

XML AT ADC: STEPS TO A NEXT-GENERATION DATA ARCHIVE

By Edward Shaya

The eXtensible Markup Language (XML) is a document markup language for the creation of hierarchical information structures. It allows the document type creator to specify requirements on the document's content and to provide choices for attributes of the contents. It supports automatic checking of documents for structural validity. XML is supported by nearly every major corporate software developer worldwide. A rich array of tools is now available to help process and display XML documents. In addition, a whole new class of scripting languages is being written in XML to make programming much easier. These languages include languages for building GUIs, creating Web forms, interfacing with data bases, examining decision trees, describing Web sites, etc. XML was featured in the May 1999 issue of *Scientific American*.

The SSDOO's Astronomical Data Center (ADC, <http://adc.gsfc.nasa.gov>) is developing an XML tool box for importation, enhancement, and distribution of data and metadata documents written in XML. Work has begun on a Document Type Definition (DTD, at <http://glissando.gsfc.nasa.gov/xml/acatalog.dtd>) that specifies the elements of content and their

attributes in ADC metadata documents. This project attempts to define both the metadata of an astronomical catalog and the XML format for an astronomical table.

The ADC is actively creating designs for the flow of data through automated pipelines from authors and journal presses into the XML archive as well as data retrieval through the Web via the XML Query Language. The documentation for each data set will be viewable in several different styles via eXtensible Style Language (XSL) scripts.

The legacy data in plain ASCII format is being converted to XML by describing the details of the format with a new scripting language, developed at the ADC, to XML. A processor then parses the to XML commands and performs the generalized transformation.

When completed, the catalogs and journal tables at the ADC repository will be tightly hyperlinked to enhance data discovery. In addition, one will be able to search on any combination of metadata elements to return the appropriate catalog name or table name or data value, depending on the specifics of the query.

PROJECT RADIO JOVE HAS TEENAGERS LISTENING

By James Thieman

A new education and outreach project has recently been started by staff within the Space Science Data Operations Office, although many others outside NASA are involved. Radio JOVE is an interactive activity that brings the radio sounds of Jupiter and the Sun to students, teachers, and the general public. What better way to get teenagers involved in science than to have them listen to a radio? Not only do they listen, but they also help to build the equipment and use it to collaborate in research on the solar system. Building the equipment is accomplished through the construction of a simple radio telescope kit and/or the use of a real-time radio observatory on the Internet. The data collected can be used for collaborative research with other schools and the science community as a part of the International Jupiter Watch.

The radio telescope kit contains the parts and information needed for building a receiver and a radio telescope designed to observe Jupiter or

the Sun at a frequency of 20.1 MHz. The kits are available at a cost of one hundred dollars, the cost of the parts in them, but the first 100 kits will be sold at a discounted price of fifty dollars to schools to get a reasonably-sized starter group of participants and to assure purchase of parts at bulk quantity prices. The associated Web site (<http://radiojove.gsfc.nasa.gov>) contains background science information, education resources, observing guides, instruction manuals, and general information about the project.

The project is funded through grants from the GSFC Director's Discretionary Fund and the Initiative to Develop Education through Astronomy and Space Science (IDEAS) administered by the Space Telescope Science Institute. Further information can be obtained by contacting the author at thieman@nssdc.gsfc.nasa.gov.



Radio Jove team (left to right): William Taylor, RITSS; Chuck Higgins, NSF; James Thieman, NASA; Albert Davison, SIP.



Note: FULL version of this article is available at http://nssdc.gsfc.nasa.gov/nssdc_news/

See Commonly Used Acronym list on page 4.

SSDOO SUPPORTS A CDAW ON SOLAR ERUPTIVE EVENTS

By James Green

Over 55 scientists specializing in studies of solar eruptions and the solar wind gathered at Goddard Space Flight Center (GSFC) for a data intensive workshop whose topic was Global Picture of Solar Eruptive Events. The primary goal of the April 27-30, 1999, workshop was to obtain a broader, more comprehensive understanding of solar eruptions and how they affect Earth and the space around it. The workshop was convened by Drs. Nat Gopalswamy and James Green. This CDAW has an "open" data policy.

With the launch of several solar-observing spacecraft in the 1990s such as Yohkoh, Wind, the Advanced Composition Explorer (ACE), and the Solar and Heliospheric Observatory (SOHO), a large number of solar eruptions have been observed in unprecedented detail. In most cases, however, these events have been analyzed as individual, isolated occurrences. "The questions that the workshop addresses - and the ones that need to be answered in order to better understand space weather - all involve the interaction of solar eruptions with the steadier stream of the solar wind," said one of the scientists attending the workshop. "With the data we have collected for this workshop and with the distinguished group of scientists attending the meeting, we should begin to formulate some of the answers."

The workshop has begun a process by which a more systematic and comprehensive study of more than 28 solar eruptive events is taking place. The 28 events were chosen from a list of Type II solar radio bursts in the spectral range from 1 to 14 MHz by the Wind/WAVE instrument. The times of the 28 events are found at the following URL: <http://orpheus.nascom.nasa.gov/istp>. The primary data used for this workshop were archived at the National Space Science Data Center, the Solar Data Analysis Center, and the CDAWeb system. Workshop participants submitted relevant and highly processed data for all of the events several months prior to the beginning of the workshop. Over 40 distinct data sets were used that encompass solar image data, in situ observations, and ground-based observations. Data from the CDAW periods were freely exchanged and accessible to all CDAW participants. Unrestricted public

access to the data base became available at the conclusion of the workshop through the above Web address.

The workshop was organized with only a few plenary sessions and five working groups. These working groups, headed by a science coordinator, concentrated on investigating specific science questions in five science themes. The themes were as follows:

- Near-Surface Manifestations, led by Nat Gopalswamy.
- Coronal Dimming and Arcade Formation, led by Barbara Thompson.
- Magnetic Field Changes, led by Craig DeForest.
- Sources of Energetic Particles, led by Steve Kahler.

NSSDC INTERACTIONS WITH SDAC CONTINUE

By Joseph King

Some years ago, Goddard's Dr. Joseph Gurman built and managed a facility for science and data operations for the 1980-launched Solar Maximum Mission spacecraft. Over the years the facility has evolved into the multimission Solar Data Analysis Center (SDAC) and is widely valued throughout the NASA and international solar physics community as that community's primary solar data management and distribution center. Much of the current focus of the SDAC is on data from the 1995-launched ESA/NASA Solar and Heliospheric Observatory (SOHO) mission and on data from the 1998-launched Transition Region And Coronal Explorer NASA TRACE mission. The home page of the SDAC is at <http://umbra.nascom.nasa.gov/sdac.html>. As SDAC continues to strengthen and NSSDC lost its solar physics "acquisition scientist" (David Batchelor) some years ago, the SDAC and NSSDC have increasingly assumed the roles of "active archive" and "permanent archive" for solar data. NSSDC's solar pages point to the SDAC for data and for expertise about data. An example of the SDAC-NSSDC interaction follows.

Over the past few years, NASA has funded restorations of various space science data sets with the expectation that restored data would be archived at NSSDC if not elsewhere. Among the solar physics data sets falling into this category were solar X-ray and UV data from the Solrad 11

- CMEs and Magnetic Clouds, led by Len Burlaga.

The workshop was sponsored by the Inter-Agency Consultative Group (IACG) and the International Solar-Terrestrial Physics (ISTP) program, two multinational efforts to share data and resources from more than two dozen spacecraft and observatories to develop a more comprehensive picture of the Sun-Earth system. It is expected that the science results will be published in an upcoming issue of *Geophysics Research Letters*. Currently, eight science papers are being written. A followup workshop is planned for sometime in February 2000 at GSFC. For more information on the workshop, please visit the above Web site.

spacecraft launched in 1976. Robert Kreplin and A. J. Martin of the Naval Research Lab worked on this data restoration project and contacted NSSDC for guidelines on various technical matters. NSSDC in turn contacted SDAC to share in this interaction. SDAC's Douglas Biesecker has become the acquisition scientist for NSSDC and for SDAC for this activity.

The Solrad data are formatted telemetry-level data. They will be provided to the SDAC and to NSSDC on CD-WO disks, accompanied by detailed mission, experiment, and data documentation, PC compatible Fortran code for extracting X-ray and UV data from the CDs and IDL code for data display. SDAC will provide support to users of these data, and NSSDC will ensure the long-term availability of these data.

NOST NEWS

By Donald Sawyer and Joseph King

Formats Evolution Process Underway

The Formats Evolution Process (FEP), outlined in the previous newsletter and hosted by NOST, is now well underway and is ready for outside involvement. The process is being guided by a Formats Evolution Process Committee (FEPC). The FEPC is a group of concerned individuals who represent format developers, researchers, project data managers, archive managers, and commercial tool vendors.

A central feature of this process is the establishment of a dialogue with the science community to determine what has been working and what is needed to improve the

Continued on page 3, col. 3

NEW NSSDC SPACE PHYSICS PAGE DEVELOPED

By Natalia Papitashvili

NSSDC has recently created a new main space physics Web page with a three-panel structure. This structure was chosen in recognition of the three quite different ways people may want to start their interactions with NSSDC's space physics data and services. Each panel corresponds to one of these three ways, namely, looking for data from or information about a specific spacecraft (Panel A), entering one of NSSDC's several multispacecraft data or information systems (Panel B), or searching for NSSDC's other services like geophysical models and spacecraft trajectory information.

If one starts a session by selecting a spacecraft, in Panel A, then the data systems shown

in Panel B become limited to those providing access to the data from the chosen spacecraft and Panel C becomes a spacecraft-specific panel providing information and further choices relevant to the chosen spacecraft. On the other hand, if the session is started by choosing a data access system (e.g., OMNIWeb, CDAWeb), then Panel C shows the top page for that system while Panel A continues to show the spacecraft name list. Finally, an initial choice from Panel C brings up in Panel C the chosen service while leaving Panels A and B unchanged.

Multipanel Web pages are more often designed because they seem an advanced approach rather than because the content and intent of the overall page demands the design. In this case, however, the triple nature of the independent pathways through which users approach the array of NSSDC's space

physics data and services means this multipanel approach greatly benefits the users. The new page can be found at <http://nssdc.gsfc.nasa.gov/space/>, which is the same URL as the predecessor space physics page. Initial reaction to the page has been enthusiastic. NSSDC hopes readers will try the page and provide some feedback.

NOST NEWS

(continued from page 2)

community's ability to use information more cost-effectively. NOST expects consensus positions to emerge from this process that will impact the proliferation of formats in some communities and the evolution of formats for all communities. Readers have an opportunity to join this process and express their views. Working together can ensure that the formats most useful will survive and evolve.

Readers can participate in this process over the WWW at <http://ssdoo.gsfc.nasa.gov/nost/fep/>. The dialogue is organized into discussion forums focused on various types of users, format developers, and tool developers. An easy-to-use WWW form interface allows users to express their opinions concerning the various formats they have used and the functionalities they wish formats and their supporting software had. Completed forms are posted on the WWW for others to read and comment on. Comments will also be organized and posted so others can follow the discussions. There is also a forum on the potential impacts of new standards and technologies on the formats. Participants are encouraged to submit white papers on relevant topics or provide pointers to such white papers.

NOST expects the Web site to evolve into a NASA-wide resource for information on formats and support services. Once sufficient material has been submitted, NOST plans to convene a meeting of interested contributors to draft consensus documents guiding future data format evolution. Anyone who uses, stores, provides, or manipulates data should begin participating in this dialog now.

INTRODUCING THE SSDOO VISUALIZATION LAB

By Ramona Kessel

Two of the stated goals of NASA's Office of Space Science with regard to education and public outreach are to "use our missions and research programs and the talents of the space science community to contribute measurably to the general elevation of scientific and technical understanding throughout the country" and to "share the excitement of discoveries and knowledge generated by Space Science missions and research programs by communicating clearly with the public." Perhaps the best if not only way to convey the qualities and dynamics of complex space science phenomena to the non-scientist is to translate scientific observations into pictures and animations.

Within Goddard's Space Science Directorate the Space Science Data Operations Office (SSDOO) is evolving a dedicated center of visualization expertise and capabilities to develop and produce 2D and 3D animations and to produce videos and quicktime movies. This group works closely with members of the Space Science Directorate and with key

members of the space science community, NASA Headquarters, and GSFC Public Affairs Office to produce finished products for the media, the education community, and the general public.

In addition to these new activities, the SSDOO Visualization Lab has proven expertise and currently supports other activities including the following:

- Original illustrations.
- Poster preparation.
- Proposal and journal figures.
- Science nuggets.
- Photography and maintenance of a photo archive.
- CD-ROM preparation.
- Award certificates and plaques.
- Scanning.

There is a new, high-quality poster printer in this lab that is being used to make posters for scientific meetings, GSFC events such as Take Our Daughters to Work Day, project or program advertisement, etc. (There is a small cost-recovery charge for the Visualization Lab services.) Send queries on the SSDOO Visualization Lab to svl@nssdc.gsfc.nasa.gov or visit NASA GSFC Building 26, Room 113.

at a workplace of his or her choosing to gain some insights and experience in an actual work environment. Kai Ole Myrdahl (eleventh grade) spent his week at Goddard/NSSDC under the mentorship of Dr. Dieter Bilitza. He learned about the activities involved in archiving space physics data and models and making them available on line on the Internet; he also learned how these data are then used by the space scientists for improving the forecast of space weather.

Of specific interest for Kai was the JOVE

project (see article on page 1), an educational project that lets schools participate in the scientific monitoring of radio signals from Jupiter and from the Sun. Kai received a comprehensive introduction to the JOVE project and the activities involved, and he helped the JOVE scientists with setting up and testing the experimental JOVE antenna. Carrying his experience and excitement back to school, he convinced his teachers and co-students to make the German School of Washington one of the schools to participate in the JOVE project.

GERMAN STUDENT SHADOWS NSSDC SCIENTIST

By Dieter Bilitza

During their latter high school years young people are faced with important decisions concerning their future occupations and the career tracks they should pursue. The German School of Washington in Potomac, Maryland, has instituted a week-long "Shadowing Program" to help its students with this difficult decision process. During one week each student works with a mentor

NSSDC PARTICIPATES IN GODDARD'S CUSTOMER FOCUS DAY

By Joseph King and Carolyn Ng

Goddard Space Flight Center hosted an NSSDC-involved Customer Awareness Day on May 25, 1999. The highlight was an engaging talk by Steven Phillips of Harley Davidson on how the strong customer focus of that company has benefited it. The day was also Take Your Motorcycle to Work Day, with the visitor parking spaces in front of the Goddard Director's building reserved for and filled with motorcycles.

NSSDC was one of six Goddard organizations invited to participate by displaying evidence of their customer focus in the auditorium where Steven Phillips spoke. Attendees were able to learn about NSSDC's customer focus through discussions with key NSSDC staffers, through NSSDC brochures, and through NSSDC Web pages.

A new set of posters was prepared for this event (1) identifying NSSDC's customer community as spanning the range from professional space scientists through students and educators to the general public, (2) providing an overview of NSSDC's data and services, and (3) highlighting customer feedback pathways ranging from the user survey on NSSDC's top Web page through the followup postcards sent to recipients of off-line data to NSSDC participation at scientific meetings and interactions with current and potential scientist-customers.

As an example of the last of these, a meeting was convened by Robert McGuire at the June 1999 American Geophysical Union meeting in Boston, Massachusetts, to solicit user feedback on optimal evolution for "value-added" space physics systems such as CDAWeb and SSCWeb.

NSSDC'S FAQ PAGES BENEFIT CUSTOMERS AND NSSDC

By David Williams

Through its various Web pages NSSDC receives numerous questions and suggestions from educators and the general public. Often the questions or suggestions lead to the addition of information to the already existing pages (such as new questions and answers on the Frequently Asked Questions or FAQ pages) or the creation of new pages covering a particular topic (such as the pages on the "Blue Moon" and the planetary alignment of May 5, 2000).

These new answers and pages not only help serve educators and the general public by providing details on frequently requested information but also save the NSSDC staff time by giving them a simple URL to send out in response to questions as opposed to answering similar questions multiple times. In fact, once the information is up on the Web, the number of questions about the given topic drops noticeably, implying that people are finding this information rather than having to ask NSSDC.

URLs for NSSDC's Blue Moon, Planetary Alignment, and FAQ pages are as follows:

http://nssdc.gsfc.nasa.gov/planetary/lunar/blue_moon.html
<http://nssdc.gsfc.nasa.gov/planetary/alignment.html>
http://nssdc.gsfc.nasa.gov/nssdc/nssdc_faq.html

CDF VERSION 2.7 DEBUT IMMINENT

By David Han

As reported previously, the NSSDC Common Data Format (CDF) Office is converting command-line-based CDF tools to Graphical User Interface (GUI) tools in JAVA and is developing platform-independent JAVA Application Programming Interfaces (APIs) to coexist with present C and Fortran APIs. All tools have now been converted to JAVA/GUI with the exception of CDFedit.

The basic JAVA APIs needed to get data into and out of CDF have been developed and tested, although some "robustness testing" remains. The CDF Office is in the process of adding extra options available for CDF files and variables and expects to wrap up development and documentation by August 1999.

At that point a new CDF release, Version 2.7, will be issued containing the pre-existing functionalities plus these JAVA-based tools and APIs. Readers interested in obtaining JAVA tools or APIs in advance of the official release are invited to contact the CDF Office (davidh@xfiles.gsfc.nasa.gov).

Development of the JAVA/GUI version of the sophisticated and interactive CDFedit tool will exploit the new JAVA APIs to be part of CDF 2.7. This CDFedit conversion work is expected to be completed in November 1999. On the agenda after CDFedit is development of functionality for sparse arrays.



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.

Joe King, Head Miranda Beall, Editor Lori Ann Persichitti, Graphics, WWW

NSSDC Information

JOSEPH H. KING, HEAD
 NSSDC, CODE 633
 NASA GODDARD SPACE FLIGHT CENTER
 GREENBELT, MD 20771, U.S.A.

To request data or information from NSSDC, contact
 NSSDC (for U.S. requesters) or WDC-A-R&S (for non-U.S. requesters)

both at
 Coordinated Request and User Support Office (CRUSO)
 NSSDC, Code 633
 NASA Goddard Space Flight Center
 Greenbelt, Maryland 20771, U.S.A.

Telephone: 301.286.6695 **Internet:** request@nssdca.gsfc.nasa.gov
FAX: 301.286.1635 **NSI/DECnet:** NSSDC::REQUEST

To access NSSDC's WWW home page, enter this URL:
<http://nssdc.gsfc.nasa.gov/>

To access NSSDC's education home page, enter this URL:
http://www.gsfc.nasa.gov/education/education_home.html

Commonly Used Acronyms

CDAW Coordinated Data Analysis Workshops
CD-WO Compact Disc-Write Only
ESA European Space Agency
GSFC Goddard Space Flight Center
IDL Interactive Data Language
NASA National Aeronautics and Space Administration
NOST NASA Office of Standards and Technology

NSSDC NEWS: You'll find the complete articles on WWW at URL http://nssdc.gsfc.nasa.gov/nssdc_news/