

PDS GEOSCIENCES NODE STATUS UPDATE. S. Slavney, J. Ward, E. A. Guinness, T. C. Stein, J. Wang, L. E. Arvidson, D. Scholes, S. J. VanBommel, and R. E. Arvidson, Earth and Planetary Sciences, Washington University, 1 Brookings Drive, Campus Box 1169, Saint Louis, Missouri, 63130, Susan.Slavney@wustl.edu.

Introduction: The Geosciences Node (pds-geosciences.wustl.edu) of NASA's Planetary Data System archives and distributes science data related to the study of terrestrial planets and the Moon. The Node provides its data, along with expert assistance on its use, to all interested planetary scientists, educators, and the public, free of charge.

PDS Geosciences Node Overview: The Geosciences Node works with NASA missions and individual planetary scientists to ensure that their archives are of high quality, well-documented, and useful to the community at present and well into the future. Node holdings include data from past NASA planetary missions, current missions, and data contributed by individual researchers. Table 1 lists the current and future planetary missions and instrument teams that deliver or will deliver data to the Geosciences Node. In addition, the Node serves as a mirror repository for ESA's Mars Express data. The Node has an Advisory Group of eight members who regularly review the Node's plans and provide advice on future Node activities.

Table 1. Geosciences Node Archives of Instrument Data from Active and Future Missions

Active Missions	Instruments
Mars Odyssey	GRS, HEND, NS, Radio Science
MRO	CRISM, SHARAD, Radio Science
Mars Express	ASPERA, HRSC, MaRS, PFS, MARSIS, OMEGA, SPICAM, SPICE
LRO	Diviner, LEND, LOLA, Mini-RF, Radio Science
MSL	APXS, ChemCam, CheMin, DAN, SAM
InSight	HP ³ /RAD, RISE, SEIS, IDA
Future Missions	Instruments
Mars 2020	PIXL, RIMFAX, SHERLOC, SuperCam, Returned Sample Science
Europa Clipper	MISE, REASON
Dragonfly	DraMS, DraGNS, DraGMet

The Geosciences Node's primary interface to the planetary science community is its web site at pds-geosciences.wustl.edu. Other services include the Orbital Data Explorer (ode.rsl.wustl.edu) [1], the Analyst's Notebooks (an.rsl.wustl.edu) [2], and the community forum geoweb.rsl.wustl.edu/community. Together these web sites receive on average more than

2000 visitors per day who download more than 300 GB of data daily. Questions about any of our services can be sent to geosci@wunder.wustl.edu.

Recent Updates: *Mars InSight Lander.* InSight mission archiving is underway, with data releases approximately every 3 months. An InSight Analyst's Notebook is in development, with an expected release by March 2020.

Spectral Library. Data from the Reflectance Experiment Laboratory (RELAB) at Brown University have been archived in the Geosciences Node Spectral Library and can be searched and viewed with a new Spectral Library web interface (speclib.rsl.wustl.edu). Additional contributions to the Spectral Library are in the works.

PDS3 to PDS4 Migration. The Geosciences Node holdings from the MESSENGER and Mars Exploration Rover (MER) missions have been completely migrated from PDS3 to PDS4 [3]. This work involved creating PDS4 labels for all data products and storing them in the same directory structure with the existing PDS3 labels, so that both versions are available to users.

MER End of Mission. Additional work was done to preserve valuable information from the MER Project before it ended in August 2019. A database of contact science targets from both the Spirit and Opportunity rovers was compiled, containing a sol-by-sol breakdown of APXS, Mössbauer, MI, and RAT activities alongside target, feature, and location information. The assembled list of targets and their location data has been ingested into the Analyst's Notebook providing target "pins" on relevant images. Stein et al. [2] provide additional details on the method and ultimate products. This database will become a PDS archive. Data on rover mobility were collected and will also become a PDS archive; in the meantime the data are available upon request. Finally, documentation was updated for some data sets.

Individual Investigators. New data contributions from individual investigators this year include: 11 restored Apollo data bundles, 2 Phoenix derived data bundles, Mercury space weathering maps, MESSENGER MASCS UVVS Spectral Cube and Gamma Ray Spectral data, Kaguya spectral profiler data, and thermal infrared and Raman spectral data of laboratory shocked feldspars. Currently we are working with 46 individual investigators who are submitting data from the CDAP, DDAP, MDAP, PDART, LARS, PMDAP, and SSW programs. Proposal writers who are

considering submitting data to the PDS Geosciences Node can find more information under Help for Proposers on the web site (pds-geosciences.wustl.edu/dataserv/proposerhelp.html) and by contacting geo-sci@wunder.wustl.edu.

Forums and New Publication Guidelines. Our user community has been active on the Geosciences Node forums for data providers and data users. Currently we have 448 registered contributors to the forums along with many others who view the content without registering. On average the forums receive 291 visits per day. Posts are monitored by Geosciences Node personnel and questions are answered promptly.

Some users have asked about the recent move by several publishers of scientific research toward an open data policy; in particular, when a journal requires an author's data to be in a public archive as a condition of publication, is the Geosciences Node a suitable repository? Our recommendation is as follows: Authors of journal articles who are required to archive their data in a public repository may not wish to undertake the steps involved in submitting their data to the PDS, steps that include labeling, documenting, and possibly reformatting the data products. The effort involved may not be justified for small, simple data sets. In this case we recommend that the authors submit the data to one of the many available online data repositories, such as figshare (figshare.com) or Dataverse (dataverse.org). On the other hand, if the authors believe their data belong specifically in PDS and they are willing to put in the work, and to submit the data to a peer review, then we will work with them to create a PDS archive.

What to look for in 2020-2021: The Node plans to migrate most of its legacy PDS3 archives to PDS4 over the next several years, starting with lunar missions Chandrayaan-1, Lunar Prospector, and LCROSS.

The Geosciences Node will continue to work with several instrument teams from the Mars 2020 rover, Europa Clipper, and Dragonfly missions to design and plan their archives.

Some notable data sets in the pipeline from individual investigators include: Magellan stereo derived topography data, Venus derived radar maps, an Apollo seismic event catalog, Kaguya Gamma Ray Spectrometer data, and additional restored Apollo data.

The Node recently completed an initiative to store a copy of PDS archive holdings in the cloud for disaster recovery purposes. Previously, backup copies were written to magnetic tapes and stored off-site. We will continue exploring how other cloud services such as computing, networking, and elastic storage can benefit the Node.

A rapid prototype search services pilot was developed in conjunction with the PDS Engineering Node in

November 2019. The goal was to facilitate data discoverability and access to data using a PDS API that supports node agnostic input and provides machine readable output. This notional implementation serves as a foundation for of a PDS-wide API that is now under development.

References: [1] Wang J. et al. (2020) LPS LI, this volume. [2] Stein T. C. et al. (2020) LPS LI, this volume. [3] Slavney S. et al. (2018), LPS XLIX, Abstract #1508.