NATIONAL SPACE SCIENCE DATA CENTER
NEWSLETTER
NSSDC No. 3 August 1985
Vol. 1

CDAW Promotes Collaborative Data Analysis

History

The Coordinated Data Analysis Workshop (CDAW) system was developed as a major component in a process for the group analysis of geophysical data. This process was developed in response to the need of the International Magnetospheric Study (IMS) community for a mechanism to facilitate collaborative data analysis. NSSDC has played a major role in the acquisition phase of the IMS by providing extensive predictive data acquisition opportunities to numerous participating satellite and ground-based projects in several countries. This was accomplished through the NSSDC-developed Satellite Situation Center (SSC), which will be described in the next issue of the *Newsletter*. Recognizing the companion requirement for collaborative data analysis, NSSDC proposed the construction of a centralized database containing a diverse collection of geophysical parameters. Access was to be through a common set of software to permit rapid response to real-time requests for manipulation and intercomparison of data with graphical displays in a workshop setting.

The first CDAW was held in December 1978, after a system development cycle of less than 1 year. The purpose of CDAW 1.0 was not only to study two IMS events of December 1977, but to test and critique the CDAW concept. A total of 48 participants and observers from 38 institutions in 11 countries took part in the conduct of the Workshop and the subsequent evaluation process. The results included a document entitled, *An Evolutionary Approach to the Group Analysis of Global Geophysical Data*, which is available from NSSDC. The critique and evaluation left no doubt that the CDAW concept was regarded as "a significant milestone in the methodology of analyzing data." Suggestions arising from CDAW 1.0 have been incorporated into the WSP 2.0 and 3.0 software systems, as resources permitted, to further the goal of realizing the full potential of the CDAW concept. Database management techniques have been improved for increased efficiency, algorithm and display capabilities have been expanded for greater flexibility, and the data catalog has been automated for on-line access and rapid updating.

Including CDAW 1.0, seven distinct databases have been constructed, and ten Workshops have taken place. Of these, three have been hosted at remote sites utilizing 9600-baud access to the database: Palo Alto, California; Darmstadt, Germany; and Edmonton, Alberta, Canada. Pre- and post-Workshop analysis has been accomplished utilizing remote access capabilities. An example of the success of this process can be found in the February 1985 issue of *The Journal of Geophysical Research* that features 19 papers resulting from the analysis of the CDAW 6 database.

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A Message from the Director:

A NEW SPACE DATA SYSTEM ENVIRONMENT

I have been involved with NASA data systems (the analysis and manipulation of data after they hit the ground) from the user standpoint since graduate school. As the new head of NSSDC, my awareness of NASA data systems and the problems within those systems have definitely been heightened. On a daily basis, we must deal with the archiving and distribution of data from past NASA missions. Problems with data exchange, for example, that existed during the project now remain for NSSDC to overcome. This situation is made worse by the fact that each mission has a different data system. Few missions use a common data system for each investigator. At the beginning of a project, an investigator invests in computational, manipulative, and display tools (software and hardware) that he must design to play together in order to analyze his data. There was little thought (because, at the time, it was believed that there was little need) for standard data formats to be used. Clumsy, if any, database management techniques were used mission-wide. Toward mission's end, the principal investigator would send as much of the processed data and documentation to NSSDC as he perceived to be appropriate. At mission's end, the data system collapsed, leaving large amounts of data at the investigator facility. The results of these procedures were that NSSDC rarely obtained the complete database from a mission for community use, and intercomparisons of the received and distributed data were extremely difficult, because these data were still tied, in many ways, to the original project and/or investigator data system. It has been my experience that even though each mission has a different data system, newer has not necessarily meant better. How all this happened or why it happened can be debated extensively. But there is hope!

The advances in database management, space science data formatting, archival mass storage, low-cost computational systems, and telecommunications can really be brought to bear on the problems within NASA data systems. Well designed, integrated, and implemented acquisition-to-archiving data systems for future NASA missions will make the archiving, distribution, and analysis of space data a joy rather than a nightmare. These new tools and techniques can be applied to the data system of present missions if changes are allowed.

Our prospects for the future are truly exciting as we move toward an era of a "new space data systems environment." The integration of advanced database management techniques, format standards, optical disk archiving, and interdiscipline network communications that are currently going on at the NSSDC and other Centers will help usher in this new era.

I envision a NASA mission-independent data system that would be permanent. Missions come and go. At mission end, the multidiscipline mission-independent data system remains. With this new data system, we have the opportunity to implement what we have learned from missions and pilot data system programs and use it as a test bed for new hardware and software. The test bed approach could provide the latest in proven hardware and software for projects at implementation time. Currently, the stand-alone project approach provides a 5-year or older data system at time of launch. We need to develop the pilot data systems (PCDS, PLDS, PPDS, and PODS) into operational facilities open to their community. We will tie all this together with multidiscipline computer-to-computer network(s) providing access to remote investigators, data repositories, large number crunchers, and other NASA facilities. With NSSDC forming a major open access data center (more on this in future issues) NASA spacecraft data would become available to anyone, in usable form, long after the data acquisition phase of a project has ended. Thank goodness that we are developing the multidiscipline data system. Technology and telecommunications are such that it is now feasible to do all this, and we are gaining the experience to pull it all together. We are going to need such a system for what lies ahead.

James L Green

Meet PAT ROSS, NSSDC Request Coordinator

Ms. Patricia A. Ross has served on the contractor staff at NSSDC since March of 1970. Initially employed as a data technician in the computer services area, she quickly demonstrated the intelligence, dedication, and energy that earned her the position of Supervisor of Computer Operations. Pat was equally competent in the software and hardware aspects of this position, and it was not unusual to see her trouble-shooting cable problems beneath the raised floors and disk drive and terminal problems, and otherwise humoring the quirks of the system. Her efforts allowed the users maximum up-time and flexibility. While in this position, Pat wrote the document entitled "User's Guide for NSSDC Tape Handling Facility," which still serves as an aid to computer services personnel in the processing of magnetic tape data sets.

Pat's computer knowledge ranges from mainframe IBMs to MODCOMP minis to various micro and personal computers. Her versatility in this area has helped NSSDC through many conversions and crises.

Currently, Pat is Manager of the Request Coordination and Information Management Group. She and her dedicated staff respond to thousands of requests yearly from an international scientific community. In addition, they maintain the automated files, including the Technical Reference File (TRF) described in this issue. She will be instrumental in determining the requirements of the new NSSDC automated information system. In the interim, Pat has modernized the current processing of requests and has enhanced the automated file capabilities.

Pat keeps her technical knowledge up-to-date with continuous course work at the University of Maryland where she is majoring in Computer Science. She is a "Navy brat" with seven brothers. Her 15 years at the Data Center is the longest Pat has been in one place. Having literally grown into adulthood at the Data Center, Pat says, "I have always been proud of working here and feel that we provide an important service to the scientific community." She cites Dr. James I. Vette, Director of NSSDC from 1967 to 1984, as her primary source of motivation and inspiration.

Pat's athletic ability is legendary at the Data Center. She has both played on and coached the Goddard contractor softball team as well as playing outfield on some of the more competitive teams in the area. Pat's 1984 team was Virginia State Champions, while the 1985 team is Mid Atlantic Regional Champs on their way to the ASA National Championships in Austin, Minnesota over the Labor Day weekend. Just this month, Pat was named to the all time All-Star Team for Prince Georges County.

Pat speaks about her future at NSSDC saying, "I am looking forward to participating in the development of a truly user-oriented automated file system so that we can better handle a larger volume of information and requests in a more timely and efficient manner."

Ms. Ross is one of several long-term Data Center contractor employees whose special dedication and talents contribute greatly to the success of the NSSDC mission.

CDAW System Promotes

(Continued from page 1)

The CDAW System

The current CDAW software system, known as WSP 3.0, has a pedigree that includes a complete redesign based on the operational experience and participant critiques obtained during many Workshops. Recognizing the evolutionary nature of the requirements, a modular design approach was used to obtain a clear separation of data storage, data retrieval, data manipulation, and data display functions. Extensive database maintenance tools, essential in a real-time operational environment, are also provided. This system has recently moved from its MODCOMP environment to the NSSDC VAX 11/780 computer, which will allow for larger and simultaneously available on-line databases, access via the Space Physics and Analysis Network (SPAN), and integration with other NSSDC systems.

WSP 3.0 is typically used to build large disk databases, limited only by available disk storage space, containing over a thousand time-dependent parameters. These data are interfaced to the system through the generation of a structured data set-dependent routine and associated text that serves the dual purpose of providing the heart of the on-line data catalog material and of tightly-coupling the data loading with the catalog for excellent integrity in tracking updates to the database. A new, well-documented, flat-file data set can be made ready for loading in a few hours if necessary. Rapid access to the data is provided by using directories, a hashing table, and linked lists to arrive at the beginning of the desired data blocks in no more than a few disk accesses. Although time has been the key used for data organization within this structure in past Workshops, any other monotonic parameter could also be used. The assignment of a unique, recognizable mnemonic to each parameter facilitates the use of general-purpose data manipulation algorithms and displays.

Some data parameters consist of multiplexed quantities, such as flux from a detector that samples various energy ranges in a predetermined or command-driven manner. The user may specify the subset of data desired, and the system will demultiplex to yield the desired quantities, which may be subsequently displayed or used for additional data manipulation in algorithms or procedures.

The user may define algorithms involving parameter mnemonics in a manner that closely parallels the use of FORTRAN functions, and the system automatically processes the associated arrays to arrive at a resultant array. For example, an algorithm to calculate a drift velocity component from the corresponding observed electric and magnetic field components can be specified and entered into the system, together with the documentation required for the on-line catalog, in only a few minutes. This algorithm can then be used for display or for use in other algorithms and procedures. In this way, a large library of processing algorithms can be rapidly developed. A typical 3-day Workshop will result in over 100 such algorithms tailored to the specific needs of the participants. Another data manipulation capability, called procedures, allows the parameters to be processed as flat files and includes sorting, joining, stringing, and related processing. Procedures may be displayed directly or processed in other procedures.

The display options currently available have been selected to support a Workshop setting that focuses on the intercomparison of data. Direct output of data-versus-time and data-versus-data displays in a multipanel format are provided for this purpose. Figures 1 and 2 are examples of CDAW plot output.

Graphics are currently produced using the AGII package with support for Tektronix 4014, 4025, and 4027 terminals. A much greater range of terminals will be supported in the near future using TEMPLATE, which will be the only proprietary software in the system.

There are numerous other special features available including the display of time coverages for individual or groups of pa-

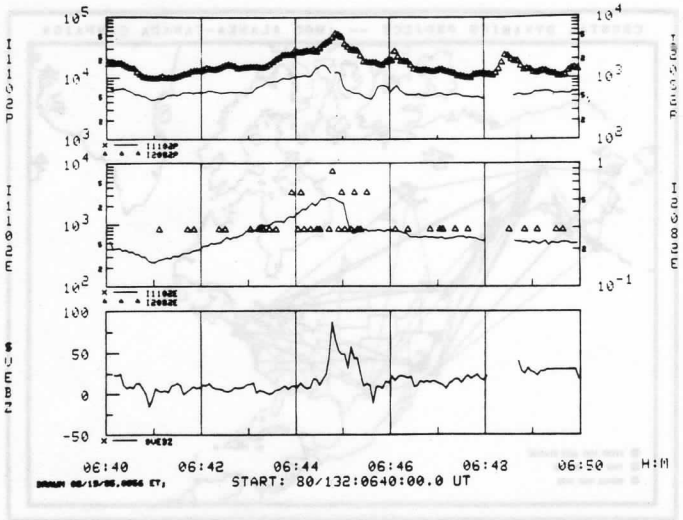


FIGURE 1: *A 3-panel, 5-parameter data-versus-time CDAW plot using algorithm $VEBZ.*

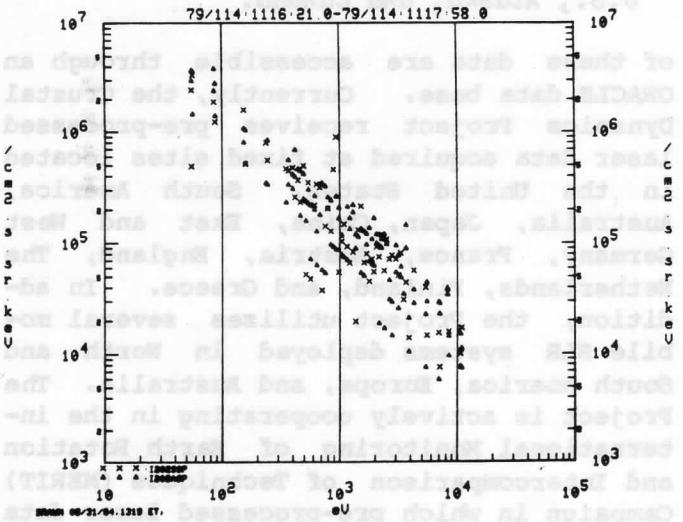


FIGURE 2: *An example of a CDAW data-versus-data plot.*

rameters and the capability for downloading to a remote terminal or personal computer any of the parameters, either as originally stored on the database or as output from algorithms or procedures. Although publication quality graphics output is not available from WSP 3.0 at this time, access via some personal computers, such as the Macintosh does allow for the generation of a publication quality output.

The Future

The CDAW concept has grown with each successive Workshop. Thus far, the solar terrestrial community has been the primary user, selecting events for study in that discipline. However, the CDAW concept is applicable to many other space science disciplines, and it is anticipated that such Workshops will occur in the future. In particular, discussions are being held with members of the astrophysical community about extending capabilities to service that discipline. CDAW 8, which will be a database focusing on ISEE 3 deep magnetotail event periods, will utilize SPAN, which will allow access for individual and small group study at the participants' home institutions. Future plans include expanding the CDAW concept to incorporate some features of the Pilot Climate Data System (PCDS) experience. A description of PCDS was given in Issue 2 of this *Newsletter*. Consideration will be given to requests for copies of the CDAW software to be used for supporting analysis at other locations. Future development of the CDAW concept is part of the overall NSSDC goal for providing easily-accessible data to a broad space science community, providing the tools to effectively do collaborative data study, and to take advantage of new technology that will allow this to occur quickly and inexpensively. A key direction for CDAW evolution is toward distributed databases and software using SPAN. Look for an upcoming *Newsletter* article describing network-assisted coordinated science concepts.

D. Sawyer, E. Stemmer

Dear Readers:

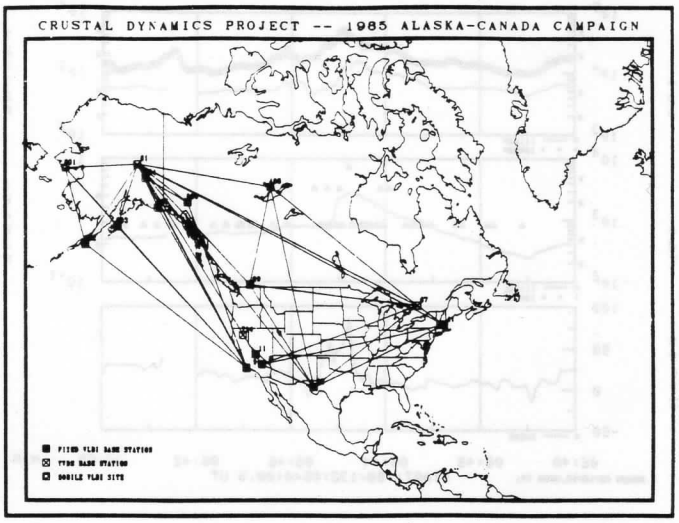
Thank you for your response to the survey card in Issue No. 2. I apologize for the short notice on the return date. Due to circumstances beyond my control, the Newsletter was distributed later than the date originally expected. Feel free to return your responses at any time. However, the responses (or lack of response) will be noted for the distribution of Issue No. 4. Thank you.

Ellen Stemmer
Editor

Crustal Dynamics Data Information Sys-

NASA's Crustal Dynamics Project has recently concluded its second Alaska-Canada Campaign. The purpose of this measurement intensive campaign is to study tectonic plate motion by the determination of long baseline distances between fixed and mobile stations located in the continental U.S., Alaska, and Canada. This was the second attempt to measure the baseline between these sites to an accuracy of a few centimeters by means of Very Long Baseline Interferometry (VLBI). A prior campaign was held in July of 1984. Radio stars are used by the VLBI technique to obtain the baseline measurements. The Project also uses the Satellite Laser Ranging (SLR) technique for making worldwide baseline measurements. The baseline distances obtained from the VLBI and SLR techniques are used in support of the Project's scientific objectives for the study of Earth dynamics, tectonophysics, and earthquake mechanisms. The collection of these data sets over the past 9 years and through the lifetime of the Project (1976 through 1990) has required the establishment of a Crustal Dynamics Data Information System (DIS), which readily provides detailed, on-line information about all acquired data. The DIS resides on the NSSDC VAX 11/780 and is accessible to all Crustal Dynamics Investigators by means of two dial-up telephone lines connected to alphanumeric terminals with 300- or 1200-baud modems. The menu-driven system and its user-friendly language allow for easy retrieval of any information contained in the DIS.

The DIS provides for the cataloging of all Project-acquired data from 1976 to the present as well as new data to be acquired during the lifetime of the Project. The collection of the various types of data includes a large amount of pre-processed SLR and VLBI data acquired at fixed and mobile stations located throughout the world. The archive of pre-processed laser ranging data is stored off-line on magnetic tape. However, yearly satellite catalogs



Crustal Dynamics Project Measurement Program for obtaining precision baselines between sites in the continental U.S., Alaska, and Canada.

of these data are accessible through an ORACLE data base. Currently, the Crustal Dynamics Project receives pre-processed laser data acquired at fixed sites located in the United States, South America, Australia, Japan, China, East and West Germany, France, Austria, England, The Netherlands, Finland, and Greece. In addition, the Project utilizes several mobile SLR systems deployed in North and South America, Europe, and Australia. The Project is actively cooperating in the international Monitoring of Earth Rotation and Intercomparison of Techniques (MERIT) Campaign in which pre-processed laser data from the participation sites are merged together and the resulting data tapes are sent to worldwide analysis centers. The DIS is responsible for the dissemination of these data products.

A portion of the archive of raw VLBI observables is stored in on-line files for access by the MARK-III VLBI Data Base Handler, which can be selected from the DIS main menu. Currently, the Crustal Dynamics Project receives VLBI data from fixed and mobile antennas located in the United States, Canada, West Germany, Sweden, Spain, Italy, and Japan. Many of

tem Provides User Access to Catalog

these facilities participate in weekly VLBI measurements, while others are operated during the scheduled VLBI campaigns.

Analyzed data products, received from investigators at GSFC, JPL, MIT, NGS, University of Texas, and others are made available from these laser and VLBI observations. These products include baseline lengths, station position data, polar motion data, and length-of-day data. Relevant comments on the derivation of these results can be viewed through the DIS HELP facility. In addition, related ancillary data products such as a priori station coordinates, calibration data, and site occupation information are accessible through the DIS. Project management data consisting of site information, site occupation schedules, and configuration control descriptions, as well as DIS-related data, consisting of directories of processed and analyzed laser and VLBI data tapes, data product deliveries, and DIS data base backup tapes, are stored in the DIS. These data items are accessible to authorized Project personnel only.

The information stored in the Crustal Dynamics Data Bank is directly accessible by the DIS via a menu-driven user language. The DIS main menu consists of nine items, each of which is listed below with its corresponding function:

HELP - aids the user in the available menu items and presents information relative to the generation of the analyzed results stored in the DIS;

SQL - allows the user to directly access the various acquired data sets through ORACLE's SQL query language;

DBH (Data Base Handler) - developed by the VLBI Science Support Team at GSFC to provide the user with information about VLBI experiment sessions and to allow the user to browse the processed VLBI data;

BULLETIN - current and previous Crustal Dynamics Project bulletins are viewed on an article by article basis;

NEWS - informs users of Project-related information such as future Project meetings, etc;

DATA EXCHANGE - provides access to several analysis programs received from Project investigators;

REPORTS - displays a sub-menu of report types that summarize and display selected data base tables such as Project occupation schedules, data catalogs, etc;

SCREEN FORMS - displays a sub-menu of screen forms that allow the user to access the tables of the ORACLE data base without the use of a formal query language.

A major responsibility of the DIS is to maintain an active log containing the occupation status of all SLR and VLBI systems. These include 30 fixed 8 MOBile LASer Systems (MOBLAS), four highly mobile Transportable Laser Ranging Systems (TLRS), 2 European highly mobile Modular Transportable Laser Ranging Systems (MTLRS), 3 Transportable VLBI Data Systems (TVDS), and 3 highly mobile Mobile VLBI (MV) systems. Accurate records of the date of movement and the site monument used by each of these systems must be retained for proper data reduction and analysis and, also, for any future references.

A *Crustal Dynamics Data Information System User's Guide* is available to all users and presents examples of typical DIS queries. In addition, the DIS assisted the Project Office in the recent publication of the *Crustal Dynamics Project: Catalogue of Site Information*. The DIS will become part of a database for the National Geodetic Reference System at the conclusion of the Project.

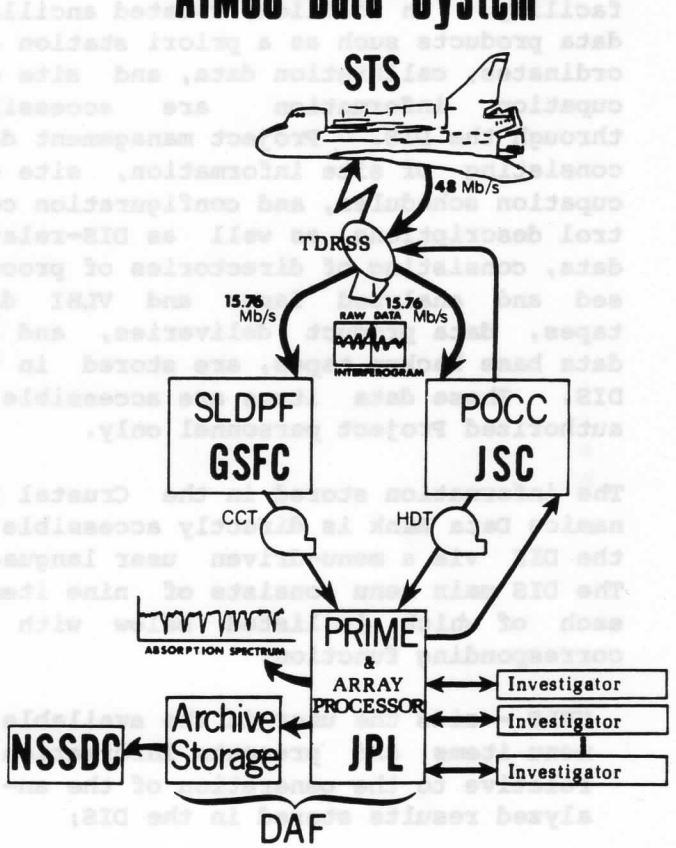
H. Linder/C. Noll

ATMOS Project Data System

The Atmospheric Trace Molecule Spectroscopy (ATMOS) program is a multiflight shuttle-borne investigation, which uses the technique of high-resolution infrared absorption spectroscopy with an advanced Fourier Transform Spectrometer (FTS) to measure the molecular composition and variability of the upper atmosphere. The first investigation was conducted on Spacelab 3 in April 1985. Follow-on measurements using the same instrument will be made on the annual Earth Observation Mission (EOM) shuttle flights over the next 10 years. The following describes the handling of the ATMOS data.

The ATMOS instrument measures, from a shuttle height of 350 km and at a rate of 15.76 Mb/s, the spectral absorption of the solar energy at sunrise and sunset limb encounters. Because each data-taking run at limb lasts 180 s, and there will be an average of 60 runs per 7-day mission, a total of 1.7×10^{11} bits of interferometric, engineering, and housekeeping data will be generated. These raw data are multiplexed into a data stream and telem-etered to both the Goddard Space Flight Center (GSFC) and the Johnson Space Center (JSC) via the Tracking and Data Relay Satellite System (TDRSS) and the Domestic Satellite (Domsat). At GSFC's Spacelab Data Processing Facility (SLDPF), the data are demultiplexed, quality monitored, and condensed into error-free, continuous, 1600-bpi computer compatible tapes (CCTs) within 60 days of each mission. They are then forwarded to the Jet Propulsion Laboratory (JPL) where a Science Team, headed by C. B. Farmer, performs final reduction and analysis in the Data Analysis Facility (DAF). The data stream that is transmitted to the Payload Operations and Control Center (POCC) at JSC is recorded onto high-density tapes (HDTs), which are later played back at approximately 1/40 the rate to generate 9-track, 10-in., 2400-ft CCTs. The tapes from JSC are shipped daily to JPL by air freight during each mission. The schematic overview of a typical ATMOS mission is shown.

At JPL, data reduction is performed by the PRIME 750 minicomputer with two array processors and very large (1.4-GB) hard disks and (2-MB) memory. Million point interferograms, each 17 to 18 bits deep, are Fourier transformed by the array processors into infrared (IR) spectra. Reduced spectra are then made available to the JSC Payload Operation Control Center (POCC) for quick look evaluation of data quality and instrument status in near real time (less than a day) through a dedicated high-speed (9600-baud) line.



More than 3,000 spectra have been obtained from the first flight of the investigation. According to F. G. O'Callaghan, the Program Manager, analysis of the data shows excellent results with a signal-to-noise ratio of 200 to 1, and all scientific expectations were exceeded. Besides the processed full-resolution spectra, there will be derived products from the experiment such as molecular line identifications, volume mixing ratios, and temperature profiles. In addition, an atmospheric atlas will be generated. It will contain several 4×10^5 point spectra, in-

cluding a non-absorption solar spectrum at the top of the atmosphere. The processed spectral data from the first mission and the subsequent ones will be kept at the JPL DAF for 1 year of exclusive use by the project team members. At the end of the year, part of the data, mainly the spectra, will be archived at NSSDC for public use. A detailed user's guide containing a catalog of the reduced products as well as alogrithms for data retrieval will be available in August 1986. In addition to off-line usage, data can also be accessed on-site at JPL or from remote locations through dial-up (1200-baud) lines using graphic terminals with a PRIME terminal emulation capability. The complete set of data, however, will not be available from NSSDC until the end of the 10-yr period. Because of the volume of the archival data, a high-density storage medium, such as optical disks, will be necessary to hold a complete 10-yr set of data. The ATMOS Science Team members and NSSDC personnel had a meeting in February 1985, and further discussions to insure effective data handling and archiving procedures are expected.

C. Ng

NSSDC's Automated Bibliographic File

Over the years, NSSDC staffers have built a MODCOMP-based information system consisting of about 12 hierarchical information files and associated software. The files' contents relate in various ways to spaceflight missions and their resulting data. The system has been used primarily for internal NSSDC operations, although various NSSDC documents such as data catalogs have been based on the file contents.

NSSDC is now entering an era of remote electronic data and information access. The functionality of the present system is being reviewed, and desirable new functions identified. A new information system will be emplaced in about 1 year, very likely using a commercial relational database product in the VAX/Data Base Machine environment.

This article, the first of a series describing those files of the present system likely to have outside interest, addresses the Technical Reference File (TRF). TRF is a bibliographic file in which published and other papers and reports are linked to specific instruments flying on specific spacecraft by means of unique NSSDC IDs.

The purpose of the TRF is threefold: to provide recipients of an NSSDC data set a list of papers that previously used that data set; to enable the generation of project bibliographies; and to account for reports, etc., used by the NSSDC staff in documenting spaceflight instruments and data in other files.

References are identified for inclusion in TRF by the routine perusal by the NSSDC scientific staff of selected scientific journals, interactions of the staff with the scientific community and perusal of reports from NASA's Scientific and Technical Information Facility (STIF) for selected subdisciplines. It should be emphasized that TRF has a much more limited scope than the STIF effort; but, given TRF's linking papers to specific instruments via the NSSDC ID, TRF is not a subset of STIF/RECON either. Some hard-to-obtain reports are held at NSSDC on microfiche for internal use. Approximately 36,000 documents are now identified in TRF.

Generally, NSSDC does not attempt to assure that all reports and papers relevant to any given instrument or spacecraft are identified in TRF. However, prior to NSSDC publication of a project bibliography, as has been done for OGO and IMP in the past and will shortly be done for Alouette/ISIS, special effort is expended to identify as many relevant papers as possible.

Some Project Scientists (ISEE, IMP) take steps to maintain completeness of their parts of TRF for periodic bibliographies. This service is available to other spaceflight projects providing relevant documents and references to NSSDC.

B. Anderson, J. King

NSSDC/SPAN ICE Testing Successful

During the week of July 15th, a test of the Space Physics Analysis Network (SPAN) support for the International Cometary Explorer (ICE) encounter was held at NSSDC. The local hardward and software environment expected to be in place during the Sept. 11th encounter with the comet Giacobini-Zinner was simulated. Teams from the Jet Propulsion Laboratory (JPL), the Los Alamos National Laboratory (LANL), and TRW participated. The test was highly successful for the LANL team, who retrieved their analyzed data and created color graphics within a few hours. The JPL team encountered some difficulties, but were able to achieve their goals by employing their back-up approach. Subsequent testing between NSSDC and JPL, using SPAN, was successful. TRW demonstrated the flexibility of networking by copying their data to an intermediate node at Marshall Space Flight Center to overcome their particular difficulties. All groups successfully produced their analyzed data in their desired graphics formats. A description of NSSDC/SPAN support for the ICE mission was given in Issue 2 of the *Newsletter*.

NSSDC is preparing a videotape of the NSSDC/SPAN support for the ICE encounter. The next issue of the *Newsletter* will detail the encounter week.

DESWT Hears NSSDC Plans

NSSDC Director and staff made two presentations to the members of the Dynamics Explorer Science Working Team (DESWT) who met at Goddard during the week of July 15th. The first described and discussed the NSSDC on-line Directory/Catalogs system and its application to DE as a test project. The second concerned the use of multiple optical disks to permanently record data from the DE 1/2 mission both for project use and NSSDC archiving. Both of these presentations reflect the current new technology thrust taking place at NSSDC. See *A Message from the Director: A New Space Science Data Systems Environment* on page 2.

First Telescience Conference Held

A Conference/Workshop on "Telescience for the Space Station Era" was held near Goddard on August 12-14. The purpose of the meeting was to explore the meaning and implication of Telescience as a guide for the design of future data systems and to develop a strategy for the continuing involvement of the user community. Telescience is loosely defined to be the interactive operation of instruments in space and the interactive analysis of multi-source data. Speakers from Goddard, NASA Headquarters, and other institutions presented data system concepts of present and future missions and introduced telescience concepts and issues. Panel meetings were held to define discipline views, and panel reports were given to the entire group by the chairmen. A document entitled, "Draft of a Summary Recommendation" was issued, which states that steps should be taken now to develop telescience for the Space Station Era. It recommends, in part, "that NASA initiate a program of telescience development including intense involvement of the scientific community and incorporating definition studies, pilot science projects, and development of necessary basic computer networking systems" and "that a cognizant office be identified in NASA to coordinate these telescience definition and development activities with ongoing space system design activities."

CODMAC Reviews NSSDC Projects

The Committee on Data Management and Computation (CODMAC) reviewed the Goddard Space Flight Center programs within Code 600 on Tuesday, July 2, 1985, during a 3-day meeting. The new Director of NSSDC, Dr. James L. Green, outlined the future directions of the Data Center. (See *A Message from the Director* on page 2.) The Data Center presentation provides to CODMAC and the scientific community immediate exposure and extensive discussion that affect the major policies and procedures within NSSDC. The next CODMAC meeting will be at Marshall Space Flight Center.

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First MPP Conference Held

The first conference of the Massively Parallel Processor (MPP) Working Group was held at Goddard on August 15-16. The MPP, which was developed for Goddard by the Goodyear Aerospace Corporation, is a large-scale parallel single-instruction stream, multiple data stream (SIMD) processor consisting of an array of 128 x 128 (16,384) processing elements (PEs), an array control unit, staging memory with up to 64 MB of storage and transfer rates up to 160 MB/s, and a host DEC VAX 11-780 computer. The MPP has the potential to process data many times faster than a conventional supercomputer.

Late last year, the Office of Space Science and Applications, NASA Headquarters, issued an Application Notice soliciting proposals for computational investigations utilizing the MPP. The MPP Working Group consists of the 35 Principal Investigators from the accepted proposals, representing research projects in four basic disciplines: Earth science applications, signal and image processing, computer science applications, and physics applications.

The conference consisted primarily of presentations and demonstrations conducted by the MPP staff at the Goddard Image and Information Analysis Center (GIIAC), which is a sister organization to NSSDC, also in the Space Data and Computing Division, and of discussions among the members of the Working Group.

NSSDC has a dual interest in the MPP. Firstly, the Space Physics and Analysis Network (SPAN) will be utilized to support access to the MPP throughout the United States, because the host computer is a VAX and many members of the working group are on or will shortly be on SPAN. NSSDC director, James Green, gave a presentation on SPAN. Secondly, NSSDC member, Lloyd Treinish, is a member of the MPP Working Group by virtue of his accepted computer science research proposal entitled, "Animated Computer Graphics Models of Space and Earth Sciences Data Generated via the Massively Parallel Processor."

Optical Disk System Installed

The anxiously-awaited delivery of the optical disk system to NSSDC by the University of Texas at Dallas has taken place. This initial system, with its PDP 11/23 interface, was installed and functioned well with only minor software changes required. With the basic functional requirements met, a second, more extensive round of testing has begun to determine its performance under conditions of heavy usage. Thusfar, testing with Dynamics Explorer (DE) and International Cometary Explorer (ICE) data has shown the system to be so reliable that it will act as a back-up storage device for ICE data during the NSSDC-supported encounter with the comet Giacobini-Zinner in September.

The optical disk system is one of the first components of the new NSSDC Computing Facility (NCF) and will be accessible to all members of the Space Physics Analysis Network (SPAN) via the node name OPTDSK. In keeping with its envisioned function as a mass on-line source of archival data, NSSDC has developed software that allows data transfer between any node on SPAN and the optical disk. Electronic data archival from across the country is an exciting application of this software. Almost immediate availability of recently-acquired archival data could be realized. A truly automated system for archival and catalog update of NSSDC holdings is clearly much closer to becoming a reality.

Additional information on the optical disk system and methods for accessing it may be obtained by contacting Brian Lopez-Swafford at (301) 344-6818 or on SPAN at NSSDC::SWAFFORD. The next issue of the *Newsletter* will feature an article on this system.

IN THE NEXT ISSUE:

The Satellite Situation Center
The NSSDC Optical Disk System
NSSDC Remote On-Line Services
The Dynamics Explorer Data System
The Giacobini-Zinner Comet Encounter
... and more

Calender of Upcoming Events

Sept. 11 International Cometary Explorer (ICE) encounter with Comet Giacobini-Zinner.

Sept. 23-24 Committee on Data Management and Computation (CODMAC) meeting at Marshall Space Flight Center.

Oct. 16-17 Second Pilot Climate Data System (PCDS) Workshop at GSFC. Contact Mary Reph, Code 634, at (301) 344-9040 for further information.

more NEWSBRIEFS

DSUWG Plans SPAN's Future

The Data Systems Users Working Group (DSUWG) met at NSSDC on July 18-19. DSUWG is the user advisory group for the Space Physics Analysis Network (SPAN). Major topics discussed at this meeting included how SPAN will take advantage of the high-speed Program Support Communication (PSC) highway within the next year, use of SPAN for the International Cometary Explorer (ICE) comet encounter, and future access to Class VI systems over SPAN, such as the Massively Parallel Processor (MPP) at Goddard.

CDAW 8 is Announced

NSSDC will soon be distributing invitations to participate in Coordinated Data Analysis Workshop 8 (CDAW 8), which will focus on ISEE 3 deep tail events occurring in time periods from October 1982 through June 1983. Data are anticipated from numerous satellite and ground-based projects including DE, IMP, and ISEE 1/2. A description of the CDAW process is given on page 1. For more information on CDAW 8, contact Ellen Stemmer at the address and telephone number given below or on SPAN at NSSDC::STEMMER.

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, costs, 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
Telephone: (301) 344-6695
Telex No.: 89675 NASCOM GBLT
TWX No. : 7108289716

Researchers who reside outside the United States should contact:

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

SUBMITTING DATA TO NSSDC

NSSDC invites members of the scientific community involved in spaceflight investigations 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 using the address of WDC-A-R&S given on left.

OBJECTIVES OF THE NSSDC NEWSLETTER

The primary objective of this *Newsletter* is to inform and expand our user community. Through regular columns and special features, the reader may become acquainted with the various data analysis systems at NSSDC, our computer facilities and services, popular and new data acquisitions, and major scientific satellite systems.

We will not only feature what is available at NSSDC, but will explore some systems and data that are available elsewhere that might be of interest to our readers.

Each issue will contain a calendar of upcoming events and a profile of some of the people who work at NSSDC. Information about requesting data from NSSDC and submitting data to NSSDC will be contained in every issue.

We welcome all comments and suggestion that you might have. Please forward them to the Editor:

Ellen Stemmer
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Code 633
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