NSSDC NEWS

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Space Physics Data Demonstration Links the East to the West

The ninth meeting of the Inter-Agency Consultative Group (IACG) for space science and its associated Working Groups was held the week of September 18-22, 1989, in Prague, Czechoslovakia. Attendees at the meeting included Dr. J. Alexander (representing Dr. L. A. Fisk) for NASA, R. M. Bonnet for ESA, R. Z. Sagdeev for Interkosmos, J. Nishimura for ISAS, and their associated program managers and project scientists.

Stunning architecture graces the streets of Prague.

The IACG is trying to enhance the scientific output from each agency's space physics missions that will be launched over the next decade. Promoting data sharing and joint data analysis should significantly advance solar-terrestrial science.

The Data Exchange Working Group was given the task of demonstrating to the IACG the current capabilities for correlative analysis and information and data transfer between space physics scientists from the different agencies represented.

Preparation for the demo started nearly six months in advance. Early in the planning stages, the working group decided to install a temporary Space Physics Analysis Network (SPAN) computer link between Prague and the European Space Agency's (ESA) European Space Operations Center (ESOC), because it unites several thousand scientific computers in Europe, the U.S., and Japan as well as many data bases and services re-

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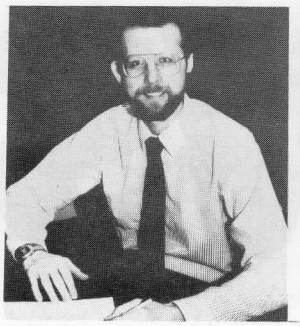

Message from the Director

Here's How Researchers Can Get Involved in Data Archiving—and We'll All Benefit

I feel strongly that researchers using NASA data should get involved in what is being archived in their fields of research and understand how to access it. If we all took this perspective, NASA archives would be rich with data and provide the best environment for correlative data analysis and science research.

Recently, I realized that perhaps many more scientists would get involved in long-term data management and archiving decisions if they just knew more about *how* to get involved. This article briefly discusses some methods for involvement. Although not comprehensive, hopefully my words will stimulate your thinking about and, more importantly, your participation in the archival process.

The science community can participate in data management in many ways—through review committees, steering groups, specific review meetings, large workshops, and oversight committees consisting of a number of members who are not paid by NASA and have no direct relationship to the project activities that are being reviewed. These committees perform periodic oversight of NASA data management and archiving practices and have a major impact on the direction that is taken by NASA.

Committees and Reviews of NASA Missions and Projects

Every January, GSFC hosts the Orbiting Satellites Review. This several-day meeting is designed to review various aspects and the status of all unmanned NASA spacecraft projects. The meeting requires an NSSDC presentation (usually on both days) that details the archiving status of the mission data from each discipline. Many NASA program managers, project personnel, and interested scientists attend these open meetings, which usually result in action items to improve the overall mission and science goals within existing budget constraints.

Two years ago, a new program to better define what data must be archived from the Interplanetary Monitoring Platform (IMP) and International Sun-Earth Explorer (ISEE) spacecraft came out of the Orbiting Satellites Review. Today, the IMP and ISEE data products have begun flowing into the NSSDC archive. Because of this effort, NASA Headquarters has announced that a unified guest investigator program will be issued soon for appropriate archival research using the Space Physics holdings at the NSSDC.

Every NASA project is required to define, before launch, what data products will be archived and where they will reside. NSSDC always recommends that the project create a science advisory committee to determine all elements of data management and archiving. We further recommend that the committee include representatives from the project, the science investigators, the archive facility, and other scientists not associated with the mission. Some of the projects have followed our recommendation, knowing that it benefits the science comunity. If you are asked to serve on such a committee, please do so.

Each NASA mission has a science working group (SWG) or team made up of all the scientists who are directly funded by the project, an NSSDC assigned acquisition scientist, and in some cases, outside (the project) scientists. One major responsibilities of the SWG is to devise the rules for data exchange, publishing, and data access by any scientist. These rules, dubbed "Rules of the Road," are widely distributed and are available on request to the project.

If a scientist who is outside of the mission does not like the rules, that person may explain the situation to the NASA Headquarters program scientist or the project scientists. Often (although this depends on the project) the scientist is invited to the next SWG meeting where his special case is discussed, and the team makes a decision whether to change the rules, make an exception to the rules, or ignore the situation. The decision in this case is placed squarely on the shoulders of the scientists who know the most about their instruments.

Guest Investigator Programs

In guest investigator (GI) programs, new scientists are selected through a proposal competition to reanalyze data already archived or to be archived. These scientists can be thought of as coming into the program for the first time, and they are allowed to become a major part of the process. In most cases, the GI is expected to use directly the existing archived data or work with selected investigators. Recent programs such as

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Master Index Volume Completes 11-Volume Data Catalog Series

The publication of the Master Index Volume (MIV) completes NSSDC's current 11-volume data catalog series. The cover of each volume carries the heading *Data Catalog Series for Space Science and Applications Flight Missions*, and then shows the following to identify each volume:

Volume 1A: Descriptions of Planetary and Heliocentric Spacecraft and Investigations.
W. S. Cameron and R. W. Vostreys, NSSDC/WDC-A-R&S 88-07, (Second Edition) March 1988.

Volume 1B: Descriptions of Data Sets From Planetary and Heliocentric Spacecraft and Investigations.
R. Horowitz, J. E. Jackson, and W. S. Cameron, NSSDC/WDC-A-R&S 87-03, April 1987.

Volume 2A: Descriptions of Geostationary and High-Altitude Scientific Spacecraft and Investigations.
H. K. Hills, R. G. Littlefield, N. J. Schofield, and J. I. Vette, NSSDC/WDC-A-R&S 82-22, September 1982.

Volume 2B: Descriptions of Data Sets from Geostationary and High-Altitude Scientific Spacecraft and Investigations.
N. J. Schofield, R. Parthasarathy, and H. K. Hills, NSSDC/WDC-A-R&S 88-11, May 1988.

Volume 3A: Descriptions of Low- and Medium-Altitude Scientific Spacecraft and Investigations.
R. Horowitz and J. E. Jackson, NSSDC/WDC-A-R&S 83-03, May 1983.

Volume 3B: Descriptions of Data Sets from Low- and Medium-Altitude Scientific Spacecraft and Investigations.
J. E. Jackson and R. Horowitz, NSSDC/WDC-A-R&S 86-01, April 1986.

Volume 4A: Descriptions of Meteorological and Terrestrial Applications Spacecraft and Investigations.
C. Y. Ng and Y-T. P. Sheu, NSSDC/WDC-A-R&S 85-03, July 1985.

Volume 4B: Descriptions of Data Sets from Meteorological and Terrestrial Applications Spacecraft and Investigations.
C. Ng and G. R. Stonesifer, NSSDC/WDC-A-R&S 89-10, September 1989.

Volume 5A & 5B: Descriptions of Astronomy, Astrophysics, and Solar Physics Spacecraft, Investigations, and Data Sets.
S. J. Kim, NSSDC/WDC-A-R&S 88-12, June 1988.

Volume 6: Master Index Volume (MIV).
R. Horowitz, P. A. Ross, and J. H. King, NSSDC/WDC-A-R&S 89-25, October 1989.

As seen from the above listing, some of the volumes are discipline oriented and some are orbit oriented. It was not possible to provide an organization of categories that separated the investigations cleanly into scientific disciplines, since many missions were multidisciplinary.

More than 270 spacecraft, 1,100 investigations, and 2,300 data sets are described in this catalog series. In addition to the textual descriptions of spacecraft, investigations, and data sets, each catalog volume contains several fixed field entries. Spacecraft descriptions include the spacecraft alternate names, NSSDC ID number, launch information (date, site, and vehicle), spacecraft weight, orbit parameters (type, epoch date, period, inclination, periapsis, and apoapsis), sponsoring country and agency, and project personnel. Investigation descriptions contain the investigation name, NSSDC ID number, discipline (s), and names and affiliations of the Principal Investigator (PI) and other associated investigators. In the data set volumes, under each investigation heading, the data set descriptions are arranged according to the NSSDC ID. The data set entries furnish the data set short and long names, the time period covered, the quantity of the data, and the medium on which the data are stored.

The recently published Master Index Volume, Volume 6, completes this paper catalog series. It contains four indexes prepared to facilitate quick searching for information, and to permit logical reading of the descriptions contained in the series. The indexes contained here should significantly assist a researcher to select the appropriate NSSDC-held data sets for his/her research project.

The four indexes in this last volume are: Data Sets Ordered by Spacecraft Common Name/Principal Investigator Last Name, Data Sets Ordered by NSSDC ID (temporal order), Data Sets Ordered by Principal Investigator Name/Spacecraft Common Name, and Ephemeris Data for Data Catalog Series Spacecraft Ordered by Spacecraft Common Name.

The Master Index Volume lists all the entries in the catalog series. Since the volumes describing the data sets were published over a period of years, the MIV does not represent a "snapshot" of NSSDC's current data holdings. A listing of data available from NSSDC as of December 1989 is in preparation and will be published in early 1990 under the title *NSSDC Data Listing*.

Requests for copies of the Master Index Volume and/or for any of the data catalogs in the series should be addressed as specified on the back page of this newsletter.

Richard Horowitz

Dr. Judith Lean Shines as NCDS Solar Irradiance Discipline Session Leader

Following is the first in a series of four articles highlighting a session of the NCDS Workshop.

Dr. Judith Lean of the Naval Research Lab opened the Solar Irradiance Session at the NASA Climate Data System Workshop on September 20, 1989, with a stimulating presentation on the variability of total and spectral solar irradiance measurements made during the last decade.

Measurements from several solar irradiance monitoring instruments were highlighted and their significance discussed. From the detailed study of these measurements, Lean noted that "the variability in solar irradiance is related to the presence of active regions on the Sun's disc, both dark sunspots, where the local emission is reduced relative to that from the surrounding quiet sun, and bright faculae and plage, where the local emission is enhanced." She also noted that the improved understanding of the origin of the variations has stimulated the development of numerical models which have been employed to estimate the sun's total irradiance in past solar cycles (11-year time frame). She captivated participants with her enthusiastic handling of the subject, heightening awareness and interest in the topic.

Dr. Judith Lean guides NCDS session

Thereafter, participants eagerly gathered in the "hands-on" area to view the data about which Dr. Lean had spoken. She capably guided the session with the help of NCDS staff. Both instrument and model irradiance data were available online in Common Data Format (CDF) for listing or display. Daily total radiative output from ACRIM on the Solar Maximum Mission satellite, from ERB on the Nimbus 7 satellite, and from the ERBE scanners on ERBS, NOAA-9, and NOAA-10 were viewed. Daily solar spectral irradiances at UV wavelengths from the SBUV instrument on Nimbus 7 and the solar spectrometer on the Solar Mesosphere Explorer satellite also were available.

An interesting observation became apparent to those in the session. Dr. Lean pointed out that "although the Sun's UV emission at all wavelengths less than 300 nm constitutes only about one percent of its total radiative output, variations in the UV portion of the spectrum account for almost 20% of the solar cycle variations observed in the total irradiance."

The solar irradiance data sets available at NCDS are listed in the table below and can be obtained by contacting the following:

NCDS User Support Office
Code 634
Goddard Space Flight Center
Greenbelt, MD 20771
(telephone: 301-286-3209)

Lola Olsen

SOLAR IRRADIANCE DATA SETS AVAILABLE AT NCDS AS OF 2/15/90

Data Set	Parameters	Temporal Coverage/ Resolution	Spatial Coverage/ Resolution	Archive Media:Volume	Output Options CDF, Tape	NCDS Data Set Name
ERBE Solar Flux from ERBS, NOAA-9, and NOAA-10	Solar Flux	10/25/84 - 12/21/88, ongoing; averages of the instantaneous values during one orbit every 2 weeks	Full solar disk	Online CDF: 46 Kbytes	CDF	ERBS_SOLIRR NOAA9_SOLIRR NOAA10_SOLIRR NOAA9-10_SOLIR ERBE_SOLIRR
Lean-Foukal Monthly Mean Solar Irradiance	Solar Flux	01/54 - 12/84; monthly means	Full solar disk	Online CDF: 12 Kbytes	CDF	LEAN-FOUKAL _SOLIRR
National Geophysical Data Center's Regions of Solar Activity	Plage, Sunspot	12/68 - 08/82; 1 or 2 observations for each clear day	Full Disk; one degree solar latitude and longitude	Tape (1): 3 Mbytes; online CDF: 3.6 Mbytes	CDF, Tape	SOLACT
Nimbus-7 ERB Solar Analysis Tapes	Plage, Solar Flux, Sunspot	11/16/78 - 03/30/86, ongoing; daily averages of solar activity indicators, daily and orbital averages of solar flux	Sun; full disk	Tape (1): 4.33 Mbytes	CDF, Tape	ESAT
Nimbus-7 ERB Solar Irradiances	Solar Flux	11/16/78 - 07/31/89 ongoing; daily	Full solar disk	Online CDF: 45 Kbytes	CDF	N-7_ERB_SOLIRR
SME LYMAN ALPHA Solar Irradiance	Solar Flux	01/81 - 12/87; daily	Full solar disk	Online CDF: 55 Kbytes	CDF	SME_SOLIRR
SMM ACRIM Daily Means of Solar Flux	Solar Flux	02/16/80 - 12/31/88; ongoing; daily averages	Full solar disk	Online CDF: 96 Kbytes	CDF	SMM_ACRIM _SOLIRR

Senate Committee Members Tour Data Center, Attend Demo, Learn About EOS

Professional staff members serving on the Senate Committee on Commerce, Science, and Transportation, chaired by U. S. Senator Ernest Hollings of South Carolina, recently were guided through a tour of NSSDC by Dr. James Green.

During the tour, various key NSSDC personnel presented demonstrations of current capabilities to Senior Professional Staff Members Martin Kress, Mike Nelson, and others. According to Kress, "During the course of this year, the Subcommittee will be spending a considerable amount of time and effort trying to assess the proposed Earth Observing System Data Information System."

One of the primary purposes of Kress' fact-finding mission was to explore NASA earth science data systems that are operational today, and then to discuss what might be an operational system of the future.

Included in the presentations was a demonstration of NASA's Climate Data System (NCDS) given by Lola Olsen, senior scientist and head of the NCDS project. Olsen showed how to locate, access, and analyze data sets supported by NCDS. She explained that the system is divided into five subsystems, including a Catalog Subsystem that allows the user to obtain both summary and detailed information on data sets available to the scientific community. The other subsystems include the Inventory that yields data volume and temporal information on data sets that are actually supported by NCDS; the Data Access Subsystem that allows users to extract portions of a supported data set and store the data on-line in their own account; and the Data Manipulation and Graphics subsystems that provide listing and visualization tools for analyzing the data. Olsen also demonstrated that the system is easy to use, supports many types of terminals, and is readily accessible through dial-in phone lines and various networks.

In another presentation, Lloyd Treinish of the Data Management Systems facility gave a demonstration of the Programmable Hierarchical Interactive Graphics System (PHIGS). He also generated a color animated sequence depicting Peruvian rainfall accumulations as well as a color-coded global three-dimensional ozone rendering. Treinish's demonstration also showed different ways in which to visualize data sets.

In a letter received following his visit, Kress expressed his thanks to NSSDC staff for "a most impressive overview of the National Space Science Data Center. Your presentation helped us better understand how NASA intends to formulate this (proposed Earth Observing) System and how NASA intends to provide the research community with access to this important data base."

Leonard Blasso

During a demonstration of NASA's Master Directory, Dr. Joy Beier describes the directories functions to, standing, (left to right) Martin Kress, Dr. Joseph King, Dr. James Green, James Closs, Ben Kobler, and seated, (left to right) Dr. James Thieman, Professional Staff Member Mike Nelson, and Barbara Cherry of NASA's Congressional Relations Office.

Interplanetary Medium Data Book Supplement Issued

Supplement 4 of the Interplanetary Medium Data Book series has been completed and mailed to several hundred space plasma physicists around the world. This book is the latest in a series initiated in the mid-1970's to create and disseminate an hourly resolution record of the interplanetary magnetic field (IMF) and plasma profile just outside Earth's magnetosphere.

The series was initiated, and is being maintained, by the National Space Science Data Center, and is one of NSSDC's most widely used products. The series now contains data for 1963-1988. The most recent supplement contains 1985-1988 data from the IMP-8 spacecraft, as well as 1985 IMF data from the Soviet / Czechoslovakian Prognoz 10 spacecraft.

Data from more than a dozen spacecraft are contained in the long data set, and care had been exercised to ensure maximal mutual consistency of the multisource data.

The 1973-1988 portion of this data base is maintained online for easy access by scientists with remote accessibility to the NSSDC computer facility. Many electronic paths to this facility have been provided. For instance, from a SPAN node, the procedure is: SET HOST NSSDC; USERNAME = NSSDC; follow the prompts and menus.

This data base will be updated as newer data become available. A paper Supplement 5 will be issued in a few years.

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the Jupiter Data Analysis Project and other research announcements fall into this category.

Please note that NASA issued more than 20 research announcements in 1989 alone. If archived data are being used actively by investigators but are not sufficiently documented for use, then it is readily discovered. In the same way, if key data are vital for an analysis but are not yet archived by the principal investigator, this is also quickly discovered. Over the years, scientists have requested that data critical to their work be archived. These requests have come directly to NSSDC, and we have worked with the community to acquire these data and will continue to do so.

Discipline Data Systems Reviews and Committees

Each of the pilot data systems over the last five years has had either major periodic science community reviews or an ongoing steering or oversight committee established. In all cases, the pilot data systems' review and committee members consist primarily of outside scientists who review the accessible data and information management systems and their contents for completeness.

For instance, **NASA's Climate Data System** had a major open science tutorial and system review meeting for one week in September 1989, with more than 200 scientists attending.

In the past, the **Satellite Ocean Data System** Science Working Group (SODSSWG) has extensively reviewed all aspects of NASA's ocean program with major participation by the outside oceanographic science community. Two major science panels that are involved in reviewing and making recommendations on data management and archiving are the SODSSWG Archive Panel and the Catalog Advisory Panel. In addition, the NASA Ocean Data System has undergone major reviews by this working group.

The **Pilot Land Data System** (PLDS) has a standing steering committee composed of several NASA and non-NASA scientists who have been instrumental in defining what data will be managed by PLDS, where these data are located, and what system capabilities will be needed to manage it.

In the area of Earth science, in addition to the above individual groups, there has been a major series of workshops that laid the foundation for all the Earth science pilots to work toward achieving greater interoperability. This collective set of pilot programs is called the **Earth Science and Applications Data System** or ESADS. The ESADS capability is the prototype for the way the user community wants to obtain access to Earth science data from the future Earth Probe mission series and, above all, the Earth Observing System (EOS).

The **Planetary Data System** (PDS) has had several major workshops that have defined their major elements. In addition, the Planetary Division at NASA Headquarters has just finished reviewing an open competition for the Planetary Data Nodes that comprise the PDS, which involved a large number of scientists who defined what data archives will be created and how the data will be managed. All proposals were peer reviewed.

Since its inception from two major open community workshops in1987, the **Astrophysics Data System** (ADS)

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effort has had an external science advisory committee. The ADS steering committee has reviewed the data management and archive holdings of five major institutions (SAO, ST-ScI, IPAC, GSFC/IUE, and NSSDC) and has made substantive recommendations as to what catalogs and data will be accessible from these distributed archives that are connected by the ADS. The steering committee meets several times per year and will continue to do so until the ADS has been completely developed and is operational.

Interoperability Workshops

In the last two years, five data system interoperability workshops have been held. (See page 8 for a report of the most recent one.) At these workshops, scientists meet with data information system operators and developers to discuss the goals of interoperability among data systems and increased efficiency in finding and obtaining data.

Although this group has focused on providing science community guidance to the development of the Master Directory, important science data holdings from many institutions have been identified; efforts have been made by those institutions to provide online computer network access to their holdings. Participants from NASA, NOAA, USGS, NCAR, academic institutions and other agencies and groups from around the world have participated in these workshops.

Management Operations Working Groups

Nearly all major NASA Headquarters science branches have a management operations working group, or MOWG. The MOWG consists almost exclusively of outside community scientists, with a few selected NASA Center personnel. The MOWG is primarily responsible for providing science guidance to the branch in the dispersal of funds. Some MOWGs are extremely active in the data management and archiving arena.

The MOWG for the Astrophysics Science Operations Branch requires annual reviews of NSSDC activities and holdings, reviews of all new astrophysics project data management plans (PDMP), and insists that its branch have signature authority on astrophysics PDMPs. Also, this MOWG has been behind the conception and major funding of the ADS.

High Energy Astrophysics Archive Definition Working Group

Recently, the Laboratory for High Energy Astrophysics at GSFC was assigned the lead role in developing a Science Archive Research Center, or SARC for several of the high energy astrophysics (HEA) missions that will be launched within the next few years. The HEASARC will manage HEA data from these missions: ROSAT, BBXRT (both shuttle flights), GRO, XTE, and ASTRO-D. In addition, to the extent possible, existing HEA data are also to be loaded into the HEASARC facilities (such as HEAO and EXOSAT). The underlying purpose of the HEASARC is to provide expert science support staffing to manage the multi-mission HEA archive.

In 1989, a working group composed mostly of non-NASA scientists was formed to delineate all the HEASARC roles and responsibilities. International science participation is assured since the head of the committee is Dr. N. White from ESTEC (an ESA Center). After several meetings, the working group issued a preliminary report.

The major thrust of the HEASARC report was to define what data products from the new missions will be archived, in what format, how the data will be managed, and what basic science services should be supported. The working group is continuing the further definition of the HEASARC and is now working on an operations concept that will lead to a costing of the system.

Life Sciences Information Systems Steering Committee

A large amount of life science data will be taken from experiments on board the shuttle and Space Station Freedom. These missions will concentrate on the study of human physiology and the effects of microgravity on plants and animals. A Life Sciences Information Systems Steering Committee was chartered in 1989 and is now being formed with scientists from NASA and the outside. This steering committee will be involved in the development of a plan for a long term archival data system. A key role for this committee will be to determine what life science data need to be archived.

NSSDC Review Committees

Several years ago, NSSDC put together an external science advisory committee to review our data holdings in the atmospheric and Earth science disciplines. It is important to note that the Data Restoration Steering Committee requested that no NSSDC atmospheric or Earth science data in the archive be released. NSSDC is following the priority of restoration set down by the committee, and completion is expected within two years.

As previously discussed in the *NSSDC News*, NASA Headquarters has approved the formation of an external committee of scientists that will review data archiving and operations of NSSDC. This committee is in the process of being formed,and will consist of scientists from industry and university environments who obtain funding from various NASA science disciplines. In addition, participation of one or two scientists from the computer science and other related gov-

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ernment agencies (such as NSF) are being sought. This group is scheduled to meet for the first time early this year.

Information Systems Strategic Planning Workshops

One of the major planning efforts for NASA's future in information systems was initiated in 1988; it is the Information Systems Strategic Plans (ISSP). This endeavor requires extensive community involvement and is nearing completion.

In a series of periodic meetings and major workshops, a plan is being formulated to encompass data management, emerging science needs, data accessibility, cost, and capability for technological evolution. Nearly 100 key personnel from all NASA disciplines have been involved.

The goal of the ISSP is to provide a strategic plan for the implementation of data and information systems that are responsive to the needs of the space science research community for the new decade. The ISSP is doing this by creating recommendations within realistic resource expectations and by recognizing the existing and ongoing work using these as the basis for evolution of capabilities to meet future needs. The plan is due for release in March 1990.

Conclusion

Scientists have many options from which to choose in deciding how to become involved in long term data management and archiving issues. These are just a few that I know of, and I hope that some of these explanations sparked your interest. There is no doubt that your participation is needed. So, please, get involved.

Dr. James L. Green

NSSDC Hosts Interoperability Workshop

NSSDC's fifth Catalog Interoperability (CI) workshop was held at the U.S. Geological Survey Headquarters in Reston, VA on January 9–11.

Representatives from the academic and scientist/user community, the major NASA discipline-oriented data systems, NASA Headquarters, NOAA and USGS data services organizations, as well as international representatives from Japan and the United Kingdom were present. Discussion centered on the progress of efforts to create an efficient, interconnected data information system for space and Earth science data, and, in particular, for global change research data.

A six-month evaluation period of the NASA Master Directory (MD) had taken place in 1989 from June through November, in which statistics of MD usage were monitored and specific questions were asked of the users. Mary James (ST Systems Corporation) of the MD staff reported on an initial analysis of the results. Of over 1400 user sessions evaluated, access was broken down as follows:

Users	No. of sessions	% of sessions
SPAN	621	44%
Dial-in/GSFC	479	34%
Telnet	158	11%
Telenet /x29 PAD	130	9%
Local terminal server	26	2%

The CI Advisory Group, representing the user community, had recommended that the MD interface not use any PF or special keys. This proved to be sage advice judging by the number of problems that users reported with PC terminal emulator programs. About 25 percent of the users had unknown terminal types, and the remainder had VT100 compatibility.

Part of the MD evaluation was to solicit user research questions in their own words. This is an interesting source of natural language queries for potential future development of a natural language interface. Clearly, the many typos, extraneous characters, misspellings, non-standard grammar, etc., pose a formidable challenge to such an interface.

Also discussed at the workshop were plans for creating networks of interconnected directories, such as a network of federal agency and international data set directories. It was considered important that users not have to access many different directories to assure themselves that they didn't miss any data relevant to their interests. Other topics were:

- A demonstration and discussion of context passing in which a file containing information about a user's identity and interests is passed from one system to another to allow more efficient searching among multiple systems. A more fully-developed prototype will be developed in the future.
- A presentation of ongoing work in sharing information among physically-separated data set inventories for a given satellite sensor (AVHRR). It was planned that this would be carried into the multiple, related sensor situation.
- Initial results of a survey of data systems designed to determine practical approaches to identifying building blocks for generic interoperable data information systems.
- Plans for the creation of directory entries in conjunction with the publication of data set descriptions in the *JGR Space Physics* journal.

In summary, good progress is being made in many areas of data system interoperability, and interest in the work is being expressed worldwide. The sixth workshop will occur in late summer–early fall at a place yet to be determined.

Dr. James Thieman

Version 2 of Common Data Format Offers Significant Enhancements

NSSDC has recently completed Version 2 of its Common Data Format (CDF). This Version 2 software is a completely new implementation in C with separate C bindings. It will offer significantly enhanced performance and flexibility over Version 1 while being upwardly compatible with it. The FORTRAN bindings will be maintained as a veneer on top of C, which provides a transparent interface for current CDF users to the new software as well as handling incompatibilities between the C and FORTRAN programming languages.

A key feature of Version 2 is its ability to operate on a wide range of different computer systems (e.g., DEC VMS, Ultrix, Sun OS, Silicon Graphics IRIX, Apple Macintosh, IBM MVS and VM). Currently, the FORTRAN veneer layer will only be supported on a subset of those systems where FORTRAN bindings will continue to be required (*e.g.*, VMS). Version 2 language bindings for IDL (Interactive Data Language, a commercial data analysis software package developed by Research Systems, Inc.) and Ultrix will also be implemented. (IDL currently only operates on DEC VAX/VMS and Sun OS systems.)

The CDF is a self-describing data abstraction for the storage and manipulation of multidimensional data in a discipline-independent fashion. The development of CDF arose out of the need for a class of data models that matches the structure of scientific data as well as how such data may be used. Applications that need to be served by an appropriate data model include analysis by statistical and numerical methods, visualization and management.

CDF Version 1 was completed in early 1986. It consists of FORTRAN language bindings and is operational on Digital Equipment Corporations (DEC) VAX/VMS systems. More than 100 organizations outside of the NSSDC representing various NASA laboratories, research groups, current and future flight projects, etc. as well as other government agencies, universities, corporations and foreign institutions are currently using or have requested this CDF software package. As a result, the CDF development efforts have become a standard method for storing space and earth science data for a variety of applications. Language bindings for IDL on VMS systems are also available.

The performance improvements in CDF Version 2 come from the inherently greater efficiency of C versus FORTRAN, including restructuring of the software to take advantage of C functionality, optimization of internal disk caching, and new access methods. In addition to the capability in Version 1 to provide random access to all elements within a data set stored as a CDF, Version 2 extends the bindings to provide *hyperplane* access. The hyperplane technique provides random, aggregate access to subdimensional blocks within a multidimensional variable. In other words a vector, plane, parallelpiped, etc. out of an equal or higher-dimensional structure can be accessed through a single call. The subdimensional structure can span the full extent of the multidimensional block or be smaller in size.

A CDF user/programmer will have the ability with Version 2 to select a run-time binding to a physical data format layer. The physical layer may be either the native format of the computer system being used or a machine-independent layer, which is built upon the IEEE standard via the eXternal Data Representation (XDR) protocol developed by Sun Microsystems and placed in the public domain.

Many computer manufacturers (typically of Unix-based systems) have adopted XDR as their native protocol. On other systems (*e.g.*, VMS) XDR services are available via software. However, for applications where data portability is not critical and absolute performance is of greater importance, the optional run-time binding to the native physical format offers significant flexibility. In addition, the upward compatibility of the software with Version 1 will apply to the data as well—Version 2 will provide read access to extant Version 1 (VMS) CDFs.

NSSDC has started the planning for CDF Version 3, which would enhance Version 2 with machine and media-independent distribution and network services.

Gregory Goucher and
Lloyd Treinish

Lloyd Treinish explains how Version 2 of the Common Data Format works.

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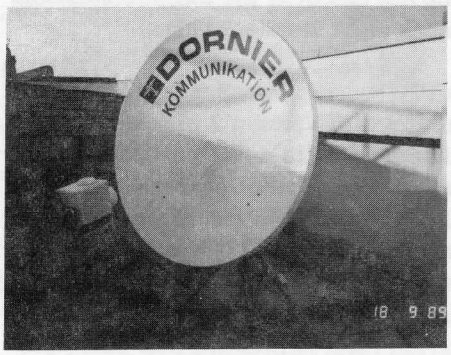


Communications dish crowns the 25-story hotel in Prague.

lated to space science research. Because ESOC is a major SPAN routing center, any space physics data system to be demonstrated could easily be reached over the network.

Every working group member realized that this was probably the first time that the "East" and "West" would be linked together with such a powerful computer-to-computer network. Preplanning efforts primarily went into providing a full-function SPAN network link into Prague. How well the link functioned would determine what type of demo could be accomplished.

The script of the demonstration had to wait until the working group members arrived in Prague to see what they were faced with. The demonstration was the last item on the agenda for the meeting.

Set-Up and Testing Begin

Several days before the start of the IACG meeting, a crew of several technicians from ESOC and later Kent Hills from NSSDC arrived in Prague for system setup and testing.

The connection between SPAN and Prague was made using a satellite link between a Dornier Personal Earth Station (installed on the roof of the hotel where the meeting took place) and the Eutelsat ground station in the Deutsche Bundespost's Forschungstechnikzentrum (FTZ) in Darmstadt. At the hotel in Prague, suitable X.25 Packet switching equipment was installed, enabling IBM PS/2 personal computers to be used as terminals. One could logon remotely to the SPAN node in Darmstadt or the European Space Information System's nodes at ESRIN in Frascati, Italy.

The screen of the PC was projected onto a large screen on the wall in the meeting room. The connection was complemented with a land-line connection in case of failure of the satellite link. Several types of software emulators were used to emulate either a VT100 terminal for text, or a Tektronics 4014 series terminal for graphics. A Bahco video projector was used to project the screen of the terminal used during the demonstration onto a large projection screen in the meeting room.

When the data working group arrived, they decided to script an ambitious demonstration that included text messages or mail, remote logons, and both color and black-and-white graphics of space physics data and spacecraft trajectories from data systems worldwide.

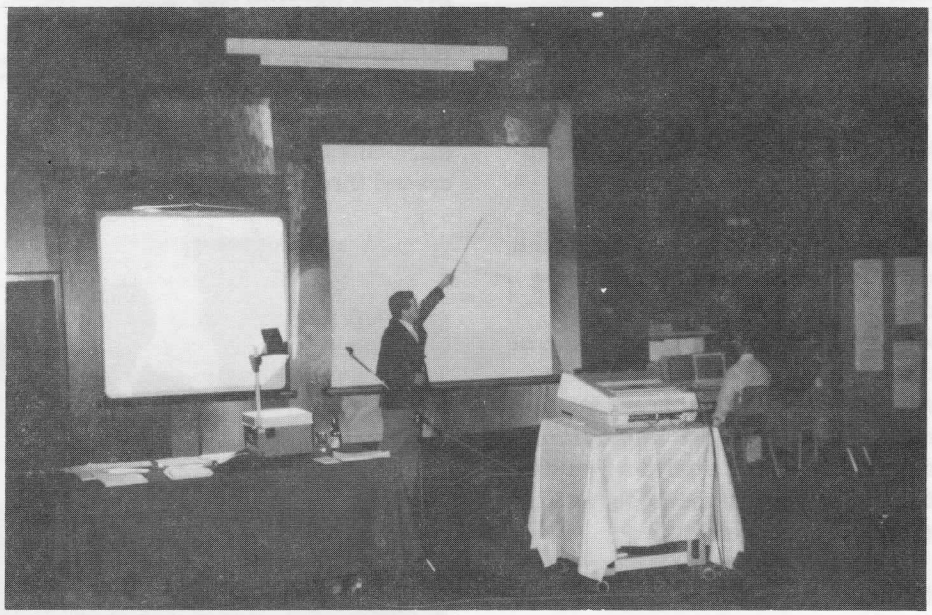
During the entire week of the IACG meeting, continual tests were made as network connections to NSSDC and the Southwest Research Institute in the U.S., ESRIN, and the World Data Center at the University of Kyoto in Japan, were attempted repeatedly.

Problems constantly appeared and systematically were solved. The working group continually assessed the situation to determine whether or not a complete demonstration could succeed. Alternate plans were made in case any aspect of the demo failed. Several "dry runs" were made of the presentation, not one of which was successfully completed because of technical problems.

Specific Snags Block Connection

A number of problems threatened the success of the demonstration, including: *heavy network traffic* throughout the setup and test periods; *installation problems* with the commercial color graphics terminal emulation software carried by NSSDC personnel to Prague; *requirement for last-minute changes* in the ESA communications configuration to accom-

see next page



Dr. Trevor Sanderson conducts the live demonstration for the delegation members of four space agencies.

IACG, *from p. 10*

Dr. Stan Shawhan presents recommendations to the working group.

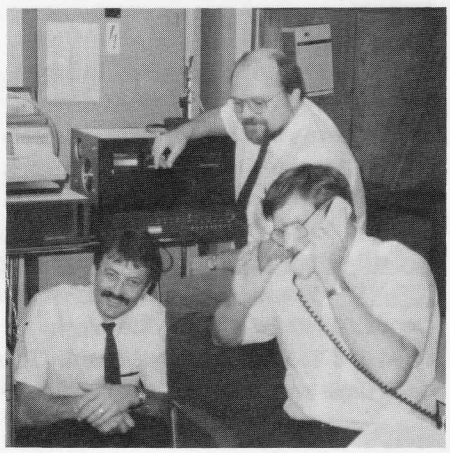
modate the graphics software requirements; *very heavy utilization of NSSDC computers,* which were simultaneously supporting a NASA Climate Data System workshop; *various temporary computer outages and a power outage* on the floor of the hotel in Prague housing the IACG meetings (the day before the demo); and finally, *Hurricane Hugo* travelled along the east coast of the U.S. toward NSSDC, potentially threatening part of the network.

When the time came for the demo, the months of planning and everyone's hard work at Prague and at the participating remote institutions made it possible to perform all the scheduled demonstrations in real time, despite the temporary nature of the installation. The capabilities of many space physics data systems were flawlessly demonstrated in real time during the live 45-minute presentation to the IACG meeting by members of the IACG Data Working Group. The following aspects were demonstrated:

Electronic mail to Japan - The first demonstration was to send an electronic mail message to a colleague in the World Data Center at the University of Kyoto, Japan. A short message was composed on the screen of the terminal in the meeting room and dispatched to Japan, travelling by satellite link to Darmstadt, by submarine fibre-optic cable across the Atlantic to NSSDC, then on to Japan. A reply from Japan was received in the meeting room at Prague about one minute later, sent by Toyohisa Kamei, who was waiting for our message.

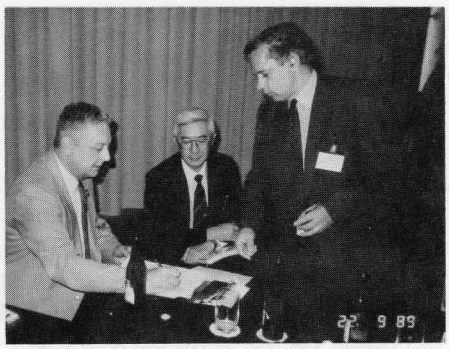
Orbit prediction - NASA's Satellite Situation Center (SSC) is located at NSSDC. The SSC contains data and software for plotting spacecraft orbits, both on-site and remotely via network connections. Both graphical and textual summaries can be produced. One of the purposes of the SSC is to enable users to predict advantageous positions of a spacecraft, relative to the position of magnetospheric or interplanetary features, to the position of other spacecraft, or to the position of ground facilities. Some SSC capabilities were recently ported to the interactive machines at NSSDC and are now reachable over SPAN.

The SSC demonstration consisted of showing how to predict the orbit of the recently launched Japanese satellite, Akebono, and comparing with the orbit of the NASA Dynamics Explorer (DE) satellite, and the predicted orbit



Klaus Blank (left), Mr. Gustoff (standing), and Dr. Kent Hills of NSSDC (right) man the switching center installed by ESA in the hotel to support FAX, phone, and SPAN communications.

of the Soviet Activny satellite (which at the time of the demonstration had not yet been launched). A period of time was chosen, the commands sent from the meeting room by network to the computer at NSSDC with an immediate response of orbit calculations



Delegation members (left to right) Dr. R. Farquhar of NASA, T. Uesugi of ISAS, and Dr. A. Galeen of Interkosmos discuss orbit trajectories of future missions of their respective agencies.

for the satellites, and the results sent over the network to Prague to be plotted on the screen in the meeting room.

The interactive nature of the SSC facility was demonstrated in real time by moving the cross hairs on the screen and then selecting the position of the cross hairs. In this way, it was possible to record the time at which the spacecraft would be at a particular position.

Near-real time Solar X-ray data - To make the entry of commands into several of the computers "user-friendly," the so-called user-shell of the European Space Information System (ESIS) was used. ESIS is a pilot project that interconnects distributed space science and astronomy data bases in Europe. Through the ESIS shell, near-real time data from a scientific satellite was displayed.

Data from the X-ray instrument on the GOES geostationary satellite, which is in the MAX91 data base of the National Oceanographic and Atmospheric Administration's data base at Boulder, Colorado, was displayed. The GOES spacecraft carries a Solar X-ray experiment which looks continuously at the Sun, and measures the solar X-ray flux integrated over the disk of the Sun. In this way, it acts as a very effective monitor of the presence of solar flares on the Sun.

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IACG, *from p. 11*

Data for each day are processed and then placed in the data base at 3:00 a.m. in Boulder. This corresponds to 11:00 a.m. Central European Time. By coincidence, the demonstration was started in Prague at 11:00 a.m. CET. Data recorded from the GOES satellite from the previous day was accessed and brought over from the U.S. to Prague via the network, and displayed on the screen.

The plot, which had not previously been seen, showed a solar flare that had occurred on the Sun on the previous day at 0300 UT. This flare gave rise to an enhancement in the X-ray flux measured by the GOES X-ray instrument. During the demonstration, it was predicted that this flare might cause a magnetic storm on Earth one or two days later. Every day of the meeting, plots from GOES were copied over the network by an automatic program and displayed as posters in the meeting room.

Southwest Research Institute Data Base/NASA Master Directory - NASA's Master Directory (NMD) was demonstrated and used to show how to access the Southwest Data Display and Archive System (SDDAS). An online information system about Earth and space science data, NMD is located at NSSDC, which acts as a starting point for computer-aided searches of data for both NASA and non-NASA scientists. The Master Directory includes brief, high-level information about existing data sets, including the archive location and how to get more information. In addition, automated connection links are available to connect the user, via a network such as SPAN, to data bases included in its directory.

One such data base is that of the Southwest Research Institute in San Antonio, Texas, which was accessed in this part of the demonstration. This data base was established to support the analysis of the DE satellite plasma data and now includes data from several particle and field instruments.

The original aim of establishing the data base was to enable scientists to access the data and produce color plots of the data at their own institute without having to write computer programs. The data base can be accessed directly by computer nodes on SPAN and via the Internet network as well as through the NASA Master Directory.

The PC in Prague was used to logon to the data base. Data from several instruments on DE were then selected and transmitted over the network and displayed on the screen.

Coordinated Data Analysis Workshop (CDAW) - Finally, the data base of the Coordinated Data Analysis Workshop-9 (CDAW-9) was accessed. This data base was assembled specifically for the Polar Regions Outer Magnetosphere International Study (PROMIS), which was in the process of being run from GSFC. Data from several instruments aboard various spacecraft had already been assembled in a common data base for the CDAW workshop. This data base was accessed during the demonstration, a suitable time chosen, and the data plotted on the large viewing screen within only a few minutes of accessing the data base.

To Sum It All Up . . . .

The demonstration to the IACG was followed by a press conference in which the demonstration of mail transfer to Kyoto and access to the NOAA data base were successfully repeated for a new audience: members of the Czechoslovakian press.

The demonstrations to the full IACG and the press were performed flawlessly and made a tremendous impression on both groups. In overcoming the attending political and technical barriers, a victory was won for promoting data sharing and joint data analysis in the worldwide solar-terrestrial science community.

Not only was the event successful in showing what is currently feasible using existing facilities, but it also gave those involved in setting up and performing the demonstration a valuable insight into what will be required to share and exchange data collected during future IACG missions.

Partially as a result of the demonstration, the IACG is now recommending a study to develop a plan for implementing an operational Space Physics Data System based on the demonstrated model, but with many further enhancements.

Dr. James Green and
Dr. Robert McGuire

CDAW 9.2 Meets at Stanford, Marking First Remotely Hosted CDAW Workshop

The second in the newest series of Coordinated Data Analysis Workshops (the CDAW-9 series) took place at Stanford University from December 9 to 12, 1989. For this workshop and unlike CDAW 9.1 (see the Summer issue of *NSSDC News*), access to the CDAW-9 data base and data system residing in the NSSDC facilities at Goddard was by electronic network—Space Physics Analysis Network (SPAN) and NASA Science Network (NSN).

CDAW-9 focuses on the scientific analysis of data collected during the PROMIS (Polar Regions Outer Magnetosphere International Study) campaign. During the PROMIS period (March-June, 1986), a coordinated effort was made by the various international space agencies and numerous ground-based observers to gather simultaneous observations on a wide range of solar-terrestrial phenomena, with the goal of obtaining an improved understanding of the relation between polar phenomena (such as aurora) and physical processes taking place in the magnetosphere. Five specific event periods from within the PROMIS interval (events 9A through 9E) were identified to comprise the initial CDAW-9 data base from a combination of the apparent phenomenology occurring at these times and the availability of relevant spacecraft and ground-based data.

The thrust of NSSDC's CDAW program is to bring large, multi-source data bases and a program of collaborative research to bear on problems of "global" scale such as the structure and dynamics of the terrestrial magnetosphere. The CDAW format is unique in its effort to blend a more traditional scientific workshop with access to a large digital data base assembled from relevant observations. Between workshops in a series, NSSDC maintains the data base and software online to allow scientists to pursue an ongoing analysis via access to the facilities over electronic networks such as SPAN and NSN. This inherent capability to support remote analyses made possible the "remote" workshop at Stanford.

CDAW 9.2 immediately followed the Fall American Geophysical Union (AGU) meeting in San Francisco and was held in conjunction with the Fourth U.S.-Finnish Auroral Workshop, which followed in turn at Yosemite Park on December 12-15. Dr. C. Robert Clauer served as Local Organizer for this CDAW and was simultaneously Convenor of the U.S.-Finnish workshop. Dr. Robert H. Manka and Dr. Daniel N. Baker co-chair the overall CDAW-9 steering committee.

CDAW 9.2 was attended by some 70 solar-terrestrial scientists, including (as in CDAW 9.1) participants from the United States, Canada, Japan and Europe/Scandinavia. The overall schedule, although spanning a weekend just as CDAW 9.1 did, was again successful in substantially enhancing international participation.

The four-day 9.2 workshop agenda was composed of a mix of system training/data access sessions, plenary presentations and subgroup analysis sessions. During this workshop, participants completed some 330 interactive plots of data on ten Macintosh II personal computers (with color-graphics terminal emulators) that were rented and set up for use at Stanford (using funds provided by NSSDC). Several NSSDC staffers attended the meeting to assist participants in access and use of the data system and data base.

Satellite-based imagery can offer an excellent opportunity to survey and understand the global character of the auroral oval when combined with simultaneous satellite and ground station local "in situ" observations.

As an example of the kind of science made possible within the CDAW context, one subgroup of the CDAW-9 participants is investigating the development of a magnetospheric substorm expansive phase during event "9C," whose onset was detected by the auroral imaging experiment on the Swedish Viking satellite and for which reasonable ground-based magnetometer data are available from stations in central North America.

Of particular scientific interest is the location of the breakup arc associated with that substorm's expansive phase (which occurred at approximately 0112 Universal Time on May 3, 1986). A Viking image taken shortly after onset shows that the oval has brightened in the evening sector, both in the low and high latitude parts of the oval. It is hoped that the combination of imager data (showing the true oval location) with ground magnetometer measurements (from which the overlying current system may be inferred) will clarify where the westward electrojet actually flows during this substorm.

Such a study will also allow a new degree of "calibration" of the assumptions and models by which ground measurements are usually mapped to an azimuthal structure of the auroral oval. This kind of "calibration" should become possible by comparing values that are derived from the magnetometer measurements with the observed luminosity characteristics of the oval taken over the entire nightside oval.

Event "9C " also provides an exceptional opportunity to examine the development of substorm phenomena in the near-earth (~< 10 Re) magnetotail (Re=Earth radii). During this substorm, "in situ" CDAW data are available from 1982-019, SCATHA, GOES 5,

see next page

Solar Flares Undergo Research at NSSDC

A paper discussing results of a statistical analysis of flares by NSSDC's Dr. David Batchelor has been accepted by the *Astrophysical Journal Supplement* for publication in June 1990.

In September 1988, Batchelor presented this paper, "Observational Clues to the Energy Release Process in Impulsive Solar Bursts," at the 2nd Workshop on Impulsive Solar Flares held at the University of New Hampshire. His work involves data-intensive research on solar flares, using hard X-ray observations from the Solar Maximum Mission spacecraft and microwave data from several solar microwave observatories (mainly the University of Bern, Switzerland). Batchelor's findings will be published along with the workshop proceedings, in a special issue of the *Astrophysical Journal Supplement* (also available from NSSDC after June1990).

Dr. Batchelor's paper reports several new clues about the nature of the energy release process that produces impulsive bursts of hard X-rays and microwaves during solar flares. Previous results from analyzing a set of 30 impulsive bursts are briefly reviewed, and further results of the analysis method are reported. Source length scales derived from the combined hard X-ray and microwave spectral observations were known to be proportional to burst rise times.

Batchelor shows that the proportionality does not result from the "big flare syndrome," the tendency for intense bursts to exhibit exceptional microwave intensity or hard X-ray spectra. The event set included three bursts with unusually high peak frequencies, leading observers to invoke a special microwave emission process. Characteristics of the bursts suggest that they are of the usual type but occur within unusually small-scale sources. Further analysis of the bursts confirmed, for the first time, that the hard X-ray spectral index gamma is correlated negatively with the microwave peak frequency—important new evidence that high energy electrons cause both microwaves and X-rays. Softer X-ray spectra are also associated with longer burst rise times. In the nonthermal and thermal models, shock-wave particle acceleration and thermal conduction fronts are suggested as the most straightforward explanations of the burst time behavior.

Dr. David Batchelor

CDAW 9.2, *from p. 13*
and ISEE 1. These spacecraft were located in the premidnight sector at this time and straddled the region from ~2000 to 2400 Local Time. ISEE 1 was located at a greater radial distance than the other spacecraft (~8.6 Re) as well as between them in local time. From the pattern of the azimuthal perturbations, the participants currently believe they can show (1) that the field-aligned currents comprising the current wedge were initially located equatorward of all the spacecraft, then moved poleward as the plasma sheet expanded, and (2) that the center of the current wedge was located between SCATHA and ISEE 1.

Discussed at the 9.2 workshop as one interpretation of the data is that the disruption of the cross-tail current began on field lines crossing the neutral sheet in the geosynchronous region, then spread both tailward and azimuthally. This would have resulted in a tailward expansion of the region encompassed by the current wedge and could explain the sequence of events seen in the near-earth region. Ongoing efforts are being made to determine if a modified Tsyganyenko magnetic field model with a strong cross-tail current can reproduce the observed field configuration in the near-geosynchronous region. Such a model might then be used to map back to the ionosphere and estimate where the auroral manifestations of the substorm should have ocurred. Those results can finally be compared to the ground and image data to determine whether or not the near-earth substorm initiation hypothesis is tenable.

The next CDAW meeting is tentatively to take place at Goddard following the spring 1990 AGU meeting, although that may be implemented as a "mini-workshop." The next full CDAW meeting is scheduled to be hosted by Nagoya University in Japan (in late August, 1990), to take place between the Western Pacific Geophysics Meeting in Kanazawa and the AGU Chapman Conference on Magnetospheric Substorms in Hakone. The Nagoya CDAW is expected to be supported by export of a copy of the primary CDAW-9 data base to Japan, since current electronic links between NSSDC and Nagoya cannot support communications of the sort used at Stanford. A distinguished group of Japanese scientists will provide local steering and organization. The Japanese organizers of the Nagoya CDAW plan to convert the data base once received from NSSDC to a more convenient internal format relative to their computer operating system and the data access software they are now developing. In January, a preliminary and mainly Japanese meeting on the CDAW-9 data was held to prepare for the major international workshop in August.

Preliminary scientific results from CDAW-9 will be presented at a special session now scheduled for the Spring 1990 AGU meeting. Some consideration is also being given to the possibility of a CDAW-9 session as part of the 1991 IAGA meeting in Vienna.

Dr. Robert McGuire

SPAN Offers "Security Toolkit" to System Managers and Users

System security has taken on a new importance with the growth of networks. The increased exposure of a networked system must be compensated by increased attention to system integrity. The desire to monitor a system more closely, or to reduce exposure, is good, but will prove very difficult without the appropriate tools.

VMS supplies many useful security features, but these take time and varying skill levels to implement. Most system managers do not have the time available. But rather than give up the idea of a secure system, NSSDC has developed some tools to reduce the work involved in determining a system's vulnerabilities.

There are no claims that these solutions are perfect or even ideal. Many can, and probably will, be improved in the future. Some tools were written locally by NSSDC system staff for use on their own systems, and some were acquired from other system managers.

The toolkit has evolved and been improved with the experience gained in using it and will continue to evolve as new ideas are suggested or new threats appear. Based on SPAN receiving many requests for individual programs in the past, it was decided that they should be consolidated into a toolkit and then documented and modified to improve their portability to other VMS systems.

It is highly recommended that system managers read *Guide to VAX/VMS System Security*, which comes with VMS. There are a number of features of VMS that can contribute significantly to system security. Many of them are only mentioned in passing in the documentation for the SPAN toolkit. Reading the VMS documentation, especially the System Security manual, is the only way to learn everything about what is available and what should be avoided or watched. The toolkit is only intended to aid the system manager in maintaining a secure system. It can not take the place of knowledge of one's system or eliminate all of the effort needed to secure it.

Why Was The Toolkit Created?

SPAN management has always believed that the only way to have a secure network is to secure each host attached to the network. During the September 1988 meeting of the Data Systems Users Working Group (DSUWG) meeting in Anaheim, CA, several dozen SPAN node managers asked SPAN management to develop such a set of system security tools to help them in their day-to-day system management functions.

Recent incidents of unauthorized access and the most recent network worm ("WANK") have indicated that VAX/VMS systems on SPAN are vulnerable to various forms of attack. SPAN management desires to lessen the possibility of a system being penetrated due to preventable vulnerabilities. The *SPAN Security Policies and Guidelines* document describes many procedures to which SPAN nodes must adhere to maintain connectivity to the SPAN network. This document also points out many common security vulnerabilities that Systems Managers should be addressing.

What's in Phase II?

The "Security Toolkit" consists of a number of programs, text files, command procedures and data files. These may be used together, or selected capabilities may be implemented as appropriate for the particular system environment.

The toolkit provides the system manager with system security auditing capabilities. It helps inform the manager of the status of user controlled functions, such as passwords and file protections. It provides an automated means for system managers to check the security alarms on their systems and to mail analysis reports to the appropriate individuals in their organization. In addition, the toolkit can check the system authorization file for accounts with high login failures or accounts with varying degrees of privileges. Software contained in the toolkit allows the system manager to check for changes in system critical files. A procedure is provided for checking a captive account for common vulnerabilities that would leave the account susceptible to abuse. The toolkit also contains documentation to help users and system managers set up a captive account and to ensure that the account remains captive (i.e., only does what the owner of the account wants it to do).

Exactly which of the tools contained in the toolkit a system manager should implement depends on the specific situation. If it is suspected that users are not choosing secure passwords, then the program called TAP (Test for Awful Passwords) is a good first step. If a system is generating excessive security alarm messages, then the program SECLOG might be best. Not everyone needs everything in the toolkit; different system managers have different priorities. Probably the best "first step" is to read the embedded documentation for each of the utilities and learn what they do. It will then be easier to decide on the best order of implementation for the particular system.

The current release of the toolkit has been tested on standalone and cluster VMS systems from V4.5 thru V5.2.

How To Receive The Toolkit

The SPAN Security Toolkit is available for distribution through the SPAN

see next page

Security Toolkit, *from p. 15*

Management Office. To request a copy, send an electronic mail message to one of the following:

NCF::NETMGR
NSSDCA::NETMGR
6277::NETMGR

You may also order by calling (301) 286-7251 or FTS 888-7251, or by writing to the SPAN Information Center, NASA/Goddard Space Flight Center, Code 630.2, Greenbelt, MD 20771.

You will receive an electronic mail message with information for you to review. Also, you will be asked to fill out the Host Identification Questionnaire and return it to the network management office. This information helps SPAN management to keep the data base information current.

You will be told how to copy the SPAN Security Toolkit software to your system. The save set is approximately 5300 blocks. When restored, you will need approximately 12,000 blocks of free space to house the directory tree and save set. Special arrangements can be made if you require a 9-track tape distribution.

Sites receiving the toolkit are asked to (1) document and report any problems found while installing the toolkit to NCF::SUPPORT, and (2) document and report any local changes made to the existing software tools to NCF::SUPPORT so that the master copy kept at NSSDC can take advantage of any enhancements you found useful.

In the mail message you receive will be a disclaimer notice that is required by NASA to be included, since the toolkit was developed in part from publicly available software. Each module, however, has been thoroughly verified and tested before being included as part of the toolkit.

Pat Sisson and Ron Tencati

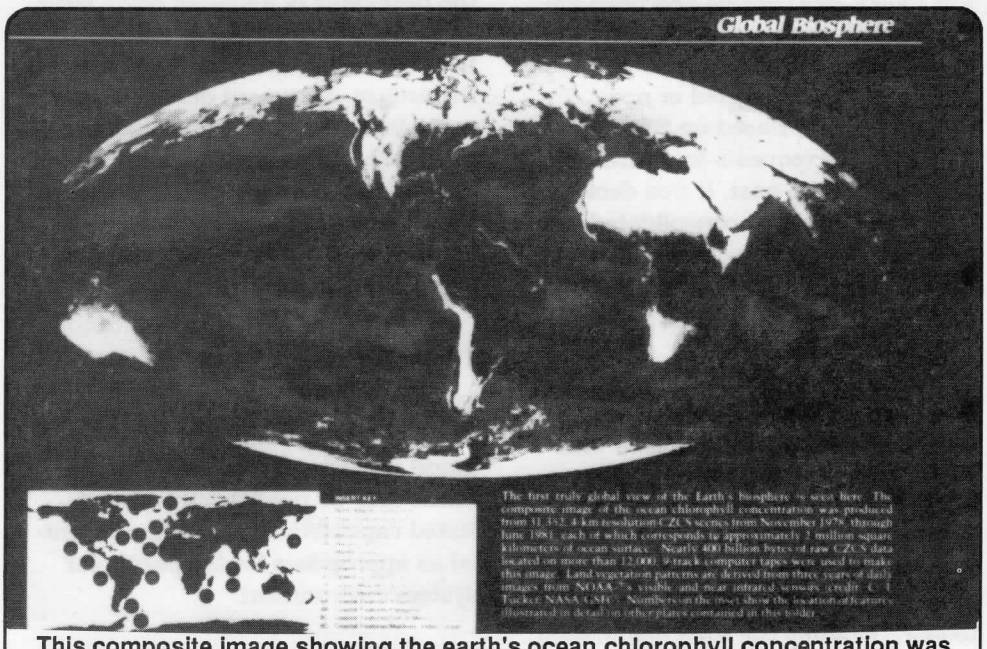
Ocean Color Data Acquires Bulletin Board and Worldwide Browse Capability

In an effort to make the global Coastal Zone Color Scanner (CZCS) data set more accessible to the scientific community, Dr. Gene Feldman and his CZCS team in the information Systems Development Facility (ISDF) have established a CZCS bulletin board and worldwide data request capability through OMNET/Telemail, which contains 7 options including the capability for users to request data, to request information about data, and even to contact the CZCS staff.

In addition to this data request capability, a new feature addresses the difficulty faced by researchers who would like to browse the CZCS data, but do not have access to the CZCS video browse discs. The CZCS team has modified the Telemail-accessed Browse program so that a researcher who does not have access to the CZCS video browse discs can complete a browse session and have it recorded on a VHS tape and mailed to him or her. The researcher can view the videotape at leisure and may request the digital data from the CZCS archive for further analysis, making a selection of scenes based on what is seen on the tape. The order file, which lists all the scenes selected based upon the user's initial search criteria, can be sent to the user as a Telemail message, edited accordingly, and then sent back to the archive.

Many researchers may also want to use the Browse program's ability to generate user-specific movie loops, a feature that is also available in the Telemail-accessed Browse program. Currently, the Information Systems Development Facility is capable of producing only NTSC standard video (VHS) tapes. It is investigating the possibility of supporting other video standards including PAL and SECAM, and will implement this option if the CZCS data demand calls for it.

Gene Feldman



This composite image showing the earth's ocean chlorophyll concentration was produced from 31,352, 4-km resolution CZCS scenes from November 1978, through June 1981.

NEWSBRIEFS-NEWSBRI

Associate Administrator (OSSA) Investigates NASA Master Directory

At the request of Associate Administrator Dr. L. Fisk and Chief Scientist for Global Change Dr. I. Rasool, the NASA Master Directory was demonstrated by Dr. J. Thieman, and Ms. M. James (ST Systems Corporation) at NASA Headquarters on February 16. Other attendees at the presentation included Assistant Associate Administrator Dr. J. Alexander, Mr. J. Bredekamp, and Mr. T. Villasenor (Code ECI). The main purposes of the demonstration were first, to indicate the current availability of this tool for identifying and locating NASA as well as non-NASA data in the space and Earth sciences and, second, to show that access to the directory is easily made through ordinary PC's having communications software and dial-out or network connectivity.

Information about several data sets was displayed and connections to other data information systems, such as the EROS Data Center in South Dakota and the ESA Earthnet Catalog in Frascati, Italy, were exercised. It was seen that the system can play a significant role in making the science community aware of NASA and other data available for research. A discussion following the demonstration emphasized the importance of completing the already reasonably comprehensive coverage of useful data sets within the directory.

Dr. James Thieman

Current TOMS Ozone Data Available Online at NSSDC

NSSDC is providing immediate electronic access to the current Antarctic ozone hole data from the Nimbus-7 TOMS. Principal Investigator, A. J. Krueger has pointed out that the 1989 Antarctic ozone hole deepened in the first week of October to the same record low level as in 1987. These interesting data are now available, through a public account on the NSSDC computer facility, to scientists who desire immediate access to small quantities of TOMS ozone data.

Daily gridded ozone values are retrievable on NODIS (NSSDC's Online Data and Information System) within three to six weeks after acquisition. They may be browsed on screen or downloaded to a personal computer. Interested users may log onto NODIS via SPAN by setting host to NSSDCA or by dialing in to 286-9500. Enter username as NSSDC; no password is required. The Nimbus 7 GRID TOMS option is in the top menu.

Dr. Joseph King and Carolyn Ng

Pilot Land Data System Ports Software to UNIX

The staff of the Pilot Land Data System (PLDS) has just completed a port of the data system software from the VMS operating system environment to the UNIX environment. All PLDS-supported software that enables scientific users to access the data system, find data, order data, and communicate with other computers now runs under both the VMS and UNIX operating systems.

In mid-January the UNIX version of the software was demonstrated to the members of the PLDS Science Working Group. The core software was transported via wide-area communication lines (DECNet or Telnet) from the Goddard PLDS node, where it was developed, to the Ames node of PLDS, where the demonstration was to take place.

The Ames and Goddard staff installed the core software and integrated it with the optional and site-specific software that is resident at the Ames PLDS node. The Ames node of PLDS uses a Sun 4/280 computer system to run the Sun version of the UNIX operating system.

Requiring over 9 months to implement, the direct port of the software took about 12 man-months of effort. During that period some of the software was substantially rewritten to meet requirements for portability placed upon the software over the last two years. Although these requirements increased the initial porting effort, they will, in the long-term, substantially reduce the overall porting and maintenance costs associated with this software.

Dr. Blanche Meeson

Nimbus-7 SBUV User's Guide Has Been Updated

The Nimbus Project updates the NIMBUS-7's users' guides and other documentation on a continuing basis as appropriate. One of the most recently updated users' guide in progress is the "NIMBUS-7 Solar Backscatter Ultraviolet (SBUV) Ozone Products User's Guide."

Other documentation updates completed in FY89 are:

- User's Guide for the NIMBUS-7 Scanning Multichannel Microwave Radiometer (SMMR) CELL-ALL Tape, NASA Reference Publication 1210, October 1988.

- NIMBUS-7 ERB Solar Analysis Tape (ESAT) User's Guide, NASA Reference Publication 1211, November 1988.

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• NIMBUS-7 Stratospheric and Mesospheric Sounder (SAMS) Experiment User's Guide, NASA Reference Publication 1221, May 1989.

Copies of these documents are available from the Central Data Services Facility of NSSDC.

Arnie Oakes

NSSDC Takes Part in Annual Review of Operations Spacecraft (AROS)

The 1990 AROS was held January 16–18 at GSFC. The purpose of AROS is to assess the scientific justification of ongoing NASA spaceflight missions, to address the telemetry acquisition support for each such mission, and to address the plans that assure the wide accessibility of scientific data from those missions.

NSSDC gave a presentation on the status of its archiving of data from the missions addressed and on some of the activities it is pursuing in anticipation of growing archiving/dissemination responsibilities. The Data Center participated in many discussions concerning Project Data Management Plans and the relative advantages of various data media.

The NSSDC representative, in his role as IMP-8 Project Scientist, also gave his seventeenth annual presentation on the scientific rationale for extension of operations of that venerable but still healthy and highly important spacecraft.

Dr. Joseph King

SPAN/NSN Moves Near Real-Time Galileo Data

From December 27-30, 1989, the Galileo Project turned on all of its science instruments. Quick-look data from these instruments were directly sent to the investigators at their institutions over SPAN and NSN networks.

The investigators, who received their data from Jet Propulsion Laboratory, are located at UCLA, University of Iowa, Applied Physics Laboratory, University of Colorado, Heidelberg (Germany), Arizona State University, Planetary Science Institute (AZ), Lunar and Planetary Laboratory (AZ), USGS Flagstaff, Brown University, Cornell University, USGS Menlo Park, Catech, Rand Corporation (Santa Monica), Oberpfoffenhofen (Germany), and Goddard Institute for Space Studies (GISS).

NSN was used for the Lunar and Planetary Laboratory (LPL) and the GISS links. SPAN was used for all other links. Ted Clarke, the Galileo Project Manager, reports that all parts of the Galileo Science checkout worked and that "the needed communication services from SPAN and NSN worked perfectly.

Dr. James Green

Data Restoration Program Expands to Optical Disks

For the past year, NSSDC has been moving data from old magnetic tapes to new reel tapes and, on the NSESCC IBM/3081, to 3480-type cartridge tapes. Data from approximately 10,000 old tapes have now been migrated to about 1,000 new tapes. As part of its data restoration program, NSSDC has just migrated data from 218 Helios zodiacal-light data tapes onto one 2-gigabyte write-once optical disk platter using the NSSDC-developed SOAR software package. The selection of this particular data set was stimulated by one of NSSDC's early customer requests for data on optical media. Long-life optical disks offer an attractive approach for compact archival of NASA's large data volumes, present and future.

Dr. Joseph King and Chuck Davis

NSSDC Supports Science Team for Soviet Mission

Selected U.S. scientists participating in the Soviet ACTIVE spacecraft mission met for the first time at GSFC December 12-13. These scientists were selected from the NRA-89-OSSA-11 Research Announcement and are investigators recognized by the Soviet Space Research Institute (IKI) through the U.S./U.S.S.R. Space Agreement.

Launched on September 28, 1989, ACTIVE is designed to emit a powerful VLF signal (about 10 KHz) into space that will strongly interact with the surrounding plasma, and whose effects can be observed by instruments on the ground and on other satellites. The purpose of the meeting was to review the overall stability of the ACTIVE passes.

NSSDC's Satellite Situation Center (SSC) was used extensively to provide the necessary information to determine ACTIVE's late December and early January observing schedules (over 30 opportune passes were selected during these 2 months). For the U.S. investigators, the SSC will continue to be the organization disseminating all ACTIVE orbit and position information, a key function in the coordinated observation program. Paul Pashby, NASA ACTIVE Project Manager, is the only point of contact with the Soviets for ACTIVE operations. The next ACTIVE group meeting will be in the U.S. in March or April; the results of this campaign will be discussed and a new observing schedule planned.

Dr. James Green

EFS-NEWSBRIEFS-NEW

Cosmic Background Explorer (COBE) Analysis Center Gears Up for Launch

The COsmic Background Explorer (COBE) Analysis Center (CAC) supports the COBE Science Working Group (SWG) and its contractors in the off-line validation of the level 0-to-level 1 processing of the data; development, validation, and operation of the level 1 to level 2 data processing; and in off-line science analysis, image processing and visualization, and interactive physical modeling. To provide computer power, storage, and display capabilities, a VAX 6440 and 5 VAX 3100 and 3200 workstations, as well as 22.5 Gbytes of disk storage and a variety of peripheral equipment have been procured and integrated into the cluster.

The COBE Science Data Room (CSDR), located in Bldg. 7 and supported by Code 730, is responsible for the operation of the scientific instruments and processing of the quick-look data. A COBE-dedicated LAN link to the CSDR has been provided to promote rapid communication and transfer of data between the two COBE support centers. The CAC currently is providing work space for 20 SWG support people, and expects to increase this number to 30 when the satellite is launched.

The basic configuration of the CAC is complete, and the staff is ready to support the COBE mission.

Richard White

TELENET Access to NSSDC Now Restricted

TELENET access to data bases and individual user accounts on the NSSDC have been restricted because of software changes in the Data Center and the mandatory use of NASA Packet Switched Service (NPSS) based at Marshall Space Flight Center. All TELENET access to any NASA facility must go through NPSS. This means that all users wishing to access the NSSDC via TELENET will have to acquire a NPSS user name and password to continue accessing the NSSDC facility.

This action will directly impact users of the CANOPUS, NODIS, SPAN_NIC, MD, and other data bases as well as any researchers who use local TELENET public PADS to access the NSSDC data bases or NSSDC personal accounts from remote locations.

Users who require NPSS user names and passwords will be required to supply their full names, postal address, telephone, and organization to their NSSDC account representatives or data base administrators. The account representative or DBA will then apply to NPSS for your NPSS user ID and password. NPSS will not accept requests directly from users. If you need help determining who is your NSSDC account representative or DBA, please call (301) 386-9794, (FTS 888-9794), or send a mail message to NCF::SUPPORT.

CALENDAR

March 26 - 30, 1990
CCSDS Panel 1 Meeting
London, U.K.

April 2 - 3, 1990
CCSDS Panel 2 Meeting
Toulouse, France

April 9 - 10, 1990
CCSDS Management Council Meeting
Noordwijk, Netherlands

June 2, 1990
CDAW 9 Mini-Workshop
Goddard Space Flight Center
Greenbelt, Maryland

August 29-31, 1990
CDAW 9.3
Research Institute for Atmospherics
Nagoya University
Toyokawa, Japan

CCSDS Plenary V Meeting Advances Information System Interoperability

The Consultative Committee for Space Data Systems (CCSDS) held a "Plenary V" meeting, September 25-29, 1989, in Ottawa, Canada. Hosted by the Canadian Space Agency (CSA), Plenary V brought together Panel 1 (Telemetry and Telecommand), Panel 2 (Standard Data Interchange Structures), and Panel 3 (Systems) for a productive series of plenary and parallel sessions.

Specific accomplishments included the approval of new Blue Books (agency-approved for distribution) in the following areas:

- Advanced Orbiting Systems (AOS) space-ground communications, and radio frequency, and Modulation (Blue)
- Control Authority procedures, and Parameter Value Language/Format (Red)
- Language Usage Tutorial (Green)
- Standards for Formatted Data Unit (SFDU) structures (Red and Green)

In the area of new work to be addressed by CCSDS, the NASA proposal for developing an international recommendation facilitating the location of science and support data was favorably received. This proposal seeks to build on the Directory Interchange Format (DIF) of the NASA Master Directory effort under the guidance of NSSDC's Jim Thieman.

The CCSDS Management Council has approved an exploratory workshop to involve key participants and organizations expected to lead to a new CCSDS subpanel on directories and catalogs.

Renewed vitality was displayed by the participants, and many reaffirmed their committments to CCSDS and its goals. The next full meetings of the CCSDS panels are scheduled for March/April in Europe, followed by mid-September meetings in Pasadena, CA.

The NASA Master Directory can be accessed several ways—through GSFC ROLM lines, SPAN, or INTERNET. Instructions follow:

- Via GSFC ROLM lines (286-9000) enter CALL MD at the CALL, DISPLAY, or MODIFY prompt and then enter NSSDC to the request for Username.
- Via the SPAN network, enter SET HOST NSSDCA from your node and respond with NSSDC to the Username prompt.
- Via INTERNET, enter TELNET 128.183.10.4 and respond with NSSDC to the Username request.

Don Sawyer

NSSDC NEWS

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NSSDC Services

Researchers can obtain information about NSSDC's data archive— how to contribute to it or how to request data from it (including cost and availability concerns)— by addressing their questions as follows:

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