

RECENT AND PLANNED PLANETARY DATA SYSTEM GEOSCIENCES NODE ACTIVITIES. Susan Slavney, Raymond E. Arvidson, Keith Bennett, Edward A. Guinness, and Thomas C. Stein, McDonnell Center for the Space Sciences, Washington University, 1 Brookings Drive, Campus Box 1169, St. Louis, Missouri, 63130, Susan.Slavney@wustl.edu.

Introduction: The Geosciences Node of NASA's Planetary Data System archives and distributes science data relevant to the study of planetary surfaces and interiors. The node works with missions to help them generate quality archives and with end users to help them obtain and use the archives. The node is planning new services that will benefit both the producers and the users of planetary geoscience data.

PDS Background: The basic premise of the Planetary Data System (PDS) is that science data are best maintained by scientists who are interested in using the data. Hence PDS is an organization of several discipline-specific nodes, each located at the home institution of a research group of experts in the discipline. The Geosciences Node is located in the Earth and Planetary Remote Sensing Laboratory, part of the McDonnell Center for the Space Sciences at Washington University in St. Louis, Missouri. The Laboratory's primary focus is on the study of the surfaces and interiors of terrestrial planets, and therefore the Geosciences Node archives and distributes science data relevant to that discipline.

The Geosciences Node and PDS as a whole serve both the producers of the science archives and the consumers of the archives. Specific functions are:

- To enable NASA planetary missions to produce well-documented, peer-reviewed archives.
- To preserve the archives for the long term, beyond the life of the mission and the lives of the people that generated them.
- To make archives available to the public, in particular to the knowledgeable science user.
- To help users get the most from the science data by providing expert advice.
- To set standards for planetary archives.
- To work with space agencies outside the U.S. to facilitate the sharing of science data from all

planetary missions.

Services to Data Providers: The Geosciences Node works with data providers associated with NASA planetary missions and with individual scientists preparing archives derived from mission data or laboratory data. Most of the work is with missions, starting in the early planning stages long before launch. Each science instrument on a mission's payload is assigned a PDS node to guide the instrument team in its design and production of science archives, and one PDS node is designated as the mission's overall lead for archiving. A Data and Archives Working Group is formed to coordinate the archive work, consisting of representatives from each instrument team and the relevant PDS nodes. The archive preparations are documented in the mission's Archive Plan and in agreements between data providers and PDS nodes. Figure 1 shows a timeline of the current and upcoming NASA planetary missions for which the Geosciences Node is leading the archive work.

Science archives are required to conform to PDS standards for labeling and documentation. The archives are submitted to a peer review committee while still in the design stage so that there is time to implement any changes recommended by the reviewers. This step is crucial to ensuring a quality archive, and PDS depends on knowledgeable and thorough science reviewers. During the course of the mission as the archives are being produced, they are validated for science content by the instrument teams and for PDS compliance by the PDS node that receives the data. The data are released by PDS to the public at regular intervals according to the Archive Plan schedule.

Services to Data Users: All data archived with PDS are available to the public. PDS maintains a searchable data base of all its holdings (see <http://pds.jpl.nasa.gov>), and PDS nodes provide addi-

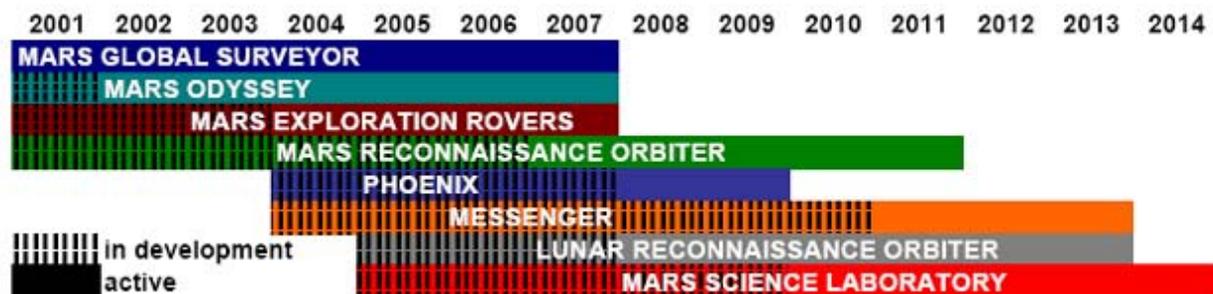


Figure 1. Timeline of NASA planetary missions for which the Geosciences Node leads the archiving effort.

tional search capabilities targeted at specific data sets of high interest. The Geosciences Node, for example, has developed the concept of the Analyst's Notebook, currently applied to the two Mars Exploration Rover missions (<http://pds-geosciences.wustl.edu/meran>). The Analyst's Notebook is a web-based interface that integrates MER raw and derived science data with daily mission activity plans, site and traverse maps, quick-look data and other resources. Figure 2 shows a Notebook view of an Opportunity Pancam image and the associated rover site map. The Analyst's Notebook concept has been very successful and will likely be applied to archives from future landed missions, including Phoenix and Mars Science Laboratory.

Future Work: The Mars Reconnaissance Orbiter (MRO) was launched in August 2005 and will begin its primary mission in November 2006. The high volume of data expected from this mission represents a dual challenge to PDS: to be able to receive and process the data as it is delivered, and to help users navigate the large and complex data sets to extract data of interest. As the lead PDS node for MRO, Geosciences personnel are working with the MRO Project to design and implement a series of readiness tests to exercise data delivery procedures from the instrument teams to the PDS nodes and finally to the end user. The tests, which will take place between May 2006 and February 2007, will cover various aspects of data delivery, including the separate data flow paths from each instru-

ment team, the time required to receive and validate a standard delivery, ability of the system to handle high volume deliveries, and ability of the end user to download the data from the PDS repository. PDS expects to work with other missions to conduct similar readiness tests as needed.

To address the challenge of navigating MRO data sets, the Geosciences Node is developing the Orbital Data Explorer (ODE) concept to provide advanced search and retrieval tools, integrated analysis tools, and visualization tools for orbital data sets. Early versions will support MRO data sets from the CRISM, SHARAD, and Gravity/Radio Science experiments, later adding HiRISE and CTX. Eventually ODE will be extended to support other Mars orbital data sets and possibly lunar data such as that from the Lunar Reconnaissance Orbiter. Version 1 development is timed to support MRO readiness tests. Version 2 will support the first MRO delivery to PDS in summer 2007.

Conclusion: The PDS Geosciences Node welcomes questions and comments from the user community. Please send email to geosci@wunder.wustl.edu or call 314-935-5493. The Geosciences Node web site at <http://pds-geosciences.wustl.edu> has links to all the node's holdings and is updated whenever new data become available. The Geosciences Node is committed to serving both the providers and the users of PDS archives in order to make the best use of these valuable and irreplaceable resources.

The screenshot displays the 'MER Analyst's Notebook' interface for 'OPPORTUNITY MER-B'. The top navigation bar includes links for 'Rover Home', 'Sol Summaries', 'Maps', 'Navigator', 'Search', 'Resources', 'User Forum', and 'Help'. A 'Switch to Spirit' button is also present.

The main content area is divided into several sections:

- Notebook Navigator:** A sidebar on the left with a navigation tree and sorting options (Instrument, Site, Sol).
- Product View Window:** The central area showing a 'Product Page' for 'PDS Label' and 'Panoramic Camera - Full frame EDR'. It includes a 'Rover Site Map' and a 'Preview Window'.
- Product Details:** A table of metadata for the selected product, including Sol (Planet Day Number), Local Time Solar Time, Rover Motion Counter, Sequence ID, MD5 Checksum, and SHA-1 Checksum.
- Associated Products:** A section for related products, with a note: 'For each product you may:'.

The 'Rover Site Map' shows the rover's location on Mars with various colored regions and labels like 'Bary Site', 'Trek Site', and 'Opportunity Site'. The 'Preview Window' shows a close-up of a rock on the Martian surface.

Figure 2. MER Analyst's Notebook view of a Pancam image along with a schematic of the rover site geometry for context.