NSSDC NEWS

NATIONAL SPACE SCIENCE DATA CENTER

Published quarterly by the NSSDC

Vol. 2, No. 2, May 1986

Nimbus 7 Data Products Part 2--LIMS and SAMS

In the last issue of the newsletter, NSSDC holdings of Earth Radiation Budget (ERB) data from the Nimbus 7 satellite were described. Data from the Limb IR Monitor of the Stratosphere (LIMS) and the Stratospheric and Mesospheric Sounder (SAMS) are described in this issue.

LIMS and SAMS are the two experiments onboard Nimbus 7 that, for the first time, provided simultaneous measurements of temperature and trace gases in the middle and upper atmosphere. The LIMS operated flawlessly throughout its entire designed lifetime of 7-1/2 months, and the SAMS performed well for a continuous period of 4-1/2 years. Described below are the LIMS data products (delivered to NSSDC on 9-track, 1600-bpi magnetic tapes) and the SAMS data products (9-track, 6250-bpi magnetic tapes).

All the LIMS digital data products now archived at NSSDC (Table 1) were originally generated by the National Center for Atmospheric Research (NCAR) and reprocessed by NASA/Langley Research Center (LaRC). Earth-located, calibrated, but uncorrected radiances measured both day and night, plus housekeeping information, instrument status, and data quality information are available on the Radiance Archival Tapes (RAT), with one day of data per tape.

Table 1
LIMS* Digital Data Products

RAT	Radiance Archival Tape
LAIPAT	Inverted Profile Archival Tape
LAMAT	Map Archival Tape
LASMAT	Seasonal MAT

*Co-Team Leaders: J. Gille (NCAR)
J. Russell, III (LaRC)

Corrected LIMS radiance profiles at 4° latitude intervals from 64° south to 84° north are contained in the Inverted Profile Archival Tapes (LAIPAT). There are also inverted results in the form of temperature, ozone, water vapor, nitric acid, and nitrogen dioxide mixing ratio profiles as functions of pressure (about 1000 each per day). In addition, Earth location, time, cloud top, and housekeeping information are included. There are a total of 36 tapes, each containing from 2 to 6 days of data.

Other LIMS products that are available from NSSDC include the MAP Archival Tapes (LAMAT) and the Seasonal MAT (LASMAT). The LAMAT contains daily global maps of LIMS results in the form of Fourier coefficients for each 4° latitude zone, each of 18 pressure levels (from 100 to 0.05 mb), and each of the five products. There are nine LAMAT tapes containing maps for 23 to 30 days each, and one LASMAT of

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NSSDC Anticipates Archiving GRO Data

Modern astronomy expands our view of the universe from the visible wavelength band, encompassing radio, IR, UV, x-ray, and gamma ray observations. Gamma rays, the highest frequencies of the electromagnetic spectrum, address directly the presence of very energetic nuclear processes, and thus provide a unique window to our violent universe.

The Gamma Ray Observatory (GRO) will be the major NASA mission in the 1980s to continue gamma-ray astronomy initiated by gamma-ray instruments onboard the NASA SAS-2 and ESA COS-B satellites. GRO will carry four large instruments that will make comprehensive observations in the gamma-ray spectrum covering the energy range from 0.1 MeV to 30 GeV. The GRO program has a requirement for rapid delivery of large amounts of gamma-ray data to the scientific users. To handle these large amounts of data efficiently, GRO was designed to use an autonomous packeted data system. Data autonomy means that all of the data, including auxiliary data necessary for processing, are included in the data packet that leaves the Observatory. The purpose of this

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Message From the Director

NASA Support Communication: What's Reasonable?

There seems to be some major confusion concerning bit rates of communication lines and their purpose. A network such as SPAN, which is a dedicated low-rate (9.6 kb/s) communication service, is not designed for massive amounts of data transfer. SPAN is not meant to replace data tapes or, in the near future, data optical disk mailing. Communication is expensive!! If high data-rate ($\geq$ 56 kb/s) transfers are needed, the most cost effective way of handling them is switch circuit "dial-up" service (that is, you dial it up when you need it). However, a 56 kb/s line, unless in constant use, is not cost effective.

Obviously, situations having the requirements for real-time quick turnaround data transfer override the costs. So what is SPAN good for? Didn't SPAN handle real-time ICE data during the encounter? It turns out that the bit rate for the ICE spacecraft is relatively low (1024 b/s) by modern standards and was easily handled by SPAN. But the real strength behind SPAN is the access to NASA facilities, other investigators, and message communications and science information systems (such as Pilot Climate, Planetary Pilot, Coordinated Data Analysis Workshops, NSSDC) and ready access to colleagues, in addition to its availability to move binary data, software, and plot files. SPAN is to its science users as telemail is to administrators. A low-rate network like SPAN is now an essential tool for modern space and Earth science analysis.

What we are learning is that a major effort must take place to provide network accessible, science community usable NASA data and related information systems. Efforts are just beginning in the development of a truly integrated interactive NSSDC facility for remote access to space and Earth science data and information. It is hoped the NSSDC efforts will be a model for what a NASA facility, accessible to remote users, should be like.

This is going to take time and involve major participation by the science community. I urge those wanting to contribute to this effort to get involved in space and Earth science working groups like the Data Systems Users Working Group (DSUWG), Pilot Climate Working Group, and Satellite Oceans Data System Science Working Group (SODSSWG), and to support CODMAC when asked.

I am confident that communication hardware and software will become available to support high-rate data transfers right to home institutions in the future. But, with few exceptions, most space and Earth science remote users do not have the high-rate capture on-line storage systems and the computational power necessary to make cost effective utilization of even the present high-rate communications, except perhaps in "burst" mode.

I must point out that I am not against high-rate communication. In fact, in an upcoming article in the NSSDC Newsletter, I will discuss how we are changing SPAN's backbone to 56 kb/s, but this goes only to selected NASA centers that are connected by the PSCN and can handle the load. In addition, this situation is more cost effective than stringing 30 or more 9.6 kb/s lines across the country as SPAN is now doing.

Let's not lose our credibility. By first utilizing fully what communication we have, we will be able to know exactly what our future communication requirements are, with respect to what is technically (and cost) feasible. I contend that, if we do not fully use a low-rate system like SPAN and complete the development of on-line NASA facilities, we are not ready for high-rate communication to everyone in space and Earth sciences. Regardless, in today's environment, some type of low-rate communication should be a given!

James L. Green

SAR Wins Major NSSDC Support Contract

On May 1, 1986, Science Applications Research (SAR) began work on a new contract to provide scientific analysis, programming, data management, archival, and distribution services for the NSSDC.

SAR is a joint venture company formed in 1983, sponsored by SASC Technologies, Inc., with RMS Technologies, Inc. SAR has been providing scientific analysis, research, and programming support to the Space and Earth Sciences Directorate at Goddard Space Flight Center. Headquartered in Lanham, Maryland, SAR employs nearly 280 persons with the addition of the NSSDC support contract.

SASC Technologies, which also has headquarters in Lanham, Maryland, has major contracts with NASA/Goddard, NASA/Langley, the Air Force Geophysical Labs, the Peoples' Republic of China, and the Federal Aviation Administration. RMS Technologies is headquartered in Trevose, Pennsylvania; its Space Sciences Division is headquartered in Landover, Maryland.

SAR's responsibility within the NSSDC is to provide data acquisition support with space and Earth sciences projects and with principal investigators to ensure that valuable data sets are archived at the NSSDC. In addition, SAR personnel will support the development of prototype systems like PCDS and PLDS, and, also, they will participate in the computer science research and development activities, such as Intelligent Data Management and DAVID.

SAR will also be responsible for the request coordination and the distribution and dissemination of the NSSDC holdings. The company will be developing a centralized NSSDC Information Management System that will incorporate and advance the concepts of CODD and PCDS Catalog and Inventory, as well as other concepts under development within the NSSDC.

Kenneth Klenk

NYMA, Inc., Chosen to Support Photolab and Computer Systems

NYMA, Inc., a new contractor for the NSSDC, on May 1, 1986, began its responsibilities to provide computer operators for the NSSDC computer systems and manage the NSSDC photo lab.

NYMA, Inc., which was founded in 1978, has its headquarters in Greenbelt, Maryland. The company has 38 employees; 14 of these employees are located at NSSDC under contract to oversee the photographic laboratory and the computer operations.

The company has contracts with Government agencies located in Atlantic City, New Jersey; Gaithersburg, Maryland; and Greenbelt, Maryland. NYMA is a small business, certified under the Small Business Administration 8(a) Program.

Kenneth Klenk

Several ADC Projects Near Completion

NSSDC Astronomical Data Center (ADC) personnel have been building a continuously expanding archive of astronomical data: The new Status Report on Machine-Readable Astronomical Catalogs, dated February 15, 1986, contains approximately 475 data files and catalogs available for distribution (most of the entries in the list are catalogs; some files consist of observational data).

In addition, ADC personnel have been involved with several long-term projects that are nearing completion. These projects, of general interest to our readers in the astronomical community, are briefly described in this article. A large data base of observational and bibliographic information on individual objects, which we hope to make available to North American astronomers in the near future, is also discussed.

Durchmusterung Catalogs

A major collaborative effort to computerize the Durchmusterung (DM) catalogs has just been completed. These catalogs comprise the largest generally available collection of star positions and estimated visual magnitudes over the entire celestial sphere, and they have provided the most widely used system of stellar identifications in the astronomical literature. The four primary catalogs, which have been transferred to machine-readable form and verified or proofread over the last 10 years, are now available for dissemination on magnetic tape. The Cordoba Durchmusterung (CD; 613,959 stars in declination zones -22° to -89°) was keypunched at NSSDC and proofread over a period of 7 years by ADC personnel and a number of outside volunteers. The Cape Photographic Durchmusterung (CPD; 454,877 stars in zones -18° to -88°) was computerized in collaboration with B. N. Rappaport (now at New Mexico State University), while the Southern Durchmusterung (SD; 134,832 stars in zones -01° to -23°) was transferred directly to disk storage and verified at the Centre de Donnees Astronomique de Strasbourg (CDS) in France and at the ADC. The most recently completed catalog, the Bonner Durchmusterung (BD; about 325,000 stars in zones +89° to -01°), was computerized at the Observatoire de Nice, the CDS, NSSDC, and by B. N. Rappaport, and has been completed and assembled at the ADC over the past several months. In collaboration with B. N. Rappaport, a complete set of charts has already been produced for the CPD, while CD charts are in preparation, and SD and BD charts are planned. These high quality charts will all be produced at the same scale for uniformity over the entire sky. The machine-readable data will also make possible the inclusion of all DM stars in the CDS SIMBAD data base (described below).

The Bright Star Catalog

The Bright Star Catalogue, 4th Revised Edition (Hoffleit 1982, Yale University Observatory) is a widely used catalog of stars brighter than visual magnitude 6.5. Because of a great demand for the machine-readable version of this catalog, the almost continuous publication of new data for bright stars and the discovery of errors and omissions in the previous version (errors are the bane of all catalogs), we have, in collaboration with the author, collected errors and new data and produced an updated version of the machine catalog. In addition, numerous improvements have been made to the catalog to effect uniformity and easier data processing. The sources of new data and the modifications are discussed in detail in a forthcoming paper in the Astronomical Data Center Bulletin 1, No. 4.

Data

A new catalog of astronomical observations made from space vehicles has recently been completed. The Data Inventory of Space-based Celestial Observations (DISCO; Brotzman, Hill and Mead, 1986, Astron. Data Center Bull., Vol. 1, No. 4, in press) is a directory to data contained in 16 catalogs of space observations and tells if an object has been observed with a spaceborne instrument. Included in DISCO are the names of the objects, 1950 equatorial coordinates, and source catalog or instrument identifications, with a second file containing full source references and other pertinent information. Additional details and a complete list of the satellites included in DISCO can be found in the paper referenced above.

ADC Bulletin

The next issue of the Astronomical Data Center Bulletin (Vol. 1, No. 4) will be ready soon. In addition to the papers mentioned above, this issue will contain papers on cross-identifications of IRAS sources with other catalogs, an interim supplement to the General Catalogue of Stellar Radial Velocities, new versions of the ADC BSI (Bibliographic Star Index) retrieval system, the Bidelman-Parsons Spectroscopic and Bibliographical Catalog and The Henry Draper Catalogue, the computerization of the Cape Photographic Durchmusterung, a paper offering suggestions for the preparation of machine-

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article is to describe the general aspect of the mission, the data management plans of GRO, and the NSSDC role in this mission.

The main objectives of the four experiments onboard GRO are the following: 1) a study of compact objects such as neutron stars and black holes as well as gamma-ray emitting objects whose nature is yet to be understood; 2) a search for evidence of nucleosynthesis--the fundamental process in nature for building up the heavy elements--particularly in the environment of supernovae; 3) observation of intense gamma-ray bursts, their luminosity distribution, the spectral and temporal characteristics, and their spatial distribution; 4) the exploration of our galaxy in the gamma-ray range, particularly with regard to regions difficult to observe at other wavelengths, the origin and dynamic pressure effects of the cosmic rays, and structural features particularly related to high-energy particles; 5) a study of the nature of other galaxies in the high energy realm and especially the extraordinary ones, such as radio galaxies, Seyfert galaxies, and quasars; 6) a search for cosmological effects through the detailed examination of the diffuse radiation and the search for possible primordial black-hole emission.

The following table lists the four GRO experiments, institutions involved, energy ranges, and scientific purposes.

The GRO data system was designed to meet certain requirements, including rapid delivery of data to widely separated users, efficient delivery of large amounts of data, and delivery of auxiliary data needed for processing and science data.

Figure 1 illustrates the basic GRO data transmission scheme. All the data collected by the GRO will be relayed to Earth via the Tracking and Data Relay Satellite System (TDRSS) and White Sands Ground Terminal (WSGT). The data will be sent to the Goddard Space Flight Center (GSFC) where they will be sorted and distributed to science teams identified in the table.

The above requirements led to the design of a packet telemetry data system for GRO that is described below.

The Communications and Data Handling (CADH) system, an onboard subsystem, collects data from the instruments, supplements them with auxiliary data computed onboard, formats them into packets, and transmits them. The TDRSS merely transports the data to the Packet Processor (PACOR) in the Information Processing Division (IPD) at the GSFC facility. The data packets remain unopened until they reach the ultimate science users.

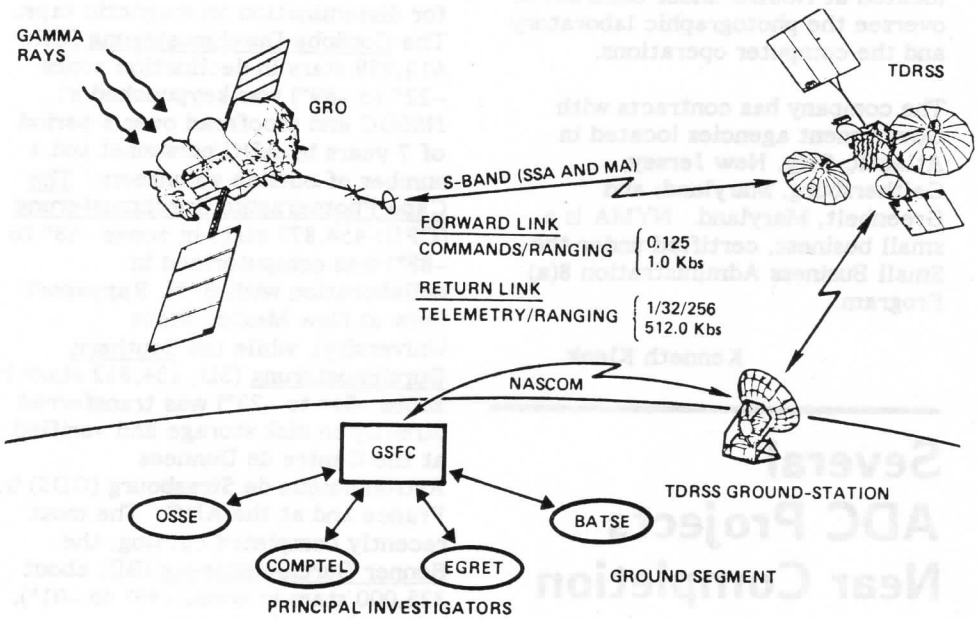


Figure 1

Experiment	Energy Range	Institution Involved	Purpose
Burst and Transient Source Experiment (BATSE)	50-600 KeV	NASA/MSFC	• Detection of transient events and bursts • Time measurements • Location
Compton Telescope (COMPTEL)	1-30 MeV	MPE, Garching, U. of Leiden, U. of N.H., ESA/ESTEC	Study of: • Point sources • Diffuse emission from the galaxy • Cosmic diffuse flux • Broadened line emission
Energetic Gamma-Ray Experiment Telescope (EGRET)	.02-30 GeV	NASA/GSFC, MPE, Garching, Stanford U., Grumman Aerospace	Study of high energy gamma-ray sources • Intensity • Energy spectrum • Position • Time variation
Oriented Scintillation Spectrometer Experiment (OSSE)	.1-10 MeV	NRL, Northwestern U., Rice University	• Detection of nuclear line radiation • Observation of continuum emission

The format of the GRO telemetry is shown in Figure 2. One major frame consists of 64 minor frames. The minor frame headers contain synchronization bytes and the mission ID. The status insert is for spacecraft engineering data. The primary header contains the source ID, mission ID, source sequence count, packet length, spare, secondary header ID, and source ID parity. The secondary header contains the time code, position, geocentric coordinates, and Observatory attitude.

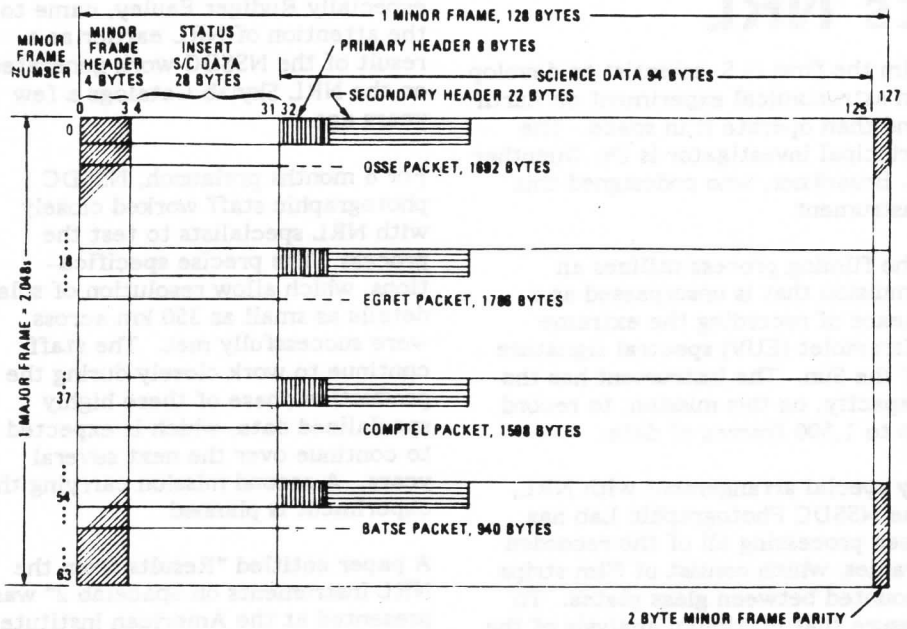


Figure 2

The NSSDC will play a major role as a primary data archiving and dissemination center for the GRO scientific data. The NSSDC is creating an active archive environment for the NASA missions such that scientific data, directories, and catalogs should be readily accessible over computer networks to the whole scientific community. The possible computer networks for the GRO mission include the Space Physics Analysis Network (SPAN), the NASA Packet Switch Network (NPSS), and TELENET.

Representatives from NSSDC are now actively participating in GRO Operations Working Group and Science Working Group meetings as advisory members to provide NSSDC expertise in the development of an electronic data archiving system and assistance in preparation of their Project Data Management Plan (PDMP). NSSDC will work with the principal investigators to ensure the integrity of the archived data, the compatibility of the data files with the electronic distribution and access system, and the possible archive of useful and well-documented software. Standardizing data formats is of great importance in enabling the GRO data to be readily usable by different users in different countries. NSSDC has developed the Common Data Format (CDF), which is now operable. Also, NSSDC is participating in developing a worldwide standard data format, Standard Formatted Data Unit (SFDU), to facilitate the exchange of scientific and technical data.

The NSSDC has been undergoing an exciting transition period from manual off-line archives to active on-line archival systems. The GRO, which is scheduled to be launched in late 1989, is certainly one of the first astronomical missions getting new technology benefits from the new NSSDC archival system.

Sang Kim

PLDS Team Meeting Via Video-Teleconferencing

The regularly scheduled Pilot Land Data System (PLDS) team meeting, to be held at the Jet Propulsion Lab (JPL), was canceled because of numerous scheduling conflicts among the various team members. These meetings are held quarterly to discuss budget, programmatic, technical, and science issues that are critical to the successful design and implementation of the system. The scheduled 2-day meeting at JPL was to cover a variety of topics and issues as well as to present status reports from the various technical area managers.

Since most of these presentations are graphical in nature (e.g., design diagrams), they make visual interaction imperative. A quick solution was to schedule a video-teleconference with the technical and science team members. This teleconference was held February 20 in the teleconferencing facilities in Bldg. 8.

The project manager, Dr. P. Smith (Code 634), discussed several outstanding issues with regard to budget and overall project goals, while the project scientist, Dr. R. Price (Code 620), gave an up-to-date report on the two science projects supported by PLDS. The systems engineer, W. Campbell (Code 634), presented the near-term system milestones and design goals. Both C. Noll and K. McDonald (Code 634) gave the Data Management Technical Area report, and Dr. H. K. Ramapriyan (Code 636) presented the Land Analysis Software Technical Area report, these technical areas are the responsibility of Goddard. JPL gave a Science and Data Standards Technical Area report; ARC reported on Networking and Communications and System Access Capabilities Technical Areas.

The 3-hour teleconference proved invaluable in providing a mechanism for keeping effective lines of communication open between the various centers and enabling the project to proceed on schedule. An additional PLDS video-teleconference was held on March 12 to cover topics not included in the earlier session. At the April 15-16 meeting, the Science Steering Committee (SSG) reviewed PLDS. This was the biannual SSG review of PLDS.

Bill Campbell

NSSDC Supports NRL

Spacelab 2 (which was aboard the Shuttle launched July 29, 1985) carried the High Resolution Telescope and Spectrograph (HRTS) experiment of the U.S. Naval Research Lab (NRL). HRTS is designed to observe ultraviolet light emitted by the solar corona and chromosphere at high spatial (1 arc sec) and spectral (.05A over an 1176-1700A range) resolution. Dr. John-David Bartoe, an NRL physicist, was one of the payload specialists aboard the flight, making him the first U.S. scientist to develop an astronomical experiment on Earth and then operate it in space. The principal investigator is Dr. Guenther E. Brueckner, who codesigned this instrument.

The filming process utilizes an emulsion that is unsurpassed as a means of recording the extreme ultraviolet (EUV) spectral signature of the Sun. The instrument has the capacity, on this mission, to record up to 1,500 frames of data.

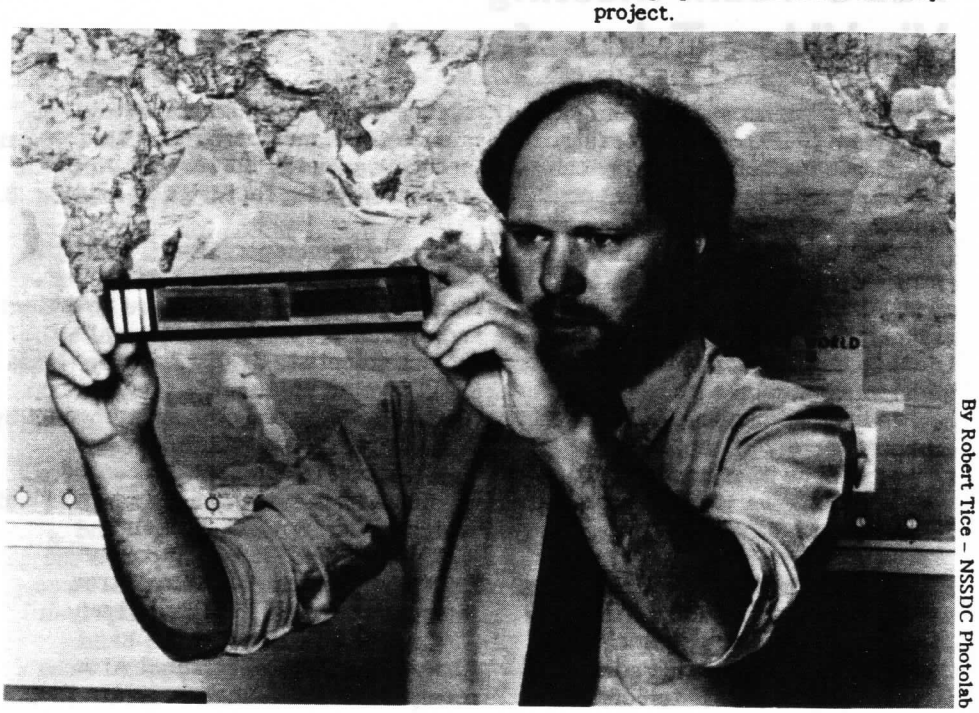
By special arrangement with NRL, the NSSDC Photographic Lab has been processing all of the recorded frames, which consist of film strips mounted between glass plates. To ensure that maximum analysis of the data is possible, NSSDC lab personnel must utilize special precautions in the reproduction process. Special problems, such as low density features and nonuniformity of exposure, must be considered by the NSSDC lab technician. The NSSDC processing is the first level in a potential series of reproductions, which would become successively degraded. Therefore, it is imperative that this first level product be reproduced with great care. The capabilities of the NSSDC photographic facilities and the expertise of the technicians, especially Rudiger Pauley, came to the attention of NRL earlier as a result of the NSSDC work generated on the NRL Skylab Catalogs a few years ago.

For 6 months prelaunch, NSSDC photographic staff worked closely with NRL specialists to test the process. The precise specifications, which allow resolution of solar details as small as 350 km across, were successfully met. The staff continue to work closely during the production phase of these highly specialized data, which is expected to continue over the next several years. A second mission carrying this experiment is planned.

A paper entitled "Results from the NRL Instruments on Spacelab 2" was presented at the American Institute of Aeronautics and Astronautics 24th Aerospace Sciences Meeting in January. The presentation contained 11 frames of the data prepared at NSSDC. HRTS data will become available to the general scientific community in the future.

Steve Peregoy

Rudiger Pauley, Lead Photographic Technician, inspecting negatives of heliographs of the HRTS telescope project.



By Robert Tice - NSSDC Photolab

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readable catalogs, ADC annual reports for 1983 and 1984, and other contributions. The bulletin is distributed automatically to institutions and university astronomy departments, but requests by individuals for specific issues will be honored.

SIMBAD

Finally, attempts are now being made to access the large data base of the CDS. Called SIMBAD (set of identification, measurements, and bibliography for astronomical data), this data base contains a multitude of cross-identifications, observational data, and bibliographic information for astronomical objects. Objects can be accessed by catalog identifiers and by coordinates; thus, it is possible to retrieve samples of stars and nonstellar objects in a certain region of the sky and to create plots of a field of view. The history of SIMBAD is summarized by Egret (1983, Bull. Inform. Centre Donnees Stellaires, No. 24, p. 109), while further information can be found in Wenger and Ochsenbein (1984, ibid, No. 26, p. 71) and Ochsenbein (1984, ibid, No. 26, p. 75; No. 27, p. 203). Our goal is to make SIMBAD accessible to North American colleagues via computer networks or by transporting the data base and software to GSFC where they can be used directly via various communication systems. All the catalogs discussed above are available at NSSDC/ADC, which satisfied 578 requests for 422 machine-readable catalogs and miscellaneous other data products in 1985.

Wayne Warren, Jr.

Second PCDS Workshop Held at NSSDC

The second Pilot Climate Data System (PCDS) Workshop, held January 29 and 30 at NSSDC, provided an opportunity for interaction between PCDS developers and current and potential users of the system. More than 100 scientists representing about 30 institutions, including Goddard, other NASA centers, other government agencies, and several universities, participated.

The workshop featured discussions and demonstrations of PCDS capabilities, presentations by users of the system, and discussions of plans for system enhancements. Participants had an opportunity to provide input on enhancements and to obtain "hands-on" experience with the system using a variety of commonly used terminals and personal computers.

The meeting began with a welcome address by Dr. G. Soffen, Associate Director for Program Planning for Goddard's Space and Earth Sciences Directorate, who gave a historical and educational look at GSFC. Then, Dr. P. Smith, Head of the Data Management Systems Facility at NSSDC and acting PCDS Project Manager, presented the objectives of the workshop and the current status of the system. He noted that, in the past year, the PCDS team responded to suggestions and critiques from the scientific community by incorporating a number of changes to the PCDS. This, he said, is especially true in terms of making the system more user friendly and easier to access. He noted that the PCDS is now easier to access, because it is available via the Space Physics Analysis Network (SPAN) to 32 sites throughout the U.S., including the University of Michigan and Pennsylvania State University. It is also accessible through SESnet, ARPAnet, and Telenet. He also listed some of the recent NSSDC Computer Facility upgrades that benefit the PCDS, including the addition of the new memory, the installation and testing of an optical disk and an IDM 500 data base machine, and the procurement of a VAX 8600 for delivery this spring. (NSSDC took delivery on the VAX 8600 in early April.)

More detailed information about the system was provided by the PCDS Development Team. Mr. L. Treinish gave an overview of the system, describing the types of users supported by PCDS, the five PCDS Subsystems, and the current software development efforts. In a separate talk, he discussed methods of downloading PCDS data to user institutions. Ms. M. Reph listed the currently supported data sets and those planned for the future and described the tasks involved in supporting a data set, initiating extensive discussion on the selection of data sets to be supported in the future. Mr. M. Gough demonstrated the new, more flexible, friendlier, graphics capabilities to be available in later releases of the PCDS. Mr. E. Wilson described the Common Data Format (CDF), which makes it feasible to develop data-set independent tools for analysis and display.

Highlights of the workshop include talks on data set production activities, university use of the system, use of the system to study specific problems, and talks on subjects of special interest to PCDS users. Dr. W. Rossow of the Goddard Institute for Space Studies described the production of International Satellite Cloud Climatology Project (ISCCP) Reduced Resolution Satellite Radiance Data, a data set supported by the PCDS, and Mr. D. McDougall of NASA/Langley Research Center presented a description of the First ISCCP Regional Experiment.

Dr. H. Jacobowitz of NOAA's National Environmental Satellite Data and Information Service (NESDIS) described plans to use the PCDS for studying the interaction of clouds and Earth radiation budget by studying ISCCP Stage C data and ERBE data, both to be supported in the future by the PCDS.

Dr. P. Hwang of Goddard's Information Analysis Facility noted in his presentation on Nimbus 7 Cloud Products that the PCDS is valuable to data producers for validation studies. His presentation included several PCDS graphics products.

Both Mr. W. Heilman of Iowa State University and Professor V. Abreu of the University of Michigan discussed university use of the PCDS. Other users presenting their work with the system were Mr. D. Short of Goddard's Climate and Radiation Branch and Dr. R. Goldberg of Goddard's Electrodynamics Branch.

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By Robert Tice - NSSDC Photolab

PCDS staff, from left to right: Mary Reph, Dr. Paul Smith, Lola Olsen, Michael Gough, Charlotte Griner, Ed Wilson, Ernest Daddio, Lloyd Treinish, Shelley Peebles.

NEWSBRIEFS

NSSDC Gets New VAX

The VAX 8600 has been delivered and installed at the NSSDC (NSSDCA::). With the new NSSDC VAX, a significant number of additional terminals can be supported; about double the current VAX 11/780 memory capacity will be added. Access to the NASA Packet Switched System (NPSS) on the VAX 8600 is also now available.

The new VAX 8600 joins the NSSDC's many other systems: the VAX 11/780, the IDM 500 Data Base Machine, the Optimem 1000 optical disk system, and the MODCOMP Classic II computer. The VAX 8600 will be upgraded to an 8650 later this summer.

To make room for the new hardware, the NSSDC Computer Facility in building 26 has been completely reconfigured, a new terminal room with a view into the computer room has been added, and a new demo/training room that opens up into the terminal room has been added.

This system will support upcoming workshops in Solar Terrestrial Physics, Pilot Climate Data Systems, Pilot Land Data Systems, and SPAN network management.

Valerie Thomas

Optical Disk Presentation to Federal Agencies

A presentation, titled "Write-Once-Read-Many-Times Optical Disk Media and Systems Testing at NSSDC/NASA," was given by Barbara Lowrey (Code 633) and Brian Lopez-Swafford (Sigma Data) on March 19, 1986, to the Federal Council on Computer Storage Standards and Technology (FCCSAT) and the Special Interest Group on Compact Disk Read-Only-Memory (SIGCAT).

FCCSAT and SIGCAT have representation from many Federal departments and agencies that have acquired optical disk systems, but they have not yet been successful in integrating and testing these systems. NSSDC, considered to be on the leading edge of this technology, was asked to make this presentation, which reviewed the current system integration and performance testing in progress at NSSDC. It is hoped that some of the approximately 200 people who attended will be able to use NSSDC as a model for their system integration.

[Brian Lopez-Swafford will give a related talk on June 11-12 at the Optical Memory Technology Center, Green Auditorium, National Bureau of Standards, Gaithersburg, Maryland.--Editor's Note]

Barbara Lowrey

DAVID Presentation

The Distributed Access View Integrated Database (DAVID) project being developed at the National Space Science Data Center (NSSDC) was recently presented by Dr. Barry E. Jacobs (Code 634) to Mr. R. Sade, Dr. Caldwell McCoy, Jr., and Mr. M. Devirian of the NASA Code E Office. The presentation elicited considerable interest because of DAVID's potential solution for dealing with the problems associated with the proliferation of data base systems.

Since DAVID is universally applicable for accessing arbitrary data bases, Code E is considering this system for support of the Space Telescope DADS, SAIS, and as a means for integrating Code EI's pilot data systems. Code S is also considering using DAVID to support Space Station TMIS. Sade suggested that he would like to bring Code E's deputy associate administrator to GSFC for a follow-up presentation.

Basically, DAVID will be a distributed data base management system that sits alongside other data bases and file management systems. It employs 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.

A high-level prototype system has been designed and is in the implementation stage. This prototype is expected to be demonstrable this summer. After the prototype demonstration, we are looking to Code E support for operational use on a NASA-wide basis.

Barry Jacobs

Notes From CODD Steering Committee Proceedings

The Central On-line Data Directory (CODD) Steering Committee met on February 19, 1986, at NSSDC. Committee members in attendance from six institutions were Vincent Abreu, Roger Anderson, Bob Clauer, Don Fairfield, Rob Gold, Al Hedin, Bob Theis, and Ray Walker. Other attendees were Steve Lubow of the Space Telescope Science Institute and Howard Singer of the Air Force Geophysics Laboratory.

The meeting began with a description of how CODD relates to the other data systems being created within and outside of NASA. A discussion of the past, present, and future of CODD and NODCS (the NSSDC On-line Data Catalog System of which CODD is one subsystem) included information about the present work on identifying and linking CODD to catalogs to create the Distributed Data Catalog System (DDCS), the second subsystem within NODCS from outside NSSDC. A short presentation on the possible use of TAE in the future version of CODD and demonstrations of both the CODD query and interactive input interfaces were provided.

The committee expressed satisfaction with the user-friendliness of the query interface and its immediate usability and recommended enlarging the data base. The problem of the response speed for remote users was brought up; CODD system programmers will be looking into where the delays occur and evaluating a range of solutions.

Among the subjects discussed was the need to generalize the present categories of spacecraft for application to ground-based data sets, the

combining of fields on the CODD starting point menu, uniformity in the naming of experiments within the system, and the minimizing of keystrokes for field entries.

The next meeting of the CODD steering committee will take place in 6–12 months, depending on the number of changes which occur in CODD during the intervening period.

Jim Thieman

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monthly and seasonal averages of the LAMAT data. Also included in the NSSDC holdings are some LIMS data on microfilm that were generated by NCAR.

All the LIMS data products (except LASMAT) and their descriptions are currently accessible on the Pilot Climate Data System (PCDS) at NSSDC.

Listed in Table 2 are the three data sets available from NSSDC. The Radiance Archive Tapes (RAT) are useful for retrieved temperatures. They contain both calibrated and uncalibrated radiances, derived tangent point pressure, retrieved temperature profiles at 2.5° intervals along the tangent track, relevant spacecraft functions, and housekeeping information. All data are arranged frame by frame along the orbit. Each RAT tape holds data for 8 calendar days (approximately 6 days of data, depending on operations modes).

Table 2
SAMS* Digital Data Products

RAT	Radiance Archive Tapes
GRID–T	Gridded Retrieved Temperature Tapes
ZMT–G	Zonal Mean CH4 and N20 (Gas) Tape

* P.I.: F.W. Taylor (University of Oxford)

A complete set of retrieved temperatures is contained in the Gridded Retrieval Temperature (GRID–T) tapes. Spatially, it covers 50° south to 67.5° north with a resolution of 2.5° latitude by 10° longitude. The temperatures are averaged over a 24–hour period, day and night, at uniform logarithmic increments at either 62 or 10 pressure levels. There are also zonal mean and climatology values. Each tape contains approximately 1 calendar year of data.

Also available is a zonal mean methane and nitrous oxide tape (ZMT–G). Retrieved mixing ratios of the gases are averaged over a 24–hour period (day and night) and latitude zones of 2.5° (from 50° south to 67.5° north) at uniform logarithmic increments at 31 pressure levels. Data cover from January 1, 1979, to December 30, 1981.

For interested readers, there are several LIMS and SAMS papers in the Nimbus 7 Special Issue: Science Results, J. Geophys. Res., 89, D4, June 30, 1984. To obtain directions for getting more information, see the last page of the newsletter.

Carolyn Ng

Publications From NSSDC

Deep Space Trajectory Book Issued by NSSDC

In order to collect in one place the spacecraft positional information needed by scientists performing multipoint heliospheric studies (solar wind evolution, cosmic ray modulation, etc.), NSSDC has issued a compilation of trajectory plots of the Pioneers 6–11, Helios A and B, and Voyagers 1 and 2 spacecraft.

The plots generated with NSSDC's Satellite Situation Center software cover spacecraft launch to 1990 (or end–of–mission, if earlier). One series of plots has the Earth–Sun line fixed, to facilitate deep space–near Earth correlations. Another series is given in inertial space to show a greater time span on individual plots and to relate spacecraft locations to the heliopause.

The document title is Trajectories of Pioneers 6–11, Helios A and B, and Voyagers 1 and 2 (NSSDC 86–03). Its authors are R. Parthasarathy, David Couzens, H. Kent Hills, and Joseph King.

Staff Member's Paper Recently Published

The following abstract is from a recently published paper by Barbara Lowrey, entitled "A Space View of a Symmetric Object," in Comp. and Maths. with Appls., Vol. 12B, Nos. 1/2, pp. 477–485, 1986.

Abstract – Symmetric features, both natural and man–made, exist on Earth and are visible in space data. This paper closely examines one circularly symmetric object, the Robert F. Kennedy stadium in Washington, D.C., which is contained in a Landsat–4 Thematic Mapper image. The effect of the space measurement on the appearance of the feature varies according to the band of the image. The human perception of the data is affected by the band and also by the magnification and context of the feature. The differences in interpretability of one object demonstrate the nature of the challenges involved in achieving computer vision. The future computing systems and related developments that may enable a machine to "understand" a symmetric object are described.

New NSSDC Documents Available Soon

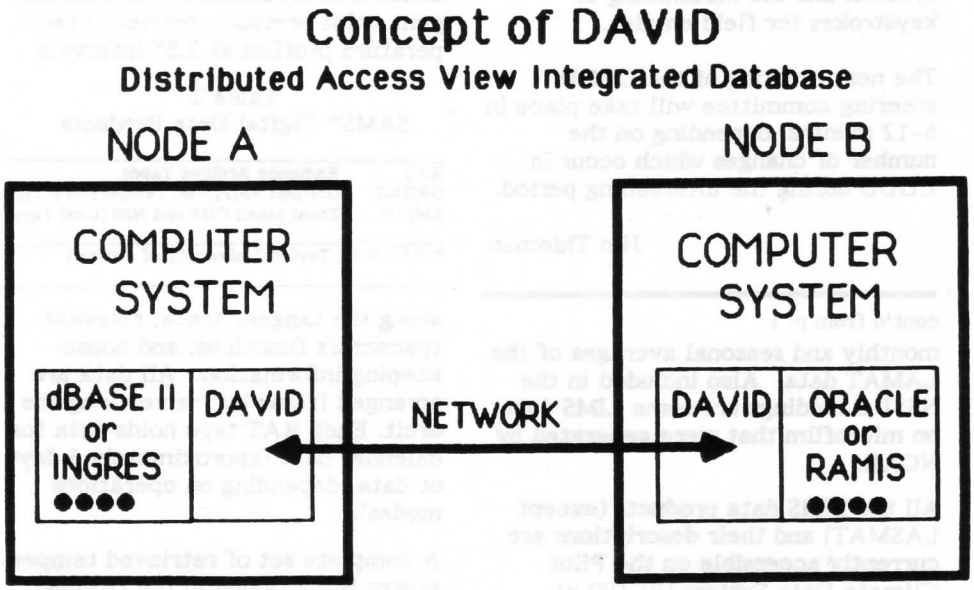
Other NSSDC documents that will be available for distribution soon are:

- Data Catalog Series (Volume 3B): Description of Data Sets from Low– and Medium–Altitude Spacecraft and Investigations (NSSDC 86–01)
- Document Availability and Distribution Services (NSSDC 86–02)
- Interplanetary Medium Data Book, Supplements 3 and 3A (NSSDC 86–04 and 86–04a)
- Documentation for the Machine–Readable Version of A Catalog of Ultraviolet Excesses for 1415 Stars (NSSDC 86–05)

These documents are currently in printing.

An Overview of the DAVID System

The objective of the Distributed Access View Integrated Database (DAVID) System project is to provide fundamental research on the data base uniformization problem so that NASA space data users can access any data base independent of its physical distribution and specific organization. The approach is to develop a solution to the data base uniformization problem based on the recently developed framework called Database Logic. DAVID will be constructed on top of existing data bases and data base management systems. It will also provide facilities for the construction of new data bases. Hence, DAVID can also be used as a stand-alone distributed homogeneous data base management system.



A functional breakdown of the DAVID system is given in the figure, and a brief description of each package is given as follows:

TERMINAL INTERFACE enables users to access data bases through a computer terminal session.

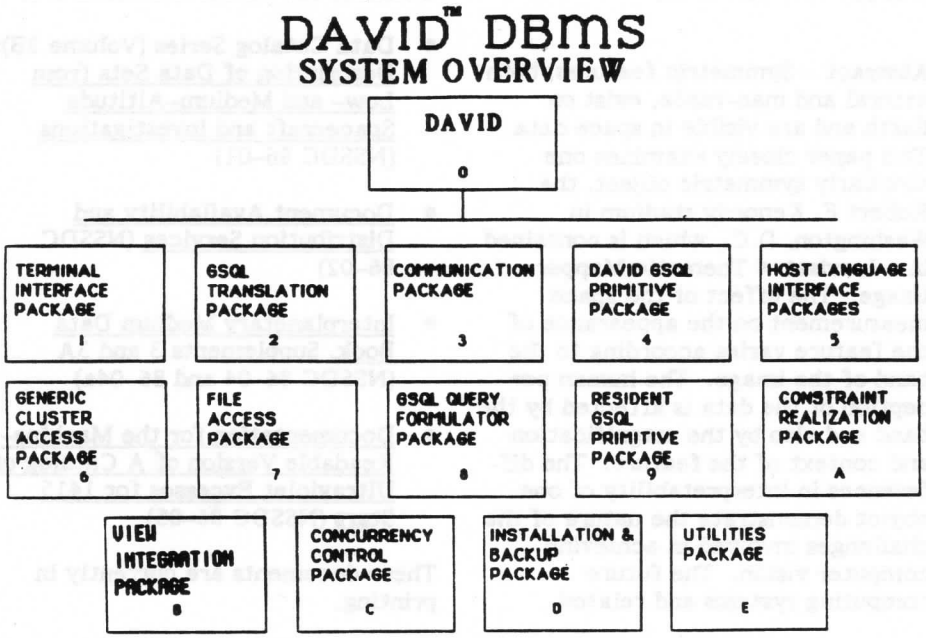
GSQL TRANSLATION breaks down a user's command in the language of GSQL (Generalized SQL) into simpler Primitive GSQL commands.

COMMUNICATIONS is responsible for sending the Primitive GSQL commands and data between different computers.

DAVID GSQL PRIMITIVE evaluates the Primitive GSQL commands for data bases stored in the DAVID data base management system.

HOST LANGUAGE INTERFACE PACKAGE enables users to access the distributed data base in a wide choice of programming languages (e.g., C, FORTRAN, ADA, COBOL, etc.).

GENERIC CLUSTER ACCESS is the single package that all of the different host language packages call.



FILE ACCESS provides the low-level access to data stored in DAVID's own data base management system.

GSQL QUERY FORMULATOR helps the user to find out which data bases contain what information and helps the user formulate a query.

RESIDENT GSQL PRIMITIVE evaluates the Primitive GSQL commands on non-DAVID data base management systems.

CONSTRAINT REALIZATION supports semantic or integrity constraint maintenance over data bases.

VIEW INTEGRATION enables the user to consolidate a sequence of user "views" into a single underlying data base.

CONCURRENCY CONTROL supports multiple user transaction processing (i.e., updating) over heterogeneous distributed data bases.

INSTALLATION & BACKUP provides for the normal loading of the DAVID system and handles recovery in the case of system or media failures.

UTILITIES contain software tools that are used by many other packages.

Barry Jacobs

NSSDC Responds to Important COSMOS Request

The U.S.S.R. Cosmos 1714 satellite was recently launched into a sub-nominal orbit. As it began to decay from orbit, there was much concern about where it might reenter, because there was circulating, at the time, a rumor (apparently untrue) that the satellite carried a nuclear reactor.

At 9:15 a.m. on February 26, NSSDC received a telephone call from the European Space Operations Center (ESOC) in Darmstadt, Federal Republic of Germany, requesting the latest Cosmos 1714 orbit elements. The caller left the request and said he would call back in 1 hour.

H.K. Hills, NSSDC acquisition scientist, knowledgeable in this area because of NSSDC's Satellite Situation Center activities, contacted Adam Johnson of Bendix (GSFC/Code 513 support) and made arrangements to retrieve the orbit elements. A quick car trip to and from the Aerospace Building on Greenbelt Road produced the needed elements just as the second ESOC call came in. Later in the day, a query from the Japanese Embassy on Cosmos reentry was also handled with dispatch.

Important requests were satisfied quickly, not with the most advanced technology but with people--their knowledge of information sources and their willingness to stretch themselves for the benefit of the requesters.

Joe King

This newsletter is a quarterly publication of the National Space Science Data Center, NASA/Goddard Space Flight Center, Greenbelt, Maryland.

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Editor's Notes

In the current mode of change at NSSDC, the NSSDC newsletter is among many things that have recently changed hands.

Let's continue the NSSDC newsletter in the spirit in which it was begun, that is, as an effort to inform members of the user community about the storing and sharing of information at NSSDC. To be sure, a newsletter is a small item among the panoply of communications that attempt to describe the results of space research; however, it is a useful tool for informally sharing information about the diversity of activities at NSSDC.

As part of our intention to have the newsletter on-line in the future, we are changing the newsletter design in this issue. Further changes may be inevitable.

We welcome comments or suggestions.

Mary Elsen
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Submitting Data to NSSDC

NSSDC invites members of the scientific community involved in spaceflight investigation to submit data to the Data Center or to provide information about data sets that they prefer to handle directly. The Data Center assigns a discipline specialist to work with each Investigator or science working team to determine the forms of data that are likely to be most useful to the community of users that obtain data from NSSDC.

The formats of data submitted to NSSDC are flexible, and usually no special processing is required.

For information on submitting data to the Data Center, please contact:

Dr. H.K. Hills
National Space Science Data Center
Code 633.8
Goddard Space Flight Center
Greenbelt, Maryland 20771
Telephone: (301) 344-8105

Researchers residing outside the U.S. may write to Dr. James I. Vette at:

World Data Center A for Rockets and Satellites
Code 630.2
Goddard Space Flight Center
Greenbelt, Maryland 20771 USA
Telephone: (301) 344-6695
Telex No. : 89675 NASCOM GBLT
TWX No. : 7108289716

Requesting Data, Publications, or Services

The services provided by NSSDC are available to any individual or organization resident in the United States and to researchers outside the United States through the World Data Center A for Rockets and Satellites (WDC-A-R&S).

For information on availability, cost and ordering procedures, researchers residing in the U.S. should contact:

National Space Science Data Center
Code 633.4
Goddard Space Flight Center
Greenbelt, Maryland 20771
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Dr. Goldberg presented his work with that of visiting scientist Ing. Gilberto Tisnado from Peru.

Other presenters included Dr. J. Green, Head of the NSSDC, who discussed network access to the PCDS; Professor J. Dutton of Pennsylvania State University, who discussed university access via UNIDATA; Dr. D. Falker of UCAR, and UNIDATA Project Manager, who presented future UNIDATA plans; Dr. J. Thiemann of NSSDC's Central Data Services Facility, who discussed the Central On-line Data Directory under development at NSSDC; and Mr. B. Lopez-Swafford, also of NSSDC's Central Data Services Facility, who discussed the installation and testing of NSSDC's optical disk system.

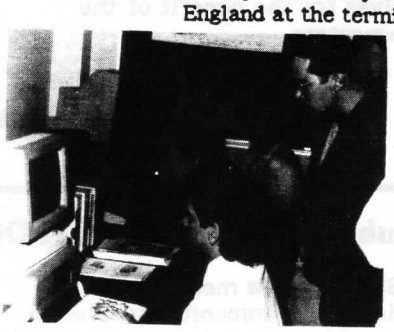
Workshop recommendations were formalized in a discussion led by Professor F. Baer of the University of Maryland. Some of the specific recommendations noted were 1) making the catalog accessible to all scientists, regardless of affiliation, 2) providing nonproprietary software to users and guidance for implementation of other such systems, 3) establishing a committee to recommend new data sets, 4) providing additional graphics display and mathematical analysis tools, 5) establishing a link with UNIDATA.

By Robert Tice – NSSDC Photolab

Workshop participants at a postworkshop gathering at the Holiday Inn, from left to right: Lola Olsen, Brenda Norcross, Dr. Joseph King.

At the workshop: Pat Kelly from England at the terminal.

By Robert Tice



Attendees from NASA Headquarters were Ai Fang, PCDS Program Manager, and Dr. R. A. Schiffer, Program Scientist.

The workshop was adjourned by Dr. M. Halem, Chief of Goddard's Space Data and Computing Division, who noted that, by participating in the meeting, users made their needs known to both the PCDS Development Staff and NASA Headquarters Program Offices.

More details will be published in the workshop proceedings now being compiled.

Mary Reph/Carol Hoxie/Lola Olsen

CALENDAR

May 8-9	Data Systems Users Working Group (DSUWG)
May 12	Engineering Colloquia Series, Goddard Space Flight Center, "New Plans for the National Space Science Data Center," an address by the Director of NSSDC
May 14	NSSDC Seminar Series, "Intelligent Data Management," by Bill Campbell and Larry Roelofs
May 15-16	Committee on Data Management and Computation (CODMAC) Meeting at GSFC
May 19-23	American Geophysical Union Spring Meeting, Baltimore, Maryland
May 22	NSSDC Seminar Series, "Advanced Graphics," by Lloyd Treinish
May 22-23	Astronomy Networking Meeting at Space Telescope Science Institute
May 28	NSSDC Seminar Series, "PLDS System Status," by Bill Campbell and Carey Noll
June 3-5	National Commercial Remote Sensing Conference, Denver, Colorado. For information: Geosat Office, (415) 981-7256; TLX 910 372 2043; or NASA Earth Resources Laboratories, (601) 688-1903
June 5	NSSDC Seminar Series, "Central On-line Data Directory," by Jim Thieman
June 11-12	PLDS Team Meeting at Goddard
July 14-17	CODATA Meeting in Ottawa
July 30-31	Dynamics Explorer Meeting at Goddard
August 11-15	AAAI Conference
September 29	Coordinated Data Analysis Workshop 8
October 4-11	IAF Congress in Innsbruck, Austria
October 28-29	PCDS Workshop