The data acquisition phase of the Polar Region Outer Magnetosphere International Study (PROMIS) came to a close on June 16, 1986, after 80 consecutive days of coordinated tracking of a number of spacecraft.

Special time intervals, totalling more than 1200 hours, were preselected on the basis of concurrently favored locations of some of the magnetospheric spacecraft, and were tracked at the highest possible priority. The spacecraft involved were IMP 8, ISEE 1 and 2, AMPTE/IRM, DE 1, and Viking.

The data of particular interest from these spacecraft are those of the solar wind plasma and its embedded magnetic field (IMP 8); plasma, energetic particles, and magnetic field in the magnetotail (ISEE 1 and 2, and IRM); and the images of auroral displays in the northern and southern auroral ovals (Viking and DE 1, respectively). The scientific interest in these regimes is to ascertain the details of the complex processes in which the solar wind energy is transferred to the magnetosphere, stored in the magnetotail, and episodically released to activate the two conjugate auroral ovals.

Some of the energy in those episodic releases is injected directly into the inner magnetosphere rather than into the auroral ovals, generating a current ring of millions of amperes, at a distance of a few earth radii. These injections were monitored by a number of geostationary and other spacecraft, notably 1982-019A, 1984-037A, 1984-146A, GOES 5 and 6, SCATHA, and CCE. There was no need to seek high-priority tracking of these spacecraft during the PROMIS period because they were being tracked nearly 24 hours each day all along.

Numerous ground-based observations below the two auroral ovals have obtained continuous data on the magnetic field and its variations. Thanks to the promptness of Dr. M. Sugiura and his colleagues at Kyoto University, Japan, the magnetic indices of these variations known as AE, AL, and AU are now available for the period at the NSSDC/WDC-A in hard copies, microfiche, and digital magnetic tapes. The hard copies have been reproduced and mailed out by NSSDC to hundreds of scientists around the world.

Some of the acquired spacecraft data have already started arriving at NSSDC. IMP 8 solar wind magnetic field and plasma, and ISEE 1 6 keV electron and proton flux data for the PROMIS period have been plotted and reproduced at NSSDC and were mailed as a series of volumes to space scientists around the world. The hope is that these "quick look" data will encourage serious efforts to define and analyze interesting PROMIS periods. Much PROMIS data are likely to remain with the principal investigators for a year or so before being deposited at NSSDC. As always, during that period the principal investigators will typically respond to any reasonable, direct request for data from researchers at large.

In addition to the data volumes mentioned, NSSDC has also mailed out a volume containing some essential orbital data, data acquisition times, a list of experiments on board, and the names and addresses of the principal investigators pertinent to all spacecraft of interest. Detailed orbital plots of some of the spacecraft (IMP 8, ISEE 1 and 2, IRM, SCATHA, DE 1, and Viking) have also been made for the entire PROMIS period and are available on microfiche, on request to NSSDC/WDC-A. Samples of these plots are included in NSSDC's orbit/coverage volume.

R. Parthasarathy

Data Center to Purchase Graphics Software

The National Space Science Data Center intends to improve the effective exchange of analyzed data and information among various NASA and non-NASA sponsored research efforts in the earth and space sciences in the Space Physics Analysis Network (SPAN) community through the use of pictorial data representations generated via computer graphics techniques.

To begin this effort, NSSDC is sponsoring a strictly competitive procurement of a commercial software package that will provide a common means of generating computer graphics products. The results of this procurement will be supported and distributed by NSSDC for the SPAN community. The primary installation of such software will be on the NSSDC Computer Facility VAX 8650 by early 1987.

Initially this procurement will cover about 40 distinct SPAN nodes, with eventual expansion to perhaps 100 nodes. There are current commitments to this mass buy from several institutions, including UCLA, the Air Force Geophysical Laboratory (AFGL), the University of Washington, the University of Michigan, the European Space Research and Technology Center (ESTEC), and Goddard Space Flight Center Code 500. The software procured through this process will be used for all NSSDC projects. The installation across SPAN initially will promote the exchange of metafiles (i.e., computer graphics device-independent plot files) and, eventually, applications software.

In addition, NSSDC is committed to the promotion of evolving graphics standards. In that regard, this procurement will require a commitment to such standards by the software vendor.

The graphics software that will be procured by this mass buy can be viewed as a toolbox for programmers. In other words, for the programmer of processing or analysis software, for example, who may be using languages such as FORTRAN, C, Pascal, or Ada, this software would be viewed as libraries of callable subroutines. These libraries will be computer system independent and will support at least DEC VAX/VMS, Sun UNIX, IBM VM/CMS, MVS/TSO, CDC NOS, and NOS/VE operating systems.

The software will be implemented to be separately optimized for each of these operating systems. In addition, this software will be computer graphics device independent via a sophisticated device model to support the following devices:

- Plotters (e.g., Hewlett-Packard HP7580A)
- Printers (e.g., Talaris 2400)
- Dumb Terminals (e.g., Tektronix 4014)
- Two-Dimensional Terminals (e.g., Tektronix 4115)
- Three-Dimensional Terminals (e.g., Megatek Merlin 9200)
- Film Recorders (e.g., III FR-80)

see Graphics, *page 15*

CDAW, *from page 1*

plasmoid that then rapidly travels down the tail, accelerating particles to as high as 2000 km/sec toward the earth. This earthward streaming plasma has been seen for many years by the Interplanetary Monitoring Platforms (IMPs) and ISEE 1 and 2. In many cases these have been attributed to local acceleration regions or fireballs instead of a plasmoid.

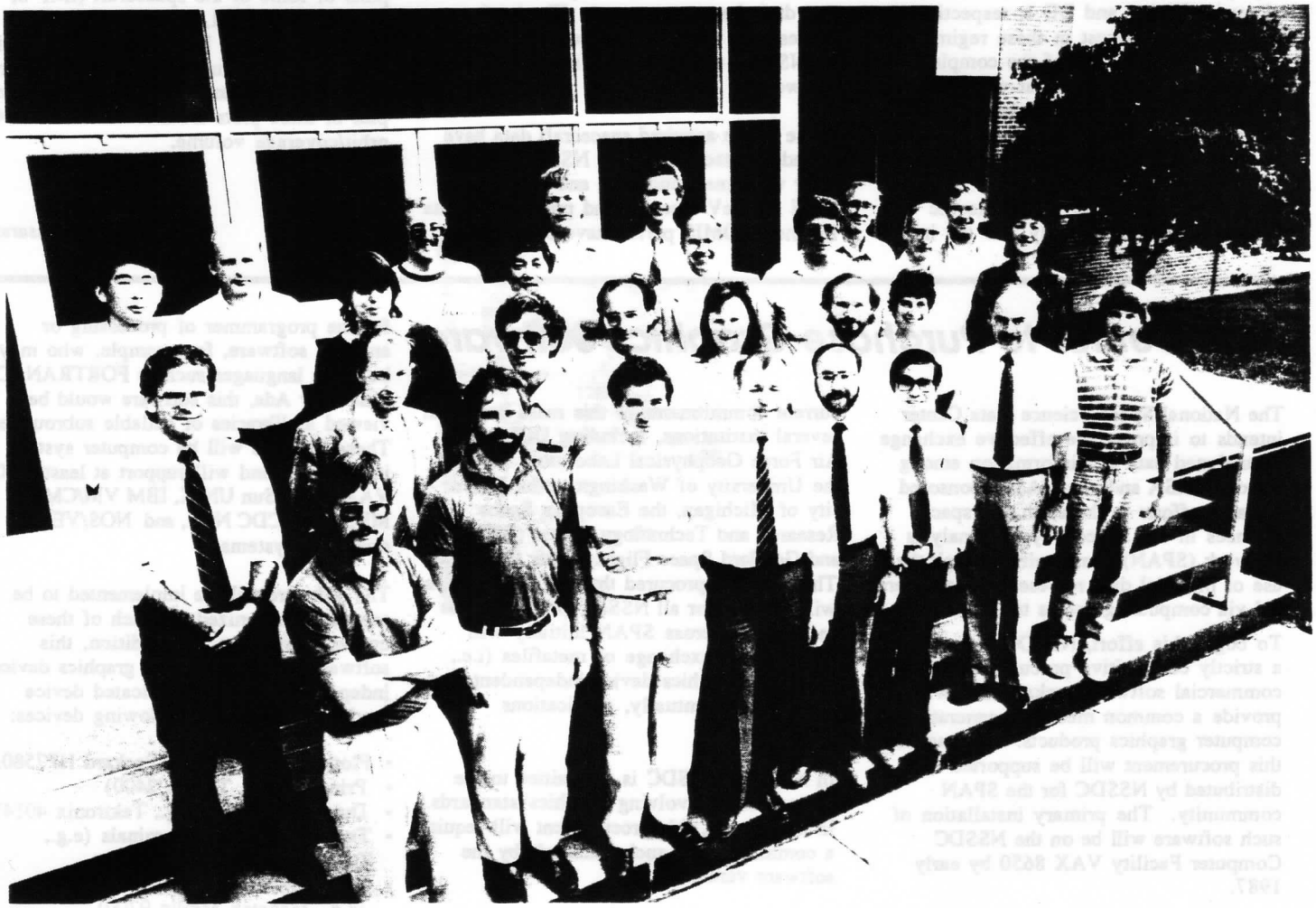
The controversial plasmoid model was put to the test in the eighth CDAW--held September 29 to October 3--an entire week of intensive activity involving more than 45 scientists from the United States, Europe, Japan, and Canada. Verifying that a plasmoid exists, one scientist said, is like knowing what an elephant looks like by only touching it. The global nature of the phenomenon requires that data that have been taken from several spacecraft and ground bases simultaneously be brought together for analysis.

For CDAW 8, the NSSDC computer systems managed 49 data sets from nearly 15 spacecraft and 5 ground-based instruments with well over a total of 400 geophysical parameters. The 6 events that were studied comprised over 52 hours of data. This is the largest collection of correlative geophysical data assembled to date.

NSSDC personnel recently expanded the CDAW concept by adding the best advanced data management, cataloging, and graphics techniques from the NSSDC "pilot" programs, adding a major data manipulation capability to it and integrating all this into the SPAN network. The result is a software system that is both data independent and network accessible and can easily be used by several space and earth science communities because of its generic nature. The new software system is called the Network Assisted Coordinated Science, or NACS, software. Its purpose is to aid the scientist in analysis to the point that during the workshop, like CDAW 8, the focus can be on science rather than data bytes.

Because of the richness of the assembled data, many other science investigations were initiated; for the case of the plasmoid, two additional time periods were selected and will be loaded into the NSSDC system over the next few months. Nearly all CDAW data sets will be left on line where scientists can have access over SPAN and Telenet at any time. The actual scientific results from this effort will take many more months to complete. Plans for a follow-on CDAW 8 are already being made for the early part of next year. NSSDC is proud to be participating in the mainstream of this scientific endeavor. Scientists now have the opportunity to put these exciting observations together to get a tantalizing look at what should become routine research during the future International Solar-Terrestrial Physics mission.

James L. Green



CDAW participants on the last day of the workshop. More CDAW pictures appear on pages 8-9.

PLDS Formalizes Requirements and Design

The Pilot Land Data System (PLDS) team met September 24-26 at Ames Research Center (ARC) in California to formalize the user requirements and system design. The roundtable discussion between the system users and engineers was extremely successful, the final result being a formal set of user requirements compiled into a single document from which PLDS Build 1 can be planned, designed, and developed. This event is significant in that it is the first time a unified set of specific user requirements has been documented for PLDS.

The user requirements were submitted by the Science Users Group (SUG), which is composed of scientists from the First International Satellite Land Surface Climatology Project (ISLSCP) Field Experiment (FIFE), the ISLSCP Retrospective Analysis Project (IRAP), and the Sedimentary Basins Project, the three science projects participating in the development of PLDS.

Primary participants in the roundtable discussion were Earnie Paylor (JPL), representing the Sedimentary Basins Project; Diane Wickland (NASA Headquarters), the PLDS program scientist, representing IRAP; Steve Ungar (GISS), representing FIFE; Bill Campbell (GSFC) and Larry Roelofs (GSFC/CTA), representing PLDS System Engineering; and members of the Science Users Group including Sam Asrar and Leo Fritschen for FIFE, and Claude Duchon, Ken Langran, Matt Smith, and Don Lauer for IRAP.

Following the formalization of user requirements, a preliminary functional design was formalized during presentations by the five technical area managers. Each manager presented a work breakdown structure, milestones, and plans for meeting the user requirements. The System Engineering team prepared a pictorial system design by each technical area that followed the overall top level system design prepared by System Engineering before the meeting. The pictorial system design illustrates the components of and interactions between each technical area. Ken McDonald (GSFC) discussed Data Management; Jim Hart (ARC) and Milo Medin (ARC) presented Networking and Communications; Bill Likens (ARC) and Brian Phillips (ARC), System Access; H. Ramapriyan (GSFC), Land Analysis Software; and Fred Billingsley (JPL), Special Processes.

A formal Preliminary Technical System Review is planned for November, when the design will be reviewed in detail in preparation for the Final Technical System Review. At that time the design will be "frozen" (no changes may be made except through strictly monitored channels). The Final Technical System Review is tentatively scheduled for January, and the PLDS development team will meet with the Science Users Group in February to present the final design. The preparation of a preliminary functional design is significant in that the development of the project is moving out of the rapid prototyping phase into formal system development.

The final session involved a discussion of administrative issues, such as the forum for the next PLDS team meeting, administrative deadlines, and dates of the next Science Steering Group (SSG) meeting, IRAP kickoff meeting, FIFE kickoff meeting, and PLDS team meeting. The FIFE kickoff meeting date was not determined. The IRAP kickoff meeting was held October 22-24 in Nogales, Arizona.

Other meeting attendees were Jim Weiss, the PLDS program manager; Jim Lawless (ARC); Jim Smith (GSFC); Tom Duxbury (JPL); J. David Nichols (JPL); Ralph Kahn (NASA Headquarters); and Ed Scheffner (ARC), all of whom provided commentary and suggestions to the PLDS team throughout the meeting.

Maryel Schein

Pilot Land Data System Expected on Line by July

The Pilot Land Data System User Support Office (PLDS USO) has made great strides in its development progress. The September 1986 *NSSDC News* reported that the PLDS USO is open for business. The FIFE investigators were recently identified, increasing the number of investigators that PLDS supports by 29. That brings the total investigators supported, including IRAP and the Sedimentary Basins Project, to 50.

The USO is presently able to provide limited offline support and will provide online support to these users when PLDS becomes operational in July 1987. Currently, a variety of manuals and reports are available for perusal in the USO. Information on access to information systems and data bases such as ESDD, NCDS, and the Landsat Browse Facility is also available.

The PLDS USO is accepting data in many forms--computer tapes, maps, photographs, text--for storage in the PLDS Data Archive. These items are labeled and recorded in the Staging Archive data base upon receipt. If an item can be specified by an authorized investigator, it will be copied and distributed upon request.

NSSDC To Design Data Base for Roentgen Satellite Mission

A review meeting was held at Goddard Space Flight Center November 12-14 to discuss development of the mission planning and data analysis software for the U.S. ROSAT Science Data Center (USRSDC). The ROSAT Project is a cooperative program between the United States, West Germany, and the United Kingdom to study stellar X-ray sources with the German-built Roentgen Satellite (ROSAT). The meeting involved personnel from the Max Planck Institute for Extraterrestrial Physics (MPE), GSFC, and the Smithsonian Astrophysical Observatory (SAO).

The requirements of mission planning were discussed in detail to reflect the submission of observation proposals by U.S. guest observers and the interaction with the planning activities at the International User's Committee and at MPE. The U.S. mission planning activities will be handled with a data base designed by the Data Management Facility (Code 634) of NSSDC. This data base will be compatible with the ROSAT observation data bases at MPE and will be the primary record of all U.S. proposals and observations. It will be used to trace the data processing status of all scheduled observations and serve as the record for the Level 1 data distribution and archiving functions to be performed by NSSDC.

Another major topic of the meeting was the development of Level 1 (Standard Data Analysis System) software and the acquisition of hardware for this purpose. Information discussed included benchmarks, software size, and final format of Level 1 files. MPE provided information on the status and schedules of the development of the Level 1 software that will be delivered by MPE and installed at USRSDC as part of the cooperative program.

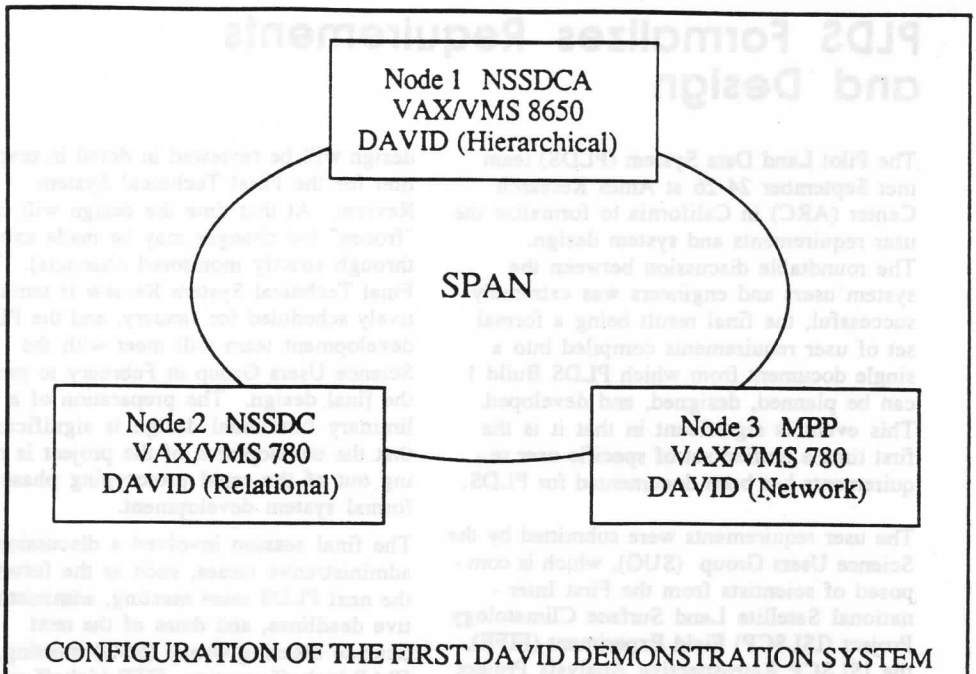
see ROSAT, page 7

DAVID Reaches First Milestone

The first successful demonstration of the Distributed Access View Integrated Database (DAVID) system was given at Goddard Space Flight Center in early October. The DAVID system, currently being developed by NSSDC, is a software system that will make it possible for users to uniformly access data bases that are heterogeneous and physically distributed over different computers. Scientists will not have to learn many different access methods to obtain the data they need.

The demonstration involved a network composed of three GSFC computers: the MPP VAX 11/780, the NSSDC VAX 11/780, and the NSSDCA VAX 8650. Three different data base models--relational, hierarchical, and network--were distributed among the three computers via the Space Physics Analysis Network (SPAN). The demonstration showed how a user could access a catalog reflecting the available data sets and software in the network, easily connect between computers, create new data sets and new programs, and access data and run programs in the user's local machine or in a remote machine.

The important breakthrough reflected in this demonstration was that the DAVID software, thus far developed, represents the first time a stand-alone data base management system supports all three major data base models with the power previously attributed only to relational data base management systems. Significantly, to support uniform access to heterogeneous distributed data bases, the underlying (i.e., DAVID) system has to represent and store data of diverse storage formats.



CONFIGURATION OF THE FIRST DAVID DEMONSTRATION SYSTEM

Dr. Barry E. Jacobs, senior research computer scientist with the Data Management Systems Facility of NSSDC, began leading the DAVID effort with investigations being carried out by eight universities, four government agencies, and five private corporations. Currently, the project employs a staff of seven scientists, many drawn from ranks of local academic computer science programs.

DAVID is universally applicable for accessing arbitrary data bases, so it is being considered as the support system for the Space Telescope Data Archive and Distribution Service and the Science Applications Information System, and as a means of integrating the GSFC Pilot Land Data System and NASA Ocean Data System. Also, DAVID may be used to support the Space Station Technical and Management Information System.

The DAVID approach is based on the recently developed mathematical framework called "data base logic." By employing a language that has a mathematical data base logic for formulating queries in a wide variety of data base system structures that other systems cannot emulate, DAVID enables users to access (i.e., query and update) other data base and file systems without any alterations to already existing software.

For further information about the DAVID system, contact Dr. Barry E. Jacobs.

Carol Hoxie

Crustal Dynamics Attracts Large Turnout

The 11th Biannual Meeting of the Crustal Dynamics Investigators Working Group was held at the Goddard Space Flight Center October 15 and 16. This was the largest meeting ever, with 142 persons registered, including 22 from Canada, China, France, West Germany, Italy, Japan, the Netherlands, and Switzerland.

There was a great deal of interest in presentations of recent analyses of very long baseline interferometry (VLBI) and laser data relating to regional deformation and global plate motion. High quality data are now available for sufficient time periods so the results are beginning to be used by investigators to address major tectonic problems.

The Crustal Dynamics Project Data Information System (DIS) is storing these analyzed data sets, generated by the project's science analysis teams, and making them available from the data base to all project investigators. In fact, over 30 investigators gave reports on their recent research, much of it using project-acquired data. In addition to the distribution of project-acquired VLBI and laser data, the DIS is also actively participating in international cooperative programs for the collection and distribution of data for MERIT (Monitoring Earth Rotation and Intercompare the Techniques) and the upcoming International Earth Rotation Service (IERS).

During the working group meeting, many informal demonstrations of the DIS were conducted to familiarize the investigators with the menu-driven system and to acquaint them with the new networking capabilities of SPAN and Telenet for easier access at their home facilities.

Henry Linder

NSSDC Aids El Niño Researchers

NSSDC has been supporting GSFC researchers studying the El Niño phenomenon via its data analysis systems, the Pilot Climate Data System (PCDS) and the Network Assisted Coordinated Science (NACS) system. With the assistance of NSSDC personnel, Dr. Richard Goldberg of NASA has been able to load ground truth from Peru into an online, flexible format that enables him to do comprehensive studies of the data through these systems.

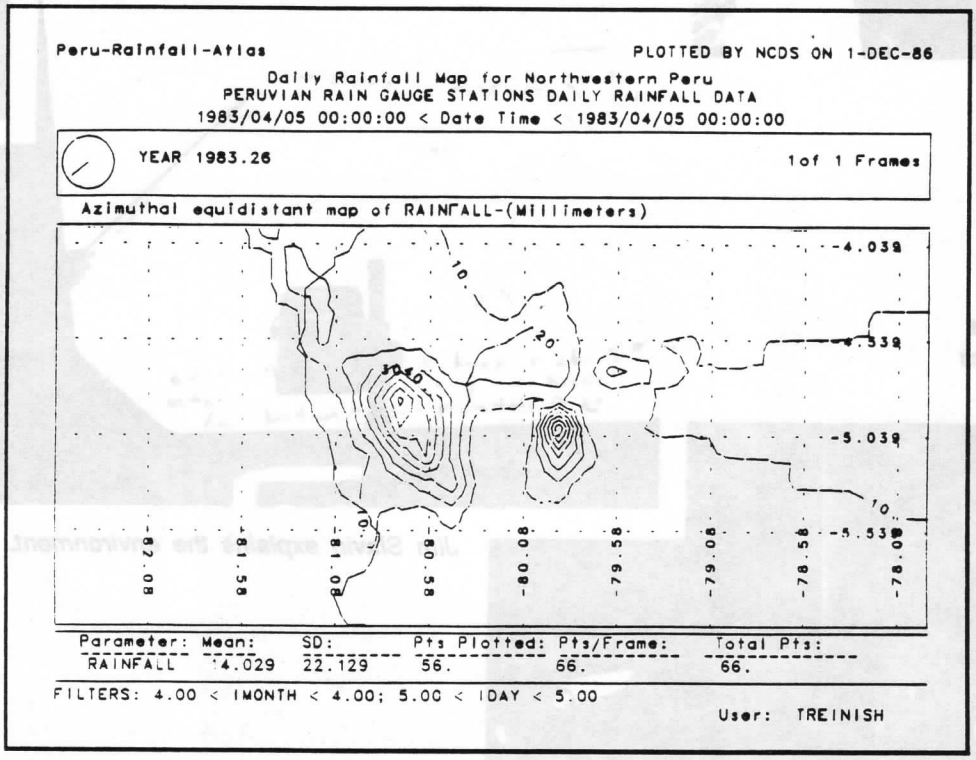
Dr. Goldberg and a Peruvian scientist, Gilberto Tisnado, who has been working at GSFC for the last year, are pursuing this work with the cooperation of the Peruvian government as arranged through NASA Headquarters, NOAA/NESDIS, and the State Department's Agency for International Development. A major portion of this work, which is called Project Preparen, involves the development of a coastal flood alert system for northern Peru and neighboring countries. The basic activities that are being pursued in this effort are to:

- Determine the nature of lee wave cloud patterns in the northern Andes before and during the last El Niño event (i.e., 1981-1982 vs.1982-1983) via remotely sensed spacecraft
- Study extreme rainfall events during El Niño by comparing spacecraft and ground truth data, and investigate methods for estimating rainfall from spacecraft-observed cloud data
- Determine the relationship between lee wave cloud and rainfall patterns
- Determine the value of NOAA Advanced Very High Resolution Radiometer (AVHRR) spacecraft-derived vegetative indices for Peruvian agroclimatic problems such as drought/crop condition assessment
- Develop a plan to implement the aforementioned tasks by user agencies in Peru and neighboring countries

Peruvian agencies have supplied the relevant ground truth data, which include 5 1/2 years of daily rainfall data from about 60 stations in northwestern Peru (1980 through mid-1985; i.e., before, during, and after the last El Niño). Using PCDS tools, these data have been entered and verified into an online data base at the NSSDC Computer Facility in the Common Data Format (CDF), which is a data-independent, self-describing data structure that can provide uniform storage for any multidimensional earth or space science data set. It provides a vehicle for transparently transferring data among the graphic display and data analysis tools available to researchers through the PCDS/NACS.

Dr. Goldberg used these tools to study the spatial and temporal characteristics of periods of peak rainfall activity during the last El Niño. He compared these data with correlative satellite cloud imagery and rainfall estimates from that imagery. His current results were presented at the recent AGU Chapman Conference on El Niño in Guayaquil, Ecuador. This work is just beginning, and Dr. Goldberg will continue to use these tools to further his study of these and related data sets. For example, supplementary data from southern Ecuador will be added to the online rainfall data base. It should be noted that the NSSDC systems that have been utilized to support his work are not yet fully available to the general NSSDC scientific user community.

Lloyd A. Treinish



This figure exemplifies the type of analysis Dr. Goldberg has been able to produce with the PCDS/NACS capabilities. It is a map of the rainfall, focusing on an azimuthal equidistant projection of the northwestern corner of Peru annotated with the coastline of the Pacific Ocean.

ROSAT, *from page 5*

The Level 2 effort, particularly whether to use the Image Reduction and Analysis Facility (IRAF) or MIDAS (a German image reduction system) software for the analysis of the ROSAT data, was a topic of major debate between GSFC, MPE, and SAO. The present plan at GSFC is to support the U.S. ROSAT guest observer program with Level 2 software that will be developed under IRAF and is transportable to workstations running the UNIX operating system. The plan at MPE is to use MIDAS software in a much less transportable environment because of MPE's affiliation with the European Astrophysics Network (ASTRONET). Workstations at about 20 nodes at German universities will be running MIDAS as already selected by the European Space Telescope Facility.

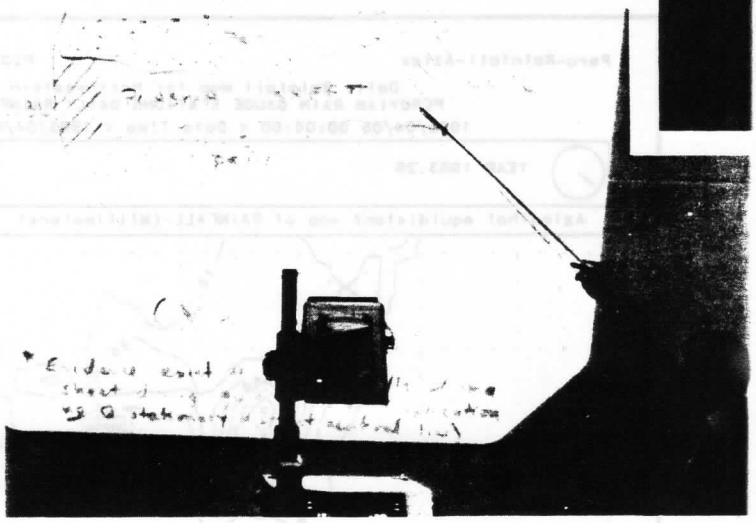
The meeting also provided a starting point for the formation of a ROSAT interface control document. The content of, and responsibilities for, inputs to this document are being developed jointly by MPE and GSFC. Requirements and approaches to networking for better communications during the ROSAT project was another meeting topic. The meeting resulted in a better understanding of the status of activities performed to date on the mission and of the planned activities to meet the present launch schedule.

Jeanne Behnke and Henry Linder

More Views of CDAW

Lee Bargatze makes a discovery.

(Left to right, seated) Joe King, George Siscoe, David Stern, (left to right, rear) Robert Holzer and Mike Gough look at observations.

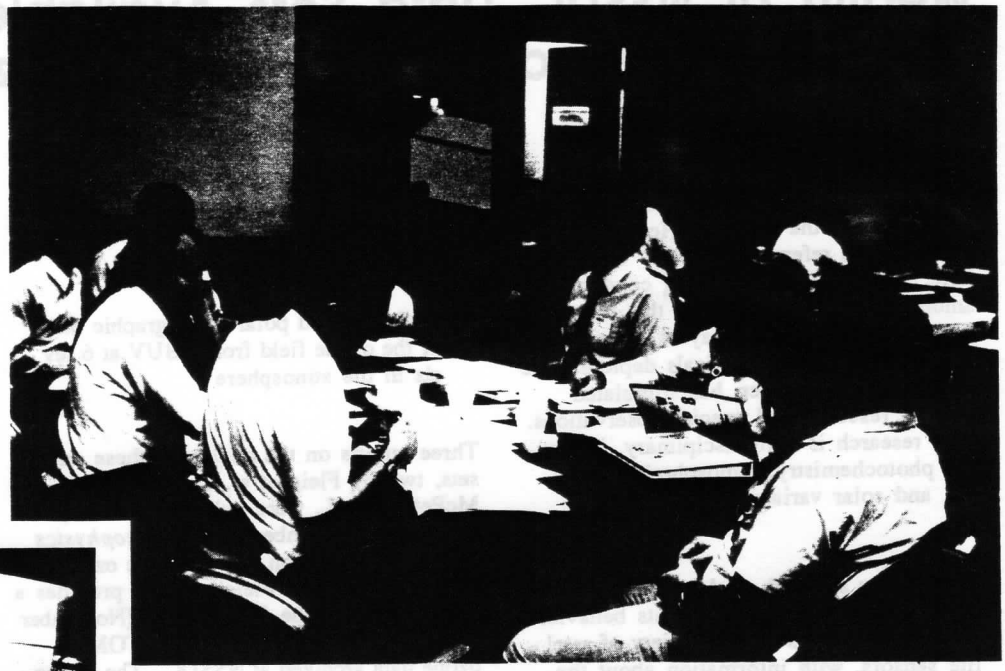


Jim Slavin explains the environment.

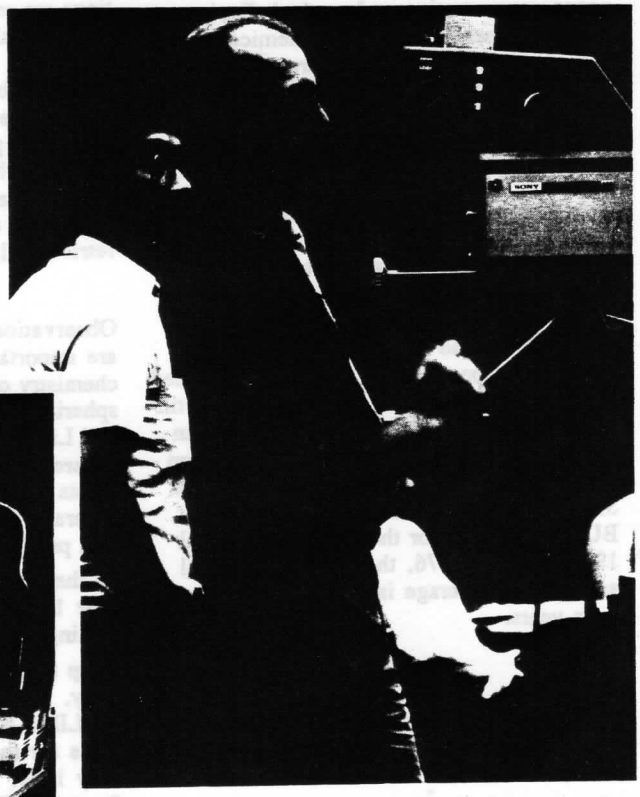
Tom Krimigis speaks to CDAW diners on the future of space plasma physics missions.

Stan Shawhan of NASA Headquarters discusses the importance of the workshop for future missions.

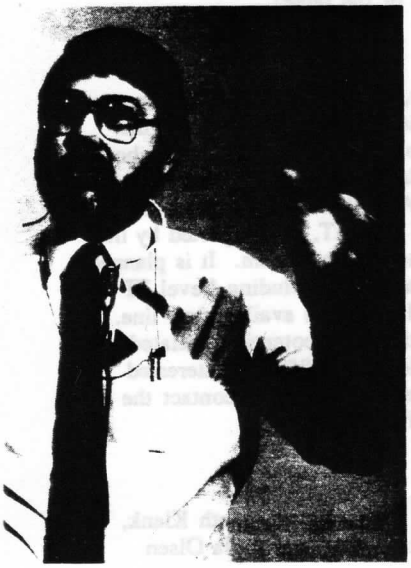
Don Mitchell, Don Williams, Joachim Birn, and Don Fairfield discuss the observations.

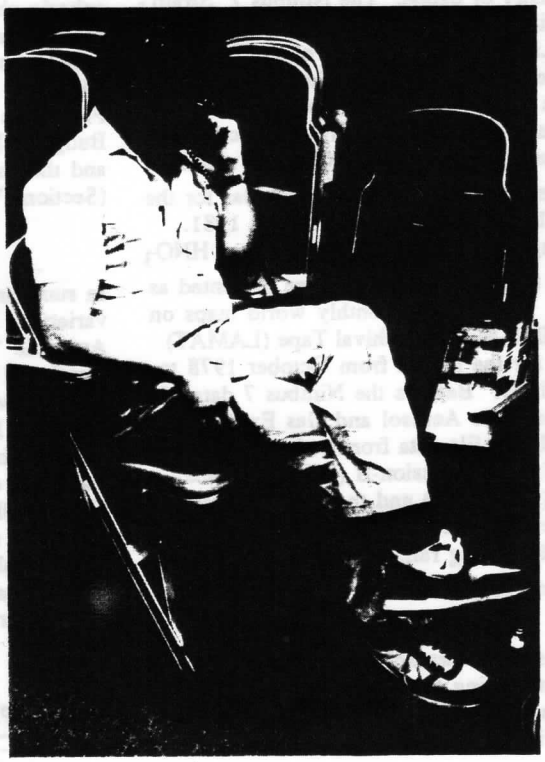


A near-tail subgroup gathers for a discussion.



Charlie Lin and Bob Tice videotape a presentation.





Bob Smith reviews the discussions that were videotaped.

Wealth of NSSDC Data Sets Available To Support Research on Antarctic Ozone Hole

The extremely low ozone amounts over the South Pole in the Southern Hemisphere spring, often referred to as the "ozone hole," are creating increasing concern among scientists. Interest in this phenomenon, which some fear may be a manifestation of manmade chemicals depleting the protective ozone layer, has stimulated prolific research and special observations. This research is multidisciplinary, involving photochemistry, atmospheric dynamics, and solar variability.

NSSDC has a wealth of data to support the study of the stratosphere and its behavior. There are holdings from a variety of satellite sensors, with information about the ozone concentration and vertical distribution, other stratospheric chemical constituents and aerosols, temperature, and solar activity. This article summarizes some of these significant NSSDC holdings.

For the studies of long-term changes in the Antarctic total column ozone and ozone vertical distribution, two instruments are the primary sources of ozone data: the Nimbus 7 Total Ozone Mapping Spectrometer (TOMS) and the Solar Backscatter Ultraviolet Spectrometer (SBUV). Launched in October 1978, both instruments are still transmitting valuable data after more than 8 years of continuous operation. Additional ozone data in a format compatible with SBUV are available from the Nimbus 4 BUV instrument for the time period April 1970 through 1976, though the temporal and spatial coverage is rather sparse in later years.

Data sets from these instruments are archived in many forms at NSSDC (Section I of table). The most accessible are:

- The GRIDTOMS tape, containing 1 year of daily TOMS total ozone (and UV reflectivity) data gridded in roughly 150 km square grids covering the entire sunlit portion of the globe

- The SBUV ZMT tape, containing 1 year of daily, weekly, and monthly zonal means at 19 levels in the atmosphere from 0.5 mb to ground, on 10-degree latitude grids covering the sunlit portion of the globe from 81° S. to 81° N.

- Daily gridded polar stereographic maps of the ozone field from SBUV at 6 levels in the atmosphere

Three reports on the quality of these data sets, two by Fleig et al. and one by McPeters et al., were published recently in the special November issue of *Geophysics Research Letters* on the Antarctic ozone depletion. One of Fleig's papers provides a table to correct the first 5 years (November 1978 through October 1983) of TOMS ozone data archived at NSSDC. The corrections are recommended because of improvements in algorithm and instrument calibration. The other paper provides an estimate of a possible instrument drift of the SBUV against the ground-based Dobson network. McPeters' paper cautions against the use of lower-level (below the altitude of 10 mb) SBUV data when the Antarctica total ozone values are too low for the SBUV ozone retrieval algorithm to be valid.

Observations of stratospheric composition are important in understanding the photochemistry of ozone. The Nimbus 7 Stratospheric and Mesospheric Sounder (SAMS) and Limb Infrared Monitor of the Stratosphere (LIMS) provided coincident measurements of stratospheric temperature and several trace species. Vertical concentration profiles of N_2O and CH_4 are available on the SAMS Zonal Mean Tape-Gas for the year 1979 and 3 months in early 1981. Mixing ratios of NO_2, H_2O, O_3, and HNO_3 at up to 18 pressure levels are presented as daily, weekly, and monthly world maps on the LIMS Master Archival Tape (LAMAT) tapes for the period from October 1978 to May 1979. Besides the Nimbus 7 data, the Stratospheric Aerosol and Gas Experiment (SAGE) profile data from both the Application Explorer Mission-B (AEM-B) spacecraft (1979-1981) and the Earth Radiation Budget Satellite (ERBS) launched in 1984 provide mixing ratios of O_3 and NO_2 as a function of altitude.

Stratospheric aerosols play an important role in heating the stratosphere and as tracers of stratospheric dynamics. SAGE and Nimbus 7 Stratospheric Aerosol Measurement II (SAM II) data sets, and the Profile and the Beta and Aerosol Number Density Archival Tape, contain stratospheric aerosol extinction profile information from cloud tops to 40 km from 1979-1981 and 1978 to the present, respectively. SAM II is still operational, and data through 1985 are available. Aerosol data from the SAGE II instrument on ERBS should arrive at NSSDC in early 1987. Section II of the table summarizes these data sets.

As for the study of stratospheric cooling in relation to Antarctic ozone depletion, NSSDC has several key data sets from both surface-based and spacecraft observations. They include the 7-month Nimbus 7 LIMS Inverted Profile Archival Tapes (LAIPAT), the SAMS Gridded Retrieved Temperature (GRID-T) data for 1979, the National Meteorological Center Gridded Temperature and Height data (NMCGRD), and the ANGELL data. Characteristics of these data sets are listed in Section III of the table.

An association between the solar sunspot cycle and the depletion of polar ozone has also been hypothesized. Correlations between solar activity with changing stratospheric chemical composition are being investigated. Data sets held at NSSDC that may be useful for such research include the Nimbus 7 SBUV Continuous Scan Solar Flux Tape (SUNC), the Earth Radiation Budget (ERB) Solar Analysis Tape (ESAT), and the surface-based solar geophysical data (Section IV of the table).

In summary, NSSDC can supply a large variety of data sets for the study of the Antarctic "ozone hole." Six of the above-mentioned data sets, ANGELL, ERB ESAT, LIMS LAMAT, NMCGRD, SAGE PROFILE, and SAM II BANAT, are supported by the NASA Climate Data System. It is planned that more data sets, including Level III SBUV/TOMS, will be available on line. There are still other potentially related data sets available from NSSDC. Interested scientists are encouraged to contact the authors for further details.

P. K. Bhartia, Kenneth Klenk, Carolyn Ng, and Lola Olsen

SOURCES OF POLAR STRATOSPHERIC DATA

(continued on page 12)

S/C Instrument Observation Period	Characteristics	Geophysical Parameters	Selected Data Products	Comments
		I. OZONE		
Nimbus 7 TOMS 11/78-Present	90° S. to 90° N. 50 x 50 to 250 x 250 km Footprint	Column Total Ozone Reflectivity	GRIDTOMS	11/78-10/84 Available 1985 & 1986 Data Available in Early 1987 Gridded Data on Roughly Square Grids of ~100 km on a Side
Nimbus 7 SBUV 11/78-Present	Horizontal: 80° S. to 80° N. 200 x 200 km Footprint, Vertical: 100-0.3 mb, ~2.5-km Intervals, Vertical Resolution Approx. 10km	Total and Profile Ozone, Reflectivity	CPOZ	11/78-10/84 Available 1985 & 1986 Available in Early 1987
			ZMT	11/78-9/84 Available, 10-Deg. Latitude Zones for 80° S. to 80° N.
			Polar Stereo-graphic Contours	11/78-10/85 Available in Early 1987 3-Day-On/1-Day-Off Cycles
Nimbus 4 BUV 4/70-5/77	Horizontal: 81° S. to 81° N. 200 x 200 km Footprint, Vertical: 100-0.3 mb 2.5-km Intervals Vertical Resolution Approx. 10 km	Total and Profile Ozone, Reflectivity	CPOZ	4/70-5/77 Available
			ZMT	4/70-4/77 Available 10-Deg. Latitude Daylit Earth With On/Off Cycles
		II. COMPOSITION + AEROSOLS		
Nimbus 7 LIMS 10/78-5/79	Horizontal: 64° S. to 84° N. Vertical: 100-0.05 mb, 1.5-km Intervals	Temperature, Geo-potential Height; Ozone, Nitrogen Dioxide, Water Vapor, and Nitric Acid Mixing Ratios	LAMAT	10/78-5/79 Available 4-Deg. Latitude Band World Maps
AEM-B SAGE 2/79-11/81	Horizontal: 79° S. to 79° N. 1 x 250 km Footprint, Vertical: Cloud Tops to ~40 km, 1-km Intervals Temporal: Satellite Sunrise and Sunset	Aerosol Extinction; Ozone and Nitrogen Dioxide Mixing Ratios	Profile	2/79-11/81 Available 6/79 Onward Sunset Events Only
ERBS SAGE II 11/84-Present	Horizontal: 57° S. to 57° N. Vertical: Cloud Tops to 150 km, 1-km Intervals Temporal: Satellite Sunrise and Sunset	Aerosol Extinction; Ozone, Nitrogen Dioxide, and Mixing Ratio	Profile	11/84 - Available Early 1987; SAGE Experimenters Are Performing a Special Study of the Antarctic Ozone Depletion, Spring-Oct. 14, 1986

(continued from page 11)

SOURCES OF POLAR STRATOSPHERIC DATA

S/C Instrument Observation Period	Characteristics	Geophysical Parameters	Selected Data Products	Comments
Nimbus 7 SAMS 10/78-6/83	Horizontal: 50° S. to 67.5° N., 2.5-Deg. Latitude 10-Deg. Longitude Vertical: 15-80 km, 31 Pressure Levels at 0.2 Scale Height or 1.4-km Intervals	Temperature, Nitrous Oxide and Methane Profile	ZMT-G	1/79-12/81 Available Gas Productt - One or the Other but Not Both on Any Given Day
Nimbus 7 SAM II 11/78-Present	Horizontal: 64° S. to 84° N. 64° N. to 84° N. 1 x 250 km Vertical: Cloud Tops to 35 km, 1-km Intervals Temporal: Satellite Sunrise and Sunset	Aerosol Extinction	BANAT	11/78-10/85 Available
III. STRATOSPHERIC TEMPERATURE				
Nimbus 7 LIMS 10/78-5/79	Horizontal: 64° S. to 84° N. Vertical: 100-0.05 mb 1.5-km Intervals	Temperature and Geopotential Height; Ozone, Nitrogen Dioxide, Water, and Nitric Acid Profiles	LAIPAT	10/78-5/79 Available 4-Deg. Latitude Profiles
Nimbus 7 SAMS 10/78-6/83	Horizontal: 50° S. to 67.5° N. 2.5-Deg. Latitude 10-Deg. Longitude Vertical: 15-80 km	Temperature	GRID-T	12/78-12/79 Available 10 or 62 Pressure Levels
NOAA TOVS and Radiosondes 10/78-Present	Horizontal: 90° S. to 90° N. Vertical: 1000-0.4 mb	Height, Temperature, Winds	NMCGRD	11/73-12/83 Available Different Grid Sizes
Surface Stations Radiosonde 1958-Present	Horizontal: 63 Stations Globally - S. Hemisphere Coverage Sparse Vertical: Surface to Stratosphere	Seasonal Temperature Deviations From 18-Year Average	ANGELL	1953-1983 Available On-Line Compiled in Monthly Climatic Data for the World
IV. SOLAR ACTIVITY				
Nimbus 7 ERB 11/78-Present	Full Disk 0.2 to 50 Micrometers Temporal: 13 to 14 Times a Day	Solar Irradiances Zurich Sunspot Number 2800-MHz Solar Flux Plage Regions	ESAT	11/78-11/85 Available Include Parameters From Solar Geophysical Data Set 3-Day-On/1-Day-Off Cycle
Nimbus 7 SBUV 11/78-Present	160 nm-400 nm, 1 nm Bandpass In 0.2 nm Steps	Solar Irradiances	SUNC	11/78-10/84 Available 3-Day-On/1-Day-Off Cycle
Surface-Based Telescope 1968-Present	Observatory Data Describing Regions of Solar Activity	Location, Size, and 9.1-cm Flux Emission Associated With Plage Regions and Sunspot Groups Crossing Solar Disk	SOLACT	1968-1982 Available On-Line Early 1987

SPAN's Rapid Development Spans Disciplines and Nations

The Space Physics Analysis Network (SPAN) links space and earth science research and data analysis computers in the United States, Canada, and Europe. It provides a common working environment for sharing computer resources, sharing computer peripherals, and providing the potential for significant time and cost savings for correlative data analysis.

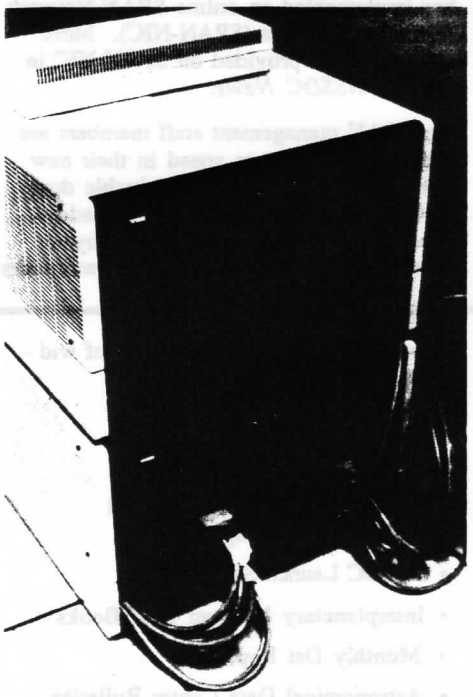
As indicated by the original name, SPAN initially linked space plasma physicists working on NASA programs. However, within the last 2 years many earth science and astrophysics instititutions have also connected to SPAN. In addition, 10 new primary SPAN nodes for the Oceans community of scientists have been added, and more are planned.

Over the last year, personnel from Boeing Corporation worked with SPAN project personnel to redesign the network to take advantage of enhanced capabilities provided by the Program Support Communication Network (PSCN). This recently implemented configuration uses four central routing nodes, at GSFC, MSFC, the Jet Propulsion Laboratory (JPL), and the Johnson Space Center (JSC), that are connected with 56 kilobits per second (kbps) links. All remote SPAN nodes are linked to the closest of these four routers using 9.6 kbps circuits (called tail circuits).

Five new nodes have been added to the European Space Agency's (ESA) SPAN router at the European Space Operations Centre (ESOC) in Darmstadt, West Germany. They are located at the Max Planck Institute (MPI) for Extraterrestrial Physics in Garching, Germany; the Paris Observatory in France; the University College of London in England; the European Space Research and Technology Centre (ESTEC) in the Netherlands; and the Space Telescope/European Coordinating Facility (ST/ECF) in Garching.

There are several switched circuit SPAN nodes that were not in the star configuration. These nodes are connected to the NASA Packet Switched System (NPSS). NPSS is an X.25 packet switch service similar to the GTE public packet switched network (PSN) called Telenet. It is another type of communication facility of the PSCN system used by SPAN. NPSS provides transparent network bridges to commerical PSN's such as Telenet, allowing communications with systems not located at NASA installations.

PSNs are often used for low-cost, low-volume data communications for remote terminal access and for communications with systems where costs prohibit leasing a dedicated line. SPAN currently has established several NPSS/PSN full-function DECnet links. Since the desired communication to Europe for a dedicated trans-Atlantic circuit is rather expensive, use of the PSN capability was a natural extension of SPAN. The first SPAN X.25 NPSS/PSN link was between the Space Science Laboratory (SSL) VAX at Marshall Space Flight Center in Huntsville, Alabama, and the European Space Operations Centre in Darmstadt. Traffic over this NPSS/PSN link from the United States to Europe has become so extensive that it now warrants a dedicated connection, expected to be operational in early 1987.



The new NSSDC SPAN routers.

The new SPAN topology will have a high level of reliability because of its "mesh" configuration, which provides multiple paths for accessing the SPAN nodes. This is evident in the backbone structure, which has several high speed links, emanating from each router, that can form alternate paths between the routing centers. In addition, SPAN nodes can be accessed using NPSS, Arpanet, and BITnet gateways and wide area networks that have joined SPAN.

The reliability of SPAN is reduced to the backbone, routing hardware, and tail circuits. The backbone circuits are multiplexed on a Program Support Communication (PSC) T1 line which, if it fails, only disables the affected routing center. NPSS can be used to create a virtual circuit between MSFC and GSFC if the MSFC backbones fail.

PSC T1 lines are expected to be operational 99 percent of the time. There are backup routers at all of the routing centers except JSC. PSC is responsible for service on the tail circuits. Since SPAN structure has primarily nonrouting tail circuits, no other node will be affected when a remote node goes down. This new SPAN network structure makes it easy to isolate problems.

Several wide-area networks (WANs) have expressed an interest in connecting to SPAN. The High Energy Physics Network (HEPNET, also known as PHYSNET), with 400 known nodes including EURO-HEPNET; the Canadian Data Analysis Network (DAN) with 12 nodes, which support CANOPUS; and TEXNET, with more than 100 nodes have also connected to SPAN. Because these existing wide-area networks already contain a large number of nodes, some coordination has been done to resolve conflicts in node numbers between SPAN and the other networks. After joining with SPAN, these WANs continue to maintain their separate identities.

The Canadian Data Analysis Network is reachable from SPAN using the NASA Packet Switched System. DAN is a network that allows the CANOPUS researchers from across Canada to access data acquired from CANOPUS field instrumentation and to manipulate these data in a variety of ways.

On September 25 the first European SPAN meeting was held in Darmstadt at the European Space Operations Centre. It was hosted by Erchard Jabs and attended by approximately 50 European scientists and system managers representing nine countries (England, Italy, France, Spain, Austria, Germany, Sweden, the Netherlands, and the United States) and 15 institutions. Dr. James L. Green represented NSSDC at this meeting and gave an extensive presentation on the status of SPAN in the United States.

Installation of an ESOC to a 9.6 kbps direct link at NSSDC is well under way, and ESOC is working with other European

see SPAN, page 14

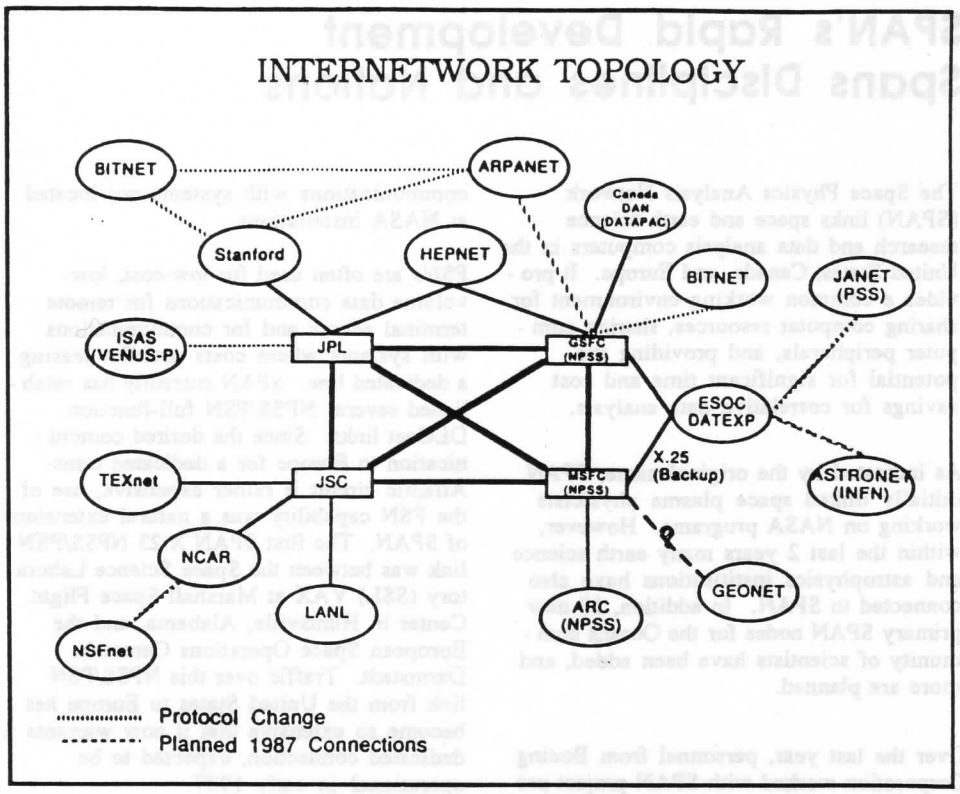
SPAN, *from page 13*

science institutions that do business with ESA and NASA to connect to their existing SPAN-compatible systems.

It was discovered at this meeting that several of the European groups already have suitable facilities to become SPAN nodes in Europe without purchase of any hardware or software, and that they could be reached over the public networks. These groups expressed an interest in becoming members of SPAN.

At the meeting, SPAN was demonstrated by logging on and accessing data from NSSDC, the International Ultraviolet Explorer (IUE) computer in Villafranca, Spain, and the Viking control center in Kiruna, Sweden. The participants displayed real-time Viking quick-look data.

With the extremely rapid growth in the number of SPAN nodes (approximately 1300) and users, it becomes a logical next step to be concerned about how researchers can easily identify computers and locate other users on SPAN. NSSDC is currently developing an online SPAN data base that contains information about the SPAN nodes (e.g., type of computer, location, contact person, discipline supported, node address). When the data base is operational, users should be able to make queries such as the geographic location of systems, the identification of systems that support specific disciplines, and the identification of universities with nodes on SPAN. Then NSSDC will implement a data base containing SPAN user information that will provide the basis for a directory of SPAN users.



As a more comprehensive approach to providing information on SPAN, NSSDC has implemented an online SPAN-Network Information Center (SPAN-NIC). More details will be provided on SPAN-NIC in the next *NSSDC News*.

The SPAN management staff members are quickly coming up to speed in their new roles. This staff will be invaluable during SPAN's continuing evolution. In addition, this process has been accelerated by the delivery and installation of the new routers and software, the migration of nodes to new network areas, and the review of requests from potentially new nodes.

Planning has already started for the next Data Systems Users Working Group (DSUWG) meeting, which is scheduled for January 29-30, directly following the CDAW meeting to be held during the first part of that week.

Valerie L. Thomas and James L. Green

RAND File Identifies Data Center Users

The Request and Name Directory (RAND) file is one of several NSSDC information files making up the System for Information Retrieval and Storage (SIRS). This system, now resident on the NSSDC MODCOMP Classic II minicomputer, will be replaced by a relational data base system in the VAX IDM data base machine environment for easy electronic access by the NSSDC user community. RAND functionality will be preserved and extended in the new system.

RAND is primarily used to identify science users of the Data Center, presently numbering 33,000. In addition to a mailing address, information is stored about a person's electronic address(es), such as SPAN ID, requests for data or other services submitted to NSSDC, and inclusion in particular distribution lists.

There are numerous lists. Those of widest interest include:

- NSSDC News
- NSSDC Data Listing
- Report on Active and Planned Spacecraft and Experiments
- NSSDC Launch Summary
- Interplanetary Medium Data Books
- Monthly Dst Reports
- Astronomical Data Center Bulletins
- Pilot Land Data System Issuances
- Pilot Climate Data System Issuances
- SPACEWARN Bulletin
- Data Systems Users Working Group

In addition, there are discipline flags set for individuals that enable mailings of data catalogs and other occasional discipline-specific material. These discipline areas presently include earth resources, meteorology, atmospheric physics, ionospheric physics, particles and fields, solar physics, planetology, and astronomy.

When the capability becomes available for a person to electronically determine whether he or she is listed in this data base, it will be announced in the newsletter. The individual will then be able to determine his or her association with specific documents and disciplines, and submit modifications electronically, as appropriate. In the meantime, interested parties are invited to request information about the lists and their own status in the file. Such requests can be made by mail, phone, or electronic means, as specified on this newsletter's back cover.

Joseph H. King

Reph Guides PCDS to Operational Status

Mary Reph recently became the manager of the Pilot Climate Data System (PCDS), with primary responsibility for all activities supporting the continuing development and operation of the system. Since her areas of expertise are in data base management and the development of scientific support for data sets, she is well qualified for this position.

Reph has been involved with PCDS since its requirements and analysis phase began over 6 years ago. She has played several roles, from data base designer to software development manager. As software development manager, she defined the activities to be performed, set priorities and milestones, reviewed the design and implementation of all software tools, and provided major design and documentation inputs. She also directed the testing of all new software and integrated it into the existing system. As data and archive manager, she defined and reviewed the content, storage structure, and access strategies of the data bases, monitored the performance and requirements of the system, and helped define necessary adjustments. She also arranged to obtain data needed by the system and to maintain these data in a library of magnetic tapes.

During the earliest stages of PCDS, Reph played a major role in designing the underlying data bases and the programs for interfacing to them. She is now guiding the system from its pilot role to an operational one. The system will be considered operational--and renamed the NASA Climate Data System--when the latest software de-

Mary Reph

velopments have been integrated and problems with computer resources have been resolved. Reph says, "I'm taking a pragmatic approach to the systems' development. The primary emphasis has to be on supporting a number of additional data sets and maintaining the system. At its current stage of development, the system has to help solve today's problems, and PCDS' staff is working hard to do that." In the meantime, PCDS has provided a test bed for some of the ideas that have been carried over to the other pilot programs.

Reph had originally planned a teaching career. After earning a B.S. in mathematics and a teaching certificate from the University of Georgia, she taught mathematics and science in Swaziland as a Peace Corps volunteer. This job was both challenging and fascinating because it required her to be involved in all levels of teaching, from laboratory management and development of teaching tools to curriculum development. After that she taught high school mathematics in Georgia, before coming to the Washington area to work on her masters in mathematics at American University, where she taught undergraduate mathematics courses. When she finished her masters she took the opportunity to work in data management at Goddard.

Reph met her husband in the Peace Corps, where they both picked up a "bug" for travel. Their vacations have included several trips to Europe, a trip to the Soviet Union, and a recent trip to China.

Graphics, *from page 3*

This software will be organized around a three-dimensional hierarchical display list to support very high performance graphics, as well as dynamic and interactive applications, when required. The software will support graphics at a low level, for output primitives, and at a high level (e.g., for contour plots). In addition, the software will support extensive defaults so that graphics can be generated with a minimum of subroutine calls. However, if the programmer desires, many other features can be activated by additional subroutine calls.

If you or your organization is interested in becoming part of the mass buy of graphics software, or is interested in the detailed technical specifications for the software procurement, contact Lloyd Treinish at NSSDC::TREINISH on SPAN or call (301) 286-9884.

Lloyd A. Treinish

CALENDAR

Nov. 5-7	PLDS Preliminary Technical System Review Goddard Space Flight Center	Jan. 15-16	PLDS Science Steering Group Goddard Space Flight Center
Dec. 1	National Science Foundation Seminar on SPAN Washington, DC	Jan. 18-20	Computer Science/Data Systems Workshop Williamsburg, VA
Dec. 1	CODMAC; SPAN; PSCN; MPP Washington, DC	Jan. 26-28	CDAW 8.2 Goddard Space Flight Center
Dec. 11	Space Telescope Institute Networking Meeting Space Telescope Institute	Jan. 29-30	DSUWG Meeting Goddard Space Flight Center
Jan. 13-15	PLDS Final Technical System Review Goddard Space Flight Center	Feb. 3-5	PLDS Team Meeting Jet Propulsion Laboratory
		March (TBD)	PCDS Workshop Goddard Space Flight Center

NEWSBRIEFS

PCDS Holds Tutorial for University Personnel

The Pilot Climate Data System (PCDS) held a tutorial for university support personnel on October 15-16 at Goddard Space Flight Center. The universities represented at the tutorial--the University of Maryland, the University of Michigan, and Pennsylvania State University--are participating in a program that involves using PCDS in the classroom, as well as for basic research.

The tutorial was designed to give university support staff the training and skills needed to assist students in using the system to complete classroom assignments and projects, and to assist in classroom presentations.

After a short system overview, most of the tutorial was spent providing direct hands-on experience with PCDS. All participants ran through an entire scenario of their own choosing. They began by examining the PCDS Catalog to determine what data existed for the parameters and times of interest to them and whether these data were available through PCDS. If PCDS provided access to the data, the participants then examined the PCDS Inventory to further identify the data of interest. With this information in hand, they were able to access, manipulate (take a subset, calculate simple statistics, etc.), and graph the data.

Both participants and PCDS staff felt that the tutorial was successful. At the end, participants felt more confident and better prepared to provide user support to their faculty, staff, and students. Each participant received the *PCDS User's Guide*, the *NASA Climate Data Catalog*, and a draft of a primer that is being prepared for PCDS. The final version of the primer should be available at the PCDS Workshop scheduled for early 1987.

Mary Reph, Blanche Meeson, and Lola Olsen

Optical Disk Paper Accepted for Publication

A conference paper titled "NSSDC Activities with 12-inch Optical Disk Drives" by Barbara E. Lowrey and Brian Lopez-Swafford has been accepted by the Society for Photo-Optical Instrumentation Engineers (SPIE) for publication in SPIE's proceedings of the Optical Mass Data Storage II Conference.

NSSDC Welcomes Newcomers

Ken McDonald has been working for NSSDC for several months as the data management technical area manager for the Pilot Land Data System (PLDS). This is a key year for the project because Build 1 of PLDS is scheduled for delivery this summer. McDonald's education includes an M.S. in physical oceanography from North Carolina State University and a B.S. in aerospace engineering from the University of Virginia. He joins NASA following two years of contractor experience with SAR as task leader for PLDS.

Dr. Robert McGuire has joined NSSDC as the lead scientist working with the International Solar Terrestrial Physics (ISTP) Project. He also has assumed principal responsibility for the restoration and renewal of the NSSDC tape archives. In addition, McGuire will continue his work as principal investigator for the energetic particles experiment and as deputy project scientist on IMP 8. He was associated with Goddard's Laboratory for High Energy Astrophysics for the past 10 years, first on a National Academy of Science/National Research Council postdoctoral fellowship and then as a research associate with the University of Maryland. A native of California, his Ph.D. in physics and B.A. in physics and mathematics are both from the University of California at Berkeley.

Dr. Blanche Meeson, a native of California with a Ph.D. from the University of California at Santa Barbara in the physiological ecology of the marine system, has been working for NASA since September. She has two major responsibilities. As data and archive manager for the Pilot Climate Data System (PCDS), she sees that all climate data is cataloged and inventoried. Her second task involves archiving the data at NSSDC for the Coastal Zone Color Scanner (CZCS), which was flown on the Nimbus 7 satellite. Most recently Dr. Meeson worked for Business and Technological Systems as a contractor for NASA on PCDS.

Fred Schamann, a graduate of the City College of New York with a B.S. in mathematics, has worked for NASA for the past 18 years in geodynamics. He is new to NSSDC, however, where his responsibilities include maintenance of ADP and photographic equipment and general property management. Schamann is a past president of the Goddard Engineers, Scientists, Technicians Association, a professional employees union.

Data Inquiries

For information on submitting data to the Data Center or inquiries regarding availability, cost, and ordering procedures, researchers *within the United States* should contact:

Submissions:

Dr. H. K. Hills
National Space Science Data Center
Code 633.8
Goddard Space Flight Center
Greenbelt, Maryland 20771
Telephone: (301) 286-4106
SPAN: NSSDCA::HILLS

Requests:

National Space Science Data Center
Code 633.4
Goddard Space Flight Center
Greenbelt, Maryland 20771
Telephone: (301) 286-6695
Telex: 89675 NASCOM GBLT
TWX: 7108289716
SPAN: NSSDC::REQUEST

Individuals residing *outside the United States* should contact Dr. James I. Vette for information on submissions. Inquiries to Dr. Vette and requests from outside the United States must be directed to:

World Data Center A for Rockets and Satellites
Code 630.2
Goddard Space Flight Center
Greenbelt, Maryland 20771 USA
Telephone: (301) 286-6695
Telex: 89675 NASCOM GBLT
TWX: 7108289716
SPAN: NSSDC::REQUEST

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