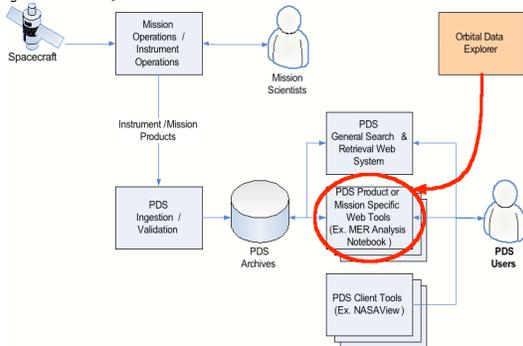


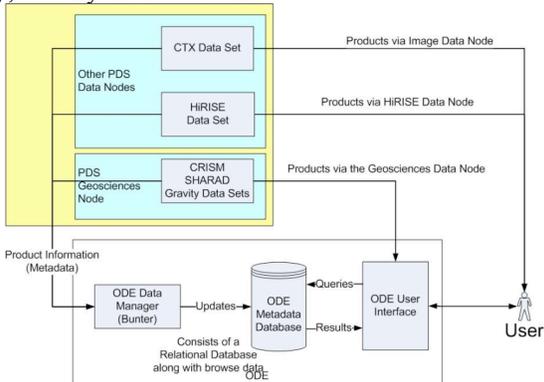
**ACCESSING MARS DATA USING PDS GEOSCIENCES NODE'S ORBITAL DATA EXPLORER.** K. J. Bennett, D. Scholes, R. Arvidson, S. Slavney, E. A. Guinness, and T. C. Stein, McDonnell Center for the Space Sciences, Washington University, 1 Brookings Drive, Campus Box 1169, St. Louis, Missouri, 63130, bennett@wustl.edu

**Introduction:** As part of its effort to make finding and using planetary data easier, the Geosciences Node of NASA's Planetary Data System (PDS) has introduced a new web-based tool, the Orbital Data Explorer (ODE) to aid in the access and use of Mars Reconnaissance Orbiter (MRO) and other selected Mars mission data.

**Overview:** ODE provides map and forms-based search, retrieve, and order functions for PDS-compliant archives from MRO observations. The MRO mission is characterized by very high data volumes and complex observation plans relative to previous planetary missions. ODE is designed to augment the existing PDS search and retrieval interface by providing advanced search, retrieve, and order tools, integrated analysis tools, and visualization tools.



ODE consists of a web site, a metadata database, and a background processor. The background processor extracts PDS product metadata from the PDS MRO archives and organizes it into a searchable database. The ODE web site provides a tool for searching and exploring these metadata as well as accessing and downloading the PDS archives themselves. The primary audience of the website is the science community, but anyone is welcome to use the website.



The ODE website complements the PDS Imaging Node's Atlas website by providing cross-mission and -instrument searches for imaging and non-imaging data products. The Atlas website includes the MRO-specific image search capability.

**PDS:** NASA's Planetary Data System (PDS) archives and distributes scientific data from NASA planetary missions, astronomical observations, and laboratory measurements. The PDS is sponsored by NASA's Science Mission Directorate. Its purpose is to ensure the long-term usability of NASA data and to stimulate advanced research. PDS is continually upgrading and updating its archives, to better serve the needs of its user communities.

The PDS includes seven university/research center science teams, called discipline nodes. These nodes specialize in specific areas of planetary data. The contributions from these nodes provide a data-rich source for scientists, researchers and developers. You can visit them through the links on the PDS Home Page.

**PDS Data:** ODE allows users to search and retrieve Mars orbital science data products stored in PDS. A data product is a set of measurements resulting from a science observation, usually stored in one file. For example, an image, a spectrum, and a time series table of measurements are data products. A data product has a PDS label that contains metadata about a product such as when and where the data were collected, what the data contain, and as how the data are organized. These labels are either detached files or attached to the beginning of a data product file.

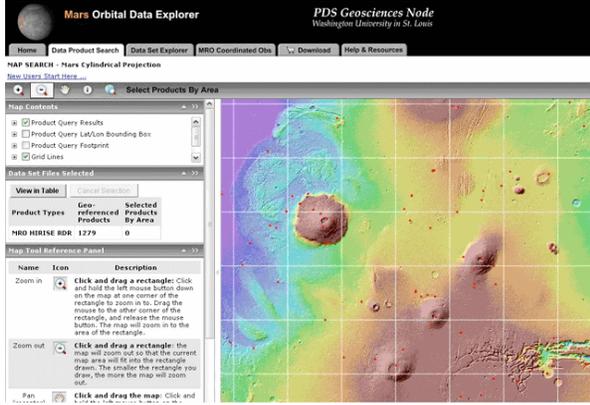
**ODE Features:**

*Product Search.* ODE allows users to search for science data product via mission, instrument, product type, location, time, and product id. Users can search across multiple missions and instruments simultaneously. Search results can be shown in a table or on a map of Mars.

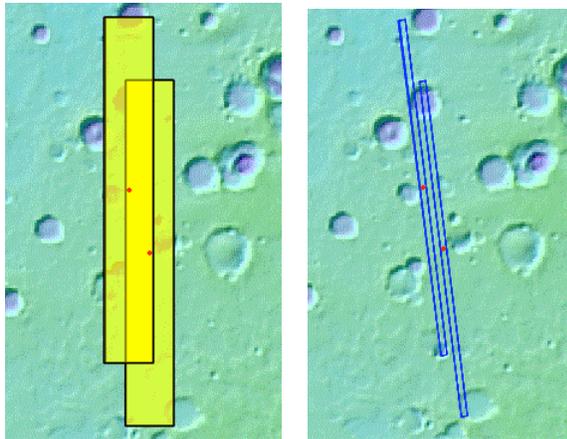
*Product Details.* Users can view the details of any product found in a search. Detail information includes a table of metadata information and the product label. Product details also include a browse version of image-oriented products allowing the user to better understand the product before downloading it. This is particularly important as many of the MRO products are quite large. Finally, for many products such as those from CRISM, the user can link back to the source products, to derived products, or to other products

from the same MRO coordinated observation (see below).

**Coverage Map.** In addition to seeing the results of a product search in a table, users may see the products plotted on a map of Mars. From this map, users may further refine their query based on location.



Map information includes product centers, latitude/longitude bounding boxes, and approximate product footprints.



**Coordinated Observations.** ODE supports the MRO concept called a "Coordinated Observation", a planned observation involving multiple instruments at a given location and time. The source of these planned observations is the MRO science operations group. ODE tracks these planned coordinated observations and then correlates them to PDS products that resulted from the planned coordinated observation. This allows users to find and view related products from HiRISE, CRISM, and CTX.

Table 1. Links mentioned in this abstract

PDS Geosciences Node web site	pds-geosciences.wustl.edu
PDS web site	pds.nasa.gov
Orbital Data Explorer	ode.rsl.wustl.edu/mars/

**Download.** Users have several options for acquiring data products from ODE. First, the user can select and order data products using a typical web-based "shopping cart" approach. As users search and review data products, they can add or remove selected data products to their shopping cart. Then, they can request these data products to be packaged and delivered to them via FTP. In addition to the selected data products, users may include in their delivery all related documentation and supporting materials. The time between submitting the order and receiving notification that the files are ready for download varies based on the size of the request, and the number of other user requests in the queue. Small requests can be available within an hour or two, but large requests can take up to 24 hours.

In addition to the cart, ODE provides several places where the user can directly download individual files of selected data products or related documentation, browse imagery, or other supporting files.

**ODE Data:** ODE currently support data products from the Mars Reconnaissance Orbiter (MRO) and ESA's Mars Express missions. MRO instruments include the imaging spectrometer (CRISM), the shallow radar instrument (SHARAD), the Radio Science experiment, the High Resolution Imaging Science Experiment (HiRISE), and the Context Imager (CTX). Mars Express instruments include the High Resolution Stereo Camera (HRSC) and the OMEGA visible and infrared mineralogical mapping spectrometer.

**ODE Future:** Several enhancements are planned for ODE including a lunar version to support the LRO mission, enhanced download capabilities for HiRISE and CTX, and the addition of new data products from the Mars Global Surveyor (MGS) Mars Orbital Laser Altimeter (MOLA) and Mars Odyssey Gamma Ray Spectrometer (GRS) instruments.

**Contact Information:** The Geosciences Node welcomes questions and comments from the user community. Please send email to [geosci@wunder.wustl.edu](mailto:geosci@wunder.wustl.edu). Specific questions about ODE can be sent to [bennett@wustl.edu](mailto:bennett@wustl.edu).