National Space Science Data Center

NSSDCNEWS

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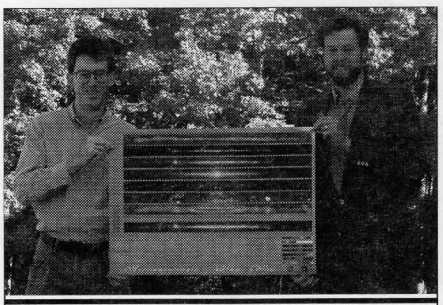
"Multiwavelength Milky Way" Poster Released

by David Leisawitz

The Astrophysics Data Facility has developed an educational poster called the "Multiwavelength Milky Way" that depicts the Galaxy at radio, infrared, optical, X-ray, and gamma-ray wavelengths. In particular, the poster contains images of the Galactic 21-cm and CO (J = 1 -> 0) line emission, and IRAS 12, 60, and 100 micron, COBE/DIRBE 1.25, 2.2, and 3.5 micron, Digital Sky Survey optical wavelength, ROSAT X-ray, and CGRO/EGRET gamma ray broadband emission. All of the data sets are publicly available, including those from the IRAS, COBE, ROSAT, and CGRO spacecraft.

Captions describe the Milky Way and what can be learned about the Galaxy from measurements made in each segment of the electromagnetic spectrum. The poster is intended to be an educational tool, one that will stimulate heightened awareness of NASA's contribution to modern astronomy among laypersons.



Seth Digel (left) and Jay Friedlander hold a copy of the Multiwavelength Milky Way poster.

The poster was unveiled at the International Astronomical Union's Symposium 179 on "New Horizons from Multiwavelength Sky Surveys," held at the Space Telescope Science Institute in Baltimore, Maryland, during August 26-30, 1996. Approximately 450 copies of the poster were distributed to those attending. Copies will also be distributed at future meetings of the National Science Teachers' Association, American Geophysical Union, and the American Astronomical Society.

Drs. Seth Digel and David Leisawitz worked with graphic artists Sarah Geitz and Jay Friedlander to design the poster. Professor Geitz of Purdue University worked on the project during her visit to NASA/Goddard as a NASA Summer Faculty Fellow. Requests for individual copies of the poster may be submitted to the NSSDC's Coordinated Request and User Support Office (see back page of this newsletter).

Summer Interns Deliver for NSSDC/SSDOO

by Nathan James

During this past summer NSSDC/SSDOO hosted 15 eager students from the following programs.

- Visiting Summer Enrichment Program
- LASER Program (of Lincoln University, Pennsylvania)
- Summer High School Apprenticeship Research Program (SHARP)
- Hughes/STX-Duval High School Summer Intern Program
- Bennett College Internship Program

Joseph Atkins of Vassar College, New York, with Frank Husson as mentor assisted the NASA Automated Systems Incident Response Capability (NASIRC) group on a WWW implementation of the Management Oversight Risk-Tree analysis tool that proactively looks for problems before they occur.

Fernando Upshaw of the University of Arizona overseen by Michael Van Steenberg supported the ingestion of scientific data to a near-line environment to facilitate easy electronic access by the research community.

John Higginbotham of Pennsylvania State University under the guidance of Cynthia Cheung supported the development of the Astrophysics Multispectral Archive Search Engine (AMASE), an object-oriented on-line metadata catalog. He designed and developed several data management software tools and enhanced the AMASE user interface by creating new HTML pages.

Steve Geller of Duke University, overseen by Barry Jacobs, developed electronic handbooks for use on the WWW for the NASA Grants Office and the NASA Small Business Innovative Research Program Office.

Justin Ho of Montgomery Blair High School, guided by Shing Fung, performed time series and statistical analyses of the Dst and AE geomagnetic indices. For this task Justin converted a C program into an IDL routine and wrote a new IDL code. Finally, Justin used NSSDC's OMNIWeb and selected a number of time intervals with various solar wind and geomagnetic conditions for further analysis.

Keita Grant of Lincoln University with Shing Fung and Ramona Kessel as mentors performed an end-to-end test of a process to convert space physics data from their native format to the NSSDC Common Data Format (CDF). His task involved creating and editing a skeleton table" for different variables in energetic particle data from the Japanese OHZORA spacecraft and running the "MakeCDF" software for the generation of a CDF file.

Tracee Walker of Lincoln University, guided by Ramona Kessel, used the orbit plots available through the GifWalk system to look for favorable conjunctions when one or more spacecraft were crossing the Earth's bow shock with one of the others upstream monitoring the solar wind. She then used the CDAWeb

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system to plot data to find interesting events that became the basis for further scientific analysis.

Yvonne Langdon of Laurel High School under the guidance of Nathan James used NSSDC's Personnel Information Management System (PIMS) interface to update personnel records in the Interactive Request Activity and Name Directory (IRAND) data base. She also used Web page maintenance tools to locate, identify, and correct many errors found on various server-resident Web pages.

Jewel Haskins of Paul Laurence Dunbar High School under the tutelage of Nathan James assisted in the redesign effort of the Space Science Education/Outreach home page. She learned HTML and how to use the Photoshop graphics design package for the Macintosh. With this tool she designed new buttons, logos, and backgrounds for the new education pages.

Yvette Langdon of Laurel High School with Robert Candey as mentor researched the Web; created a library of useful Web tools, references, and objects; and developed Web pages for the SHARP program and summer interns in NSSDC/SSDOO.

Genievee Cuizon of Duval High School, guided by Dieter Bilitza, subsetted, filtered, and plotted Atmospheric Explorer (AE) ionospheric parameters from NSSDC's AE CD-ROM. She first selected a subset of data by parameter, time span, and altitude range. She then created IDL software to display graphically the subsetted data.

Ron Fitzpatrick of Duval High School, overseen by Emily Greene, worked on programs to compare the data holdings in the ISTP/CDHF project with those held in NSSDC/SSDOO's near-line NASA Data Archive and Distribution Service (NDADS) and on-line CDAWeb environments. This work resulted in a list of missing files that were subsequently transmitted from the CDHF to NDADS.

Jane Yang of Duval High school with Emily Greene as mentor worked on maintenance and development of space physics data management planning Web pages. Jane will continue working at NSSDC/SSDOO part-time throughout her senior year.

Angela Prince of Bennett College - Greensboro, North Carolina, guided by Elise Blaese, worked on the evaluation of the Life Science Data Archive (LSDA) WWW pages from a college student's perspective. She developed tasks to evaluate usability and had students perform these tasks and provide feedback.

Ann Beck, a graduate student at Purdue University, worked with the David Leisawitz and others in the creation of "The Virtual Universe" to be made available over the Web. Ann is writing the explanatory text by which students and other laypersons will comprehend what they experience.

Still Waiting!

by Joseph King

As reported in recent issues of this newsletter, NASA's Office of Space Science (OSS) is pondering possible realignments in its science data management and archiving activity. Such realignments could have significant impact on NSSDC.

As of the end of September 1996, no OSS guidelines had come to NSSDC about its future. NSSDC will report in the electronic version of this newsletter any new guidelines when it receives them.

Electric Space Exhibit Opens to Public

by James R. Thieman

The "Electric Space: Bolts, Jolts, and Volts from the Sun" opened on August 1, 1996, in Silver Spring, Maryland. The exhibit is an educational project intended to communicate the achievements of space physics to the general public. Interactive displays, video movies, computer information stations, and full-sized spacecraft models help the browser learn about the Sun's effects on the Earth, space weather, plasma astrophysics, magnetic field interactions, and the aurora. NSSDC personnel supported the exhibit. The exhibit closed on September 2, 1996, and moved on to its next host in Hampton, Virginia. The exhibit will be on tour for three years.

New COHOWeb Daily Resolution Offered

by Joseph King

For the past two years NSSDC's COHOWeb has offered World Wide Web-based access to uniformized hourly solar wind data from many near-Earth and deep-space spacecraft. To better support scientists studying low-resolution, very long-term variations in the near and far solar wind as well as others for whom daily resolution data are useful, an option for plotting, listing, and downloading daily resolution parameters has just been added to COHOWeb.

New Listing of ISTP-Relevant Spacecraft WWW-Accessible

by Joseph King

A new World Wide Web page has recently been created by NSSDC identifying and briefly characterizing 26 spacecraft or spacecraft series relevant to the International Solar-Terrestrial Physics program. This page is an outgrowth of a paper presented by the author at the 31st COSPAR Assembly in July 1996. NSSDC will endeavor to add more relevant spacecraft as they become known to NSSDC and will generally endeavor to maintain a currency of the page's information content. The page is at http://nssdc.gsfc.nasa.gov/space/helios/cospar.html.

Solar Data at NSSDC

by David Batchelor

[Ed. Note—David Batchelor has been NSSDC's solar data acquisition scientist for almost ten years. David is moving on to other challenges at Goddard. NSSDC appreciates his significant contributions. His article below reflects the major benefit to NSSDC and its customers of his years here.—*Joseph King*]

NSSDC has acquired and distributed a rapidly increasing volume and variety of solar data in the past decade. This article presents a brief summary of what is available.

Solar Activity Data Sets: The millions of hard and soft X-ray images and spectra collected by the on-going YOHKOH mission are regularly archived at NSSDC as they become public. The state of the Sun's X-ray corona and flares are observable with unprecedented precision in the YOHKOH data, and Interactive

Data Language (IDL) data analysis software from the principal investigator teams is included. The Hard X-Ray Telescope obtains 7-arcsec resolution images in the 20 - 80 keV band; the Soft X-Ray Telescope obtains 4-arcsec images in the 0.1 - 4 keV band. The Wide-Band Spectrometer collects spectra in the 3 keV - 20 MeV band and is also sensitive to neutrons. The Bragg Crystal Spectrometer records flux in the Fe XXV, Fe XXVI, Ca XIX, and S XV lines. The data are distributed on 8-mm tapes corresponding to one week of data per tape, with about 1 GB of data on each tape. NSSDC shares responsibility for distributing the YOHKOH data with the Solar Data Analysis Center (SDAC) at Goddard Space Flight Center (see http://umbra.nascom.nasa.gov/); the SDAC provides tape replications in small numbers and analysis guidance, and NSSDC provides replications of large numbers of tapes. NSSDC can also provide YOHKOH data files via the near-line NASA Data Archive and Distribution Service (NDADS).

The SDAC and NSSDC also share responsibility to distribute Solar Maximum Mission (SMM) archive data. (See http://umbra.nascom.nasa.gov/smm/.) SMM was in orbit 1980-1989 for the study of solar activity. NSSDC holds the Coronagraph/Polarimeter image data set in photographic form and on tapes.

The C/P images were made with several broad-band filters in visible light and reach as low as 1.5 solar radii and as high as 5 solar radii, with 250 images taken per day on some days. The Ultraviolet Spectrometer/Polarimeter recorded spectra and raster images in the 1170 - 3600 A band. The Soft X-Ray Polychromator did the same in the 1.4 - 22.5 A band. The Hard X-Ray Imaging Spectrometer recorded images with 8-arcsec resolution in the 3.5 - 30 KeV band. The Hard X-Ray Burst Spectrometer obtained full-Sun spectra in the 30 - 500 keV range, with sub-second time resolution. The Gamma-Ray Spectrometer performed similarly in the 10 keV - 140 MeV range. All of these data are of continuing value to solar activity investigations.

Solar Gamma-Ray Burst Resources: Several gamma-ray spectrometers have monitored high-energy solar flares besides the ones on SMM. Solar gamma-ray bursts were monitored with the International Sun-Earth Explorer (ISEE) 3 spacecraft contemporaneously with SMM from 1978 to 1987. NSSDC holds the data and analysis software for the gamma-ray spectrometer on ISEE 3.

The Pioneer Venus Orbiter spacecraft also contained a gamma-ray spectrometer, and NSSDC holds those data from the 1978-1983 era. NSSDC also holds Compton Gamma-Ray Observatory data from the Burst and Transient Source Experiment (BATSE), which has collected gamma-ray spectra of solar bursts (.05 - 30 GeV) since launch in 1990. (See also http://umbra.nascom.nasa.gov/batse/batse_years.html.) Ulysses hard X-ray burst data are also available since 1990 in the 25-150 keV range.

Older Solar Activity Data of Interest: The Skylab missions in 1973-1974 collected thousands of images and spectra. The S-054 images in various bands of the 3 - 20 A range are available on NDADS for near-line access and network file delivery. The Skylab white-light coronagraph images are especially useful for correlative investigations with the other Skylab images. NSSDC also holds spectra from the other Skylab instruments, in the EUV band.

The Orbiting Solar Observatory (OSO) missions recorded solar X-ray and UV images and spectra from 1962-1978. From OSO 7 the EUV spectroheliograph recorded raster images with 5 arcmin resolution in the 17 - 40 nm band, and the Hard X-Ray Spectrometer provided simultaneous spectroheliograms in the .5 - .8 nm and .8 - .95 nm bandpasses. The OSOs also recorded coronagrams and other measurements.

In the 1960-1973 era a series of Solar Radiation (SOLRAD) spacecraft recorded UV and X-ray fluxes, providing an especially long time span of well-calibrated full-Sun data.

Solar Irradiance and Spectroscopy: The Spacelab-1 mission measured the solar UV spectrum in the 200-358 nm band, which is available from NSSDC. There are also irradiance data sets from the Solar Mesospheric Explorer UV spectrometer and from the Nimbus 7 Earth Radiation Budget instrument.

Solar Radio Observations: ISEE 3 also recorded solar radio bursts in the 41 KHz - 1980 KHz band, 1978-1987. The HELIOS spacecraft recorded solar radio flux in the 50 KHz 2 MHz band, and NSSDC holds data for 1974-1977. The Interplanetary Monitoring Platform (IMP) 6 also recorded solar flux in the 50 kHz - 3.5 MHz range. Voyager 1 and 2 carried Planetary Radio Astronomy receivers, which also recorded solar bursts and are in NSSDC holdings. The Request Coordination Office can provide contacts to answer questions about these archive data.

FTP Access to OMNI Data Provided

by Natalia Papitashvili and Joseph King

Over the years the OMNI compilation of multisource, hourly solar wind field, plasma, and energetic particle data has been accessible via a diversity of pathways ranging from paper data books to a World Wide Web (WWW) interface called OMNIWeb (http://nssdc.gsfc.nasa.gov/omniweb/). NSSDC has just added a new pathway to OMNI data—Anonymous FTP.

The ANON.COHO directory on nssdc.gsfc.nasa.gov has long supported FTP access to principal-investigator-provided data files from numerous deep space spacecraft. NSSDC has added a subdirectory, COHO.OMNI, to provide FTP access to annual files of OMNI data in ASCII format. This subdirectory contains a documentation file, OMNI.DOC, that gives detailed format statements, coordinate system information, and the like. OMNI.DOC discusses the two versions of the annual OMNI files, which require about 0.7 and 2.2 megabytes, respectively.

MDSS Stages Mission-Specific Data

by William Lawson

NASA launched the X-Ray Timing Explorer (XTE) spacecraft on December 30, 1995. Since then exciting data have been flowing, giving astrophysicists new insights into a wide range of astrophysical phenomena, especially ones involving rapid time variations.

The Astrophysics Data Facility (ADF) of the Space Science Data Operations Office is playing a key role in collaboration with Goddard's Laboratory for High Energy Astrophysics (LHEA) in managing XTE data.

The Mission Data Staging System (MDSS) provides a staging area for mission data in support of the XTE mission. The primary role of the MDSS is to stage data for mission participants in mission-specific formats. Additionally, the MDSS supports public access to non-proprietary data until they are available in other public archives (e.g., NSSDC).

Non-proprietary XTE data are available to the public via the MDSS by two methods:

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anonymous FTP (necsys.gsfc.nasa.gov) and the HEASARC data browse capability (W3Browse) accessed via the HEASARC home page (http://heasarc.gsfc.nasa.gov). Additional MDSS documentation is available via the Web at http://adfsvr.gsfc.nasa.gov/mdss/docs/MDSSdocs.htm.

NOST News

by John Garrett and Donald Sawyer

The NASA/Science Office of Standards and Technology (NOST) continues to support the development of an International Organization for Standardization (ISO) Archiving Reference Model. The Fourth U.S. ISO Archive Standards Workshop focused on refinement of the draft Archiving Reference Model, Version 5. The Fifth U.S. Workshop focused on preparing U.S. input for the Third International Workshop on November 4-5, 1996. NOST also remains active in promoting improved standards and codifying existing practices and is working on three document reviews related to CCSDS/EAST, CCSDS/SFDU Referencing, NOST/FITS.

Survey Initiated

by Joseph King

NSSDC has just created a World Wide Web (WWW) page linked from its home page that surveys the NSSDC user community concerning the quality of the products and services available from NSSDC. The survey also solicits suggestions for improvements or additions to the present suite of products and services. The survey is at http://nssdc.gsfc.nasa.gov/nssdc/survey.html. This WWW-based survey will be accompanied by other user-satisfaction outreach thrusts to reach the non-WWW segment of the user community.

CDF News

by Greg Goucher

Version 2.6 of the Common Data Format (CDF) software has been released for beta testing on April 5, 1996. CDF 2.6 adds two new features to the suite of options: data compression and sparse records. Although a crude form of data compression, sparse records will enable a user to minimize space in a CDF data file by omitting the empty/blank records without modifying the binary structure of the data. The data compressions techniques/algorithms supported in CDF Version 2.6 will all be of the lossless type, therefore maintaining complete integrity of the data. At the time of the initial beta release, there were three compression techniques available via the CDF library: Run Length of Zero's, Huffman, and Adaptive Huffman. A second beta release was released on June 17, 1996, and supports two additional compression techniques: RICE and GNU Zip. The RICE algorithm was provided to CDF by Pen-Shu Yeh of Goddard Space Flight Center, Code 738.

AE-8 and AP-8 WWW-Accessible

by Natalia Papitashvili and Dieter Bilitza

NSSDC has brought the AE-8 and AP-8 models of magnetospherically trapped electrons (0.1-7 MeV) and protons (0.1-400 MeV) to World Wide Web accessibility and executability. These models, developed at NSSDC some years ago, are still the world's standard models for spacecraft engineering purposes. This migration of the AE-8 and AP-8 trapped radiation models completes the move of NSSDC's major network-accessible geophysical models from NSSDC On-Line Data and Information System (NODIS) to the Web. These atmospheric, ionospheric, geomagnetic/magnetospheric magnetic field, and magnetospherically trapped particle models can be reached from URL http://nssdc.gsfc.nasa.gov/space/model/models_home.html.

New Astrophysics Data and Interfaces

by David Leisawitz

The NASA Data Archive Distribution System (NDADS) archive contains about 1.5 TB of astrophysics, space physics, and solar physics data. Astrophysics data added in the past year are from the ASCA, IRAS, IUE, ROSAT, and UIT missions. Several new Web interfaces are available, both generic and customized, to access these data. Three customized interfaces developed at the Astrophysics Data Facility are the Web Interfaces for Searching Archival Research Data (WISARD) at http://hypatia.gsfc.nasa.gov/wisard/wisard.html; an IRAS Archive Interface at http://www.gsfc.nasa.gov/astro/iras/iras_home.html; and the Astrophysics Multi-spectral Archive Search Engine (AMASE) at http://amase.gsfc.nasa.gov/.

NSSDCNEWS

NSSDC News is published quarterly by NASA's National Space Science Data Center. Please send your address changes and requests to the appropriate address listed in the box below. Your comments are welcome.

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