

PDS GEOSCIENCES NODE STATUS UPDATE. J. G. Ward, S. Slavney, E. A. Guinness, D. Scholes, S. VanBommel, P. K. Byrne, and R. E. Arvidson, Dept. of Earth and Planetary Sciences, McDonnell Center for the Space Sciences, Washington University in St. Louis, 1 Brookings Drive, Campus Box 1169, St. Louis, Missouri, 63130, jgward@wustl.edu.

Introduction: The Geosciences Node of the NASA Planetary Data System (PDS, pds-geosciences.wustl.edu) archives planetary science data from and relevant to terrestrial planets and the Earth's Moon. These data, along with tools and expert advice on their use, are provided at no cost to scientists, educators, and the general public.

PDS Geosciences Node Overview: The Geosciences Node works with NASA missions and individual planetary scientists to ensure high quality, well-documented, and peer-reviewed data are archived in perpetuity. Node holdings include data from past NASA planetary missions as far back as the Viking and Mariner programs in the 1970s, current missions, and data contributed by individual researchers. The Geosciences Node has served and serves, as appropriate, as the lead PDS node for most of these missions. The role of lead node is to coordinate archiving among all PDS nodes involved in archiving data from a mission, in addition to archiving data from relevant instruments. Table 1 lists the active and developing missions that deliver or will deliver data to the Geosciences Node.

The Geosciences Node's primary interface to the planetary science community is its web site at pds-geosciences.wustl.edu, where all Node holdings are available for download. Other services include the Orbital Data Explorer (ode.rsl.wustl.edu) [1], the Analyst's Notebooks (an.rsl.wustl.edu) [2], the Spectral Library web interface (pds-speclib.rsl.wustl.edu), and the community forum (geoweb.rsl.wustl.edu/community). The Node also offers Digital Object Identifiers (DOIs) for all of its datasets (pds-geosciences.wustl.edu/data-serv/doi.htm). Together these websites receive on average more than 2600 visitors per day who download more than 400 GB of data daily. Questions about any of our services may be sent to geosci@wunder.wustl.edu.

Recent Activities:

Mars 2020 Perseverance Rover. Mars 2020 mission archiving is underway. Data are released 3 times per year - the first 179 sols of data have been released so far. The [Analyst's Notebook for Mars 2020 Perseverance Rover](#) [2] allows search, display, and download of Perseverance data. The Geosciences Node is working with the mission to archive data relevant to samples collected for eventual return to Earth.

Table 1. Geosciences Node Archives of Active and Developing Missions

Active Missions	Science Experiments
Mars 2020*	PIXL, RIMFAX, SHERLOC, SuperCam, Returned Sample Science
InSight*	HP3, RAD, RISE, SEIS, IDA
MSL*	APXS, ChemCam, CheMin, DAN, SAM
MRO*	CRISM, SHARAD, Radio Science
LRO*	Diviner, LEND, LOLA, Mini-RF, Radio Science
Mars Express	ASPERA, HRSC, MaRS, PFS, MARSIS, OMEGA, SPICAM, SPICE
Mars Odyssey*	GRS, HEND, NS, Radio Science
Developing Missions	Science Experiments
VIPER*	MSolo, NIRVSS, NSS, TRIDENT, Rover Imaging
Europa Clipper	MISE, REASON, Radio Science/Gravity
Lunar Trailblazer*	HVM3, LTM
Dragonfly*	DraMS, DraGNS, DraGMet
VERITAS*	TBD

* Lead PDS Node

PDS3 to PDS4 Migration. The Geosciences Node continues to work towards converting all its PDS3 holdings to PDS4. Table 2 shows progress and plans for this effort. The Node has actively been working with the Lunar Reconnaissance Orbiter (LRO) instrument teams to plan their archive conversions. Work on restoration of the Node's archives for the Magellan Radar Mapper Mission to Venus is in progress [3]. The Node is assisting active missions Mars Science Laboratory (MSL), Mars Reconnaissance Orbiter (MRO), and Mars Odyssey to plan the conversions of their data processing pipelines to PDS4. These missions are expected to begin delivering data acquired after October 1, 2022, in PDS4 format.

Table 2. PDS3 to PDS4 Migration Status

PDS3 Mission Archives at the Geosciences Node	PDS4 Migration Status and Schedule
MER	Complete
MESSENGER	Complete
Chandrayaan-1	Complete
Lunar Prospector	Complete
LCROSS	Complete
LRO	In progress FY21-22
Magellan	In progress FY21-23
Clementine	FY22
Apollo	FY22
GRAIL	FY22
Mars Phoenix Lander	FY23
MGS	FY23-25
Mars Viking Lander	FY25
Mars Viking Orbiter	FY25-26
Mars Pathfinder	FY26

Individual Investigators. The Geosciences Node continues to work with individuals to archive their data, generated primarily through NASA data analysis programs. Currently there are 45 pending archives in the queue, with data submitted from the CDAP, DDAP, MDAP, LDAP, PDART, PSTAR, SSW, Exobiology, and other programs. Examples of recently archived datasets from individual investigators include: MRO SHARAD 3D radar data, an astromaterials database, Earth-based radar multi-look maps of Venus, and a Mars target database.

Application Program Interface (API). The Geosciences Node has been participating in the planning and testing of the upcoming PDS API functions. The APIs will provide access to PDS4 products' meta data and file URLs from scripts, applications, or even manual queries. Cross-node searches will also be supported through this tool.

Coming Up: The Geosciences Node will continue to migrate its PDS3 archives to PDS4 over the next several years, focusing on its lunar and other datasets.

The Geosciences Node will continue to work with several instrument teams from the Europa Clipper, Dragonfly, and recently selected VERITAS missions to design and plan their archives, in addition to work on continuing missions.

The Node will provide archiving advice and support to the science teams on CLPS (Commercial Lunar Payload Services) and CubeSat missions. A CLPS Data Archive Support Service, which will provide resources for new CLPS investigations as they plan their archiving needs and procedures, will be established. Each CLPS payload to acquire lunar

geoscience data will then follow best-practice guidelines for ensuring those data are archived with the PDS (or similar repository) by project end. These resources will be continually updated based on feedback from CLPS project teams. The Node will continue supporting the small number of individual CubeSat missions with dedicated Data Archive Working Groups.

Some notable data sets in the pipeline from individual investigators include: Apollo passive seismic data, XAS spectra of synthesized glasses, a Raman spectral database, and improved Odyssey neutron spectrometer data.

An update to the Phoenix Analyst's Notebook is underway that will incorporate the Mars Target Encyclopedia archive for mission targets and will include discovery tools found in the Notebooks for newer missions.

The Geosciences Node will catalog all of its PDS4 archives to be accessible through the PDS API, so they are available once the PDS API is live for public usage.

Please contact us at geosci@wunder.wustl.edu with any questions.

References: [1] Wang J. et al. (2022) LPS LIII, this volume. [2] Stein T. C. et al. (2022) LPS LIII, this volume. [3] Guinness E. A. et al. (2022) LPS LIII, this volume.