RECENT UPDATES OF THE PDS GEOSCIENCES NODE'S ORBITAL DATA EXPLORER. J. Wang, D. Scholes, R. E. Arvidson, E. A. Guinness, and F. Zhou, McDonnell Center for the Space Sciences, Department of Earth and Planetary Sciences, Washington University in Saint Louis, 1 Brookings Drive, Campus Box 1169, St. Louis, Missouri, 63130, wang@wunder.wustl.edu.

Introduction: The Orbital Data Explorer (ODE, https://ode.rsl.wustl.edu) is a web-based search tool developed and maintained at NASA's Planetary Data System (PDS) Geosciences Node (https://pds-geosciences.wustl.edu). ODE provides search, display, and download functionality for PDS3 and PDS4 archives of orbital data products from planetary missions to Mars, the Earth's Moon, Mercury, and Venus [1,2,3].

Key features of ODE include form- and map-based searching across multiple missions and instruments [4], product browse, and a cart system with a high-speed download option of using Aspera Connect ([5]). ODE supports specialized granular query tools for subsetting science data at specified regions [6]. ODE generates product type coverage KMZ (zipped file of Keyhole Markup Language, KML) files and shapefiles for use with GIS tools. Additionally, a Representational State Transfer (REST) interface (https://oderest.rsl.wustl.edu/, [7]) allows external users, scripts, and applications to access the ODE metadata and data products without using ODE web interfaces. Mars ODE provides a special tool for locating Mars Reconnaissance Orbiter (MRO) and Phoenix coordinated observations [3].

Recent updates to the ODE web interface and data inventory are summarized in this abstract.

Data Inventory Updates: ODE provides access to 26 million PDS products (1.74 petabytes of files) from more than 14 planetary missions and over 53 individual instruments. Available active missions include MRO, Odyssey, ESA's MEX (Mars Express) and TGO (Trace Gas Orbiter), and LRO (Lunar Reconnaissance Orbiter); completed available missions include MGS (Mars Global Surveyor), Viking Orbiter, Clementine, Lunar Prospector, Lunar Orbiter, Chandrayaan-1, Magellan, GRAIL (Gravity Recovery and Interior Laboratory), and MESSENGER. In 2020, VMC (Visual Monitoring Camera) data from MEX mission were added to ODE. Datasets from instruments NOMAD (Nadir and Occultation for MArs Discovery) and CaSSIS (Colour and Stereo Surface Imaging System) of the TGO mission will be added to ODE in the spring of 2021. Also, derived data from individual data providers including Mercury space weathering maps, Magellan stereo-derived topography mosaics, as well as MESSENGER advanced products from MASCS, GRS, and NS have been added.

ODE is continually updated for active missions as new and accumulating datasets are released by PDS. PDS4 migrated data and derived data from individual data providers will also be added to ODE as they become available. A detailed list of the current ODE holdings can be found at https://ode.rsl.wustl.edu/odeholdings/.

Web Interface Updates: In addition to adding new publicly released data to the ODE database, the ODE website contains new features that were added based on user feedback.

Changes to the Lunar ODE. The recently revised USGS Unified Geologic Map of the Moon [8] with extensive legend has been published as a map service and added to the Lunar ODE. In addition to the USA Apollo landing sites, the list of Lunar landing sites cataloged in ODE has been updated with all up to date landing locations from various space agencies' missions to Earth's Moon, including the USA Ranger and Surveyor projects, USSR Luna program, Chinese Chang'e projects, as well as Japan and India's missions. This will help users quickly search and download data at those locations. The map service of the landers and Rovers feature layer has also been updated to include this expanded list of features.

MRO Coordinated Observation Search Tool. The Mars ODE website contains a search feature for filtering and locating PDS data products that were observed as part of an MRO coordinated observation, which is a planned observation involving multiple MRO instruments at a given location and time. This search interface has been enhanced to support more precise location searches, by adding an interactive map for selecting search areas via individual points, rectangles, and custom drawn polygons.

Product Search. Both the form-based and map-based product search have been updated to include individual point search as an addition to the existing interactive map search options of rectangles and custom polygons. Figure 1 is an example of point search in Jezero Crater near the Mars 2020 Perseverance Rover landing site.

Figure 1. Point search in Jezero Crater near the Mars 2020 Perseverance Rover landing site, displaying CRISM Map-Projected TRDR and HiRISE RDR search results.

Search Result List. The product search result lists now include an icon to indicate data products that were part of an MRO coordinated observation. This allows for convenient scanning of traditional search results to locate data products that may be of additional interest.

Product Detail Page. The ODE product detail page has been enhanced to include a clear notice if the product was part of an MRO coordinated observation. An icon and text indicating this status, as well as a link to display the list of coordinated products are available through ODE (Fig. 2). In addition, links have been added to the page to allow the product detail page to be shared with colleagues via URL and email, or saved for later review. The DOI of the product's PDS3 dataset or PDS4 bundle has been added to the detail page for reference and citation, as well.

Figure 2. Enhanced product detail page, displaying an example MRO CTX EDR product.

ODE Footprint Coverage Explorer. ODE generates product type coverage files in shapefile and KMZ formats for map projected PDS data products that are cataloged in ODE. A new footprint coverage explorer page (e.g., Fig. 3) has been created to better assist users in locating desired coverage shapefiles and KMZs grouped by mission, instrument, processing level, and product type, similar to the form-based product search. The new page provides access to coverage files, along with descriptive content information, file details, product type information, and general help for using the files.

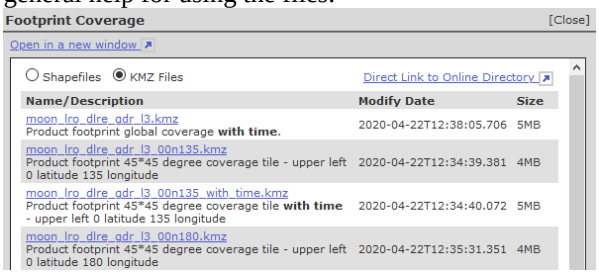

Figure 3. The new footprint coverage explorer page, displaying available LRO DIVINER GDR coverage files.

Future Work: Newly released data from ongoing missions will continue to be added to ODE. ODE's catalog of PDS archives will be updated to reflect changes as archives are migrated from the PDS3 to PDS4 standard. JAXA SELENE (KAGUYA) data will be added to Lunar ODE in the fall of 2021. The website interface will continue to be updated to improve data search and download capability. A planned enhancement to the map-based search's product result list will allow additional PDS product metadata to be displayed on screen through a mouse over or pop-up, so the user can quickly review this information without navigating to another screen. Feedback from the community is valued and always encouraged; comments from users can help identify useful future improvements and feature additions.

Contact Information: The PDS Geosciences Node welcomes questions and comments for additional ODE functions from the user community. If you have any questions or comments please send emails to ode@wunder.wustl.edu or post on the Geosciences Node forum https://geoweb.rsl.wustl.edu/community/.

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