



Cartography and Imaging
Sciences Node

Jet Propulsion Laboratory

U.S. Geological Survey

THE CARTOGRAPHY AND IMAGING SCIENCES NODE OF THE NASA PLANETARY DATA SYSTEM

The Imaging Node (IMG, PDS-IMG or just “Imaging”)

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NASA National Aeronautics and Space Administration
PDS Imaging Node
 Jet Propulsion Laboratory U.S. Geological Survey

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Welcome

The Cartography and Imaging Sciences Discipline Node (aka "Imaging Node") of the Planetary Data System is the curator of NASA's primary digital image collections from past, present and future planetary missions. Imaging provides to the NASA planetary science community the digital image archives, ancillary data, sophisticated data search and retrieval tools, and cartographic and technical expertise necessary to develop and fully utilize the vast collection of digital planetary images of many terrestrial planetary bodies, including icy satellites. Imaging science expertise includes orbital and landed camera instrument development and data processing, data engineering and informatics, planetary remote sensing at UV to RADAR wavelengths, and cartographic and geospatial data analysis and product development. For a guide to Imaging Node services download the PDS Imaging Node Tour.

Image of the Week

A Landing Site for ExoMars 2016

This landing site is the flattest, safest place on Mars, part of Meridiani Planum, close to where the Opportunity rover landed. This image shows what this terrain is like: very flat and featureless.

NASA/JPL-Caltech/Univ. of Arizona
 Full image and caption at the Photojournal

Latest News

Mars Reconnaissance Orbiter (MRO) Release #35
 December 1, 2015: The 35th MRO release has occurred for CTX, MARCI, and HRSC for data acquired Feb. 3, 2015 through May 9, 2015. The data can be accessed via the online data volumes and the Image Atlas.

MESSENGER Release #14
 October 9, 2015: This release, via the online data volumes and the Image Atlas, extends the formatted raw (EDR) and calibrated data (CDR) products available at the PDS Imaging Node for MESSENGER MDIS to include the period from September 15, 2014 through April 30, 2015. With this release, data are now available to the public for the eighth full Mercury solar day of MESSENGER's orbital operations. There are no new CDRE, BDRs, MCRs, MDS, HES, HIVE, or RTMs with this release. Visit ACT-REACT QuickMap to explore images and data from MESSENGER's orbital mission. An online tutorial for using ACT-REACT QuickMap is available at http://imaging-actreactgate.com/mgr_public_releasedact_docs/qmap.pdf

Cassini ISS, RADAR & VIMS Release #43
 October 1, 2015: Cassini data covering Oct. 1, 2014 through Dec. 31, 2014, have been released at the PDS Imaging Node for ISS, RADAR, and VIMS. Search capability is also available via the Image Atlas.

Mars Odyssey Release #53
 October 1, 2015: The 53rd Mars Odyssey release has occurred. The data may be accessed at the online data volumes and via the Image Atlas. This data is accumulating.

Mars Exploration Rover (MER) Release #45
 September 16, 2015: Data for the latest MER release, acquired on Sol 3871-3960. The data is now available through the online data volumes and via the Image Atlas. This data is accumulating.

Mars Science Laboratory (MSL) Release #9
 July 31, 2015: Data acquired through Sol 938 is now available for MSL: HAZZARD, NAVCAM, Mastcam, MAHLI, and MARMI and are available via the Image Atlas. The new PLACES archive with data for Sites 1-45 has also become available with this release.

PDS Proposers and PDS4 Guides
 June 29, 2015: The Imaging Node has added new links for PDS Proposers and PDS4 (please click on "HELP" in the navigation bar above). These links will provide help for proposer writers including PDF documents for proposing a PDS4 data archive, sample archive plan, and how to prepare a PDS4 data archive, useful starting references for new dataset submission to PDS4 include concept documents, a proposing archiving guide, standard references, and a set of examples.

PDS Marsviewer
 June 11, 2015: The PDS Marsviewer desktop client is now available for download at <http://img.jpl.nasa.gov/tools/marsviewer>. Marsviewer is an image viewing tool tailored to Mars in situ missions. The tool makes it easy to view original images (CTDRs) as well as all derived image products (CDREs), such as XYZ maps, slope, reachability, mosaics, etc. for MER, MSL, and Phoenix mission data.

- Curator of NASA's primary digital image collections from past, present and future planetary missions
 - 850 TB, growing ~100 TB/yr
- Develops & supports archive standards for
 - Image data formats
 - Documentation of observation and acquisition parameters, image properties, etc. (metadata)
 - Image calibration, documentation
- Supports validation, delivery of digital image archives, ancillary & supporting information
 - Landed and orbital cameras and imagers, metadata
 - Cartographic products such as mosaics, maps, geospatial databases, etc.
 - Links to heritage, publications, figures, etc.
- Leverages USGS/ISIS software to serve processed, derived data products
 - When ISIS is used, supports pipeline processing from raw to calibrated, photometrically corrected, map-projected products

<http://img.pds.nasa.gov/>



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Cartography and Imaging Sciences Node

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Science Discipline Focus: Cartography & Imaging Science

- Interdisciplinary expertise
 - Instrument/image geometry, cartographic data acquisition & processing
 - Orbital & landed camera instrument design, data processing & calibration
 - Detailed geometric & physical characterization of cameras
 - Planetary remote sensing at UVVIS to thermal to RADAR wavelengths
 - Single, multi- and hyperspectral images
 - Cartographic & geospatial data analysis
 - Geographic information systems, geologic & thematic mapping, 3D terrain mapping & analysis, slope & hazard mapping, site characterization
 - Data engineering & informatics, data mining
- Serves data from the NASA collection of digital planetary images
 - Terrestrial planetary surfaces
 - Mercury, Venus, Earth, Moon, Mars, Mars' moons Phobos and Deimos, asteroids Gaspra, Ida
 - Icy and outer Solar System satellites, dwarf planets
 - 9 moons of Jupiter (Io, Europa, Ganymede, Callisto, etc.)
 - 23 moons of Saturn (Titan, Enceladus, Iapetus, etc.)
 - 2 moons of Neptune (Triton, Nereid)
 - 5 moons of Uranus (Ariel, Titania, etc.)
 - Vesta, Ceres, Pluto (TBD)

<http://img.pds.nasa.gov/>



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- **Mission Interface**

- Work with imaging instrument teams to ensure cost-effective data delivery to PDS and public
- Apply systems engineering principles to data to ensure rapid identification, easy access & download of PDS data

- **Data Delivery & Cartographic Support**

- Support delivery of planetary image data in raw & derived formats
- Deliver improved ancillary data (pointing, calibration) resulting from radiometric, geodetic & cartographic processing, restoration, scientific research, etc.

- **Data User Support**

- Maintain and support online data, provide state-of-the-art search & access tools
- Provide sophisticated tools & instructions for simple to complex data interaction by users
- Provide training, expert assistance to users for cartographic and scientific data analysis (LPSC, Planetary Data Users workshops, etc.)

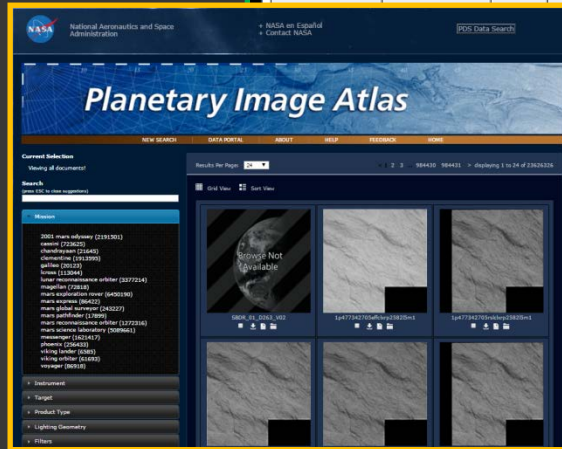
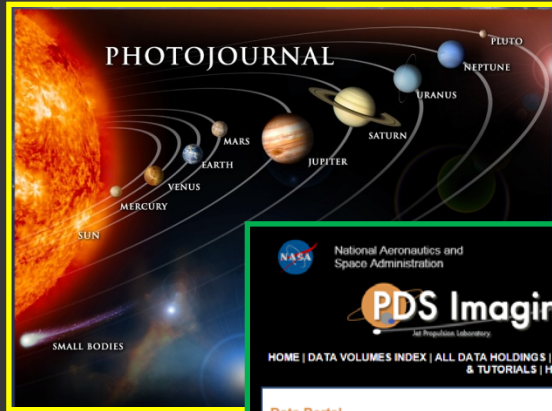


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DATA DELIVERY SYSTEMS (1 OF 2)



Photojournal

- Press-release images, other quick-release “pretty pictures”
- <http://photojournal.jpl.nasa.gov/>

Data Portal

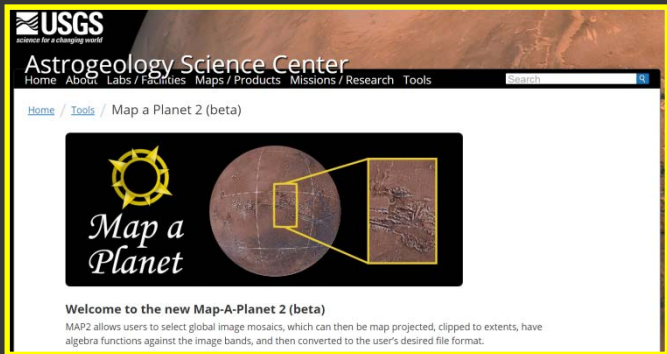
- All image data, sorted by mission name
- Links to mission documentation
- <http://pds-imaging.jpl.nasa.gov/portal/>

Planetary Image Atlas

- Faceted searches based on image label data, geographic coordinates, etc.
- Products linked to IAU planetary nomenclature database
- Supports landmark feature classification and searches
- <http://pds-imaging.jpl.nasa.gov/search/>

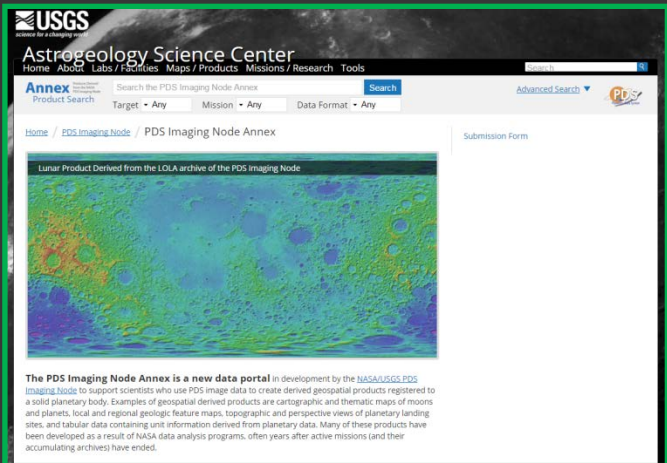
<http://img.pds.nasa.gov/>

DATA DELIVERY SYSTEMS (2 OF 2)



Map-a-Planet (MAP)

- Delivers map-projected mosaics & derived data
- Basemaps for EDR searches at IMG and GEO
- Standardized Web Mapping Services (WMS) for ~all mapped bodies
- Supports limited cartographic extraction and processing of data products
- <http://astrogeology.usgs.gov/tools/map>



Imaging Node Annex

- Supports geospatial products derived from PDS products
 - Mosaics, maps, shapefiles, tables
- Retains heritage to source data & metadata
- Links to publications, accuracy information, etc.
- <http://astrogeology.usgs.gov/pds/annex>

<http://img.pds.nasa.gov/>



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Planetary Image Locator Tool

Mercury 259,592 images	Saturn 336,855 images
Venus 7,254 images	Calypso 830 images
Earth 17,639 images	Daphnis 412 images
Moon 2,826,003 images	Dione 9,053 images
Mars 1,952,981 images	Enceladus 16,222 images
Deimos 246 images	Epimetheus 1,544 images
Phobos 444 images	Helene 1,823 images
Jupiter 85,491 images	Hyperion 4,767 images
Adrastea 23 images	Iapetus 8,836 images
Amalthea 227 images	Janus 2,339 images
Callisto 1,933 images	Methone 624 images
Europa 2,192 images	Mimas 5,653 images
Ganymede 2,247 images	Pallene 739 images
Himalia 393 images	Pan 1,161 images
Ino 3,053 images	Pandora 1,266 images
	Phoebe 2,271 images

News

PILOT / UPC Data Release September 2015: Mars Reconnaissance Orbiter - CTX
 Sep 15, 2015
 The NASA/USGS PDS Imaging Node has added the following data to the Unified Planetary Coordinate (UPC) Database... MISSION / INSTRUMENT: MARS RECONNAISSANCE ORBITER / CTX... Release #34. Mapped images: 1,749. Unmapped images: 1... Please visit PILOT to access/download the new release... Read more

PILOT / UPC Data Release March 2015: MESSENGER
 Mar 18, 2015
 The NASA/USGS PDS Imaging Node has added the following data to the Unified Planetary Coordinate (UPC) Database. MISSION / INSTRUMENT: MESSENGER Release #13/MDIS-NAC. Mapped images: 29,056... Unmapped images: 5,121. MDIS-NAAC... Read more

DATA PROCESSING SYSTEMS

① Planetary Image Locator Tool (PILOT)

- Uses Unified Planetary Coordinates (UPC) database to standardize coordinates
- Supports PDS image data for which there is an ISIS3 camera model
 - Accurate, detailed surface placement
 - 94% of Imaging Node data holdings supported
- Geospatial and parameter search of PDS EDR image archives
- Ties to online POW processing tools
- <http://pilot.wr.usgs.gov/>

② Projection on the Web (POW)

- Employs ISIS3 cartographic software
- Pipeline data processing from raw to fully processed data products
- <http://astrocloud.wr.usgs.gov/>

Map Projection On the Web

Warning: Google Chrome may request your username and password using this authentication pop-up (see help). Please dismiss this pop-up until the proper login webpage (not a pop-up) is displayed from our astrocloud login server.

Login Reset Your Password Request User Account Activate USGS Account Search Pilot

POW cluster → Science-ready Output

Map Projection on the Web Map a Planet 2

PDS archives are typically stored in their "raw" or Engineering Data Record (EDR) format. Before they are truly useful for analysis, these images, at a minimum, should be radiometrically calibrated and map projected.

While some instrument teams provide science-ready versions of their data, many other archives must first be processed by the individual researcher. POW provides users with calibrated cartographic images that can be used for geologic mapping, analysis in a Geographic Image System (GIS), change detection, merging of disparate instrument images, and use in a host of other scientific applications (e.g., ArcMAP, ENVI, Matlab, JMAPS, etc.). Output formats currently supported include ISIS, PDS, GeoTIFF, GeoTIFF2000, jpeg, and PNG.

Quick step-by-step

- 1 Request and/or login into a Astrocloud account
- 2 Find and selected images from PILOT. We currently have a 50 image limit.
- 3 In PILOT, select the "download" button.

Currently Supported Instruments in POW. click for Instrument Notes

- Cassini ISS/NA
- Cassini ISS/WA
- Clementine HRES
- Clementine NIR
- Clementine UVVIS
- Galileo Orbiter SSI
- LUNAR RECONNAISSANCE ORBITER LROC_NACL
- LUNAR RECONNAISSANCE ORBITER LROC_NACR
- Marsiner 10 VID A
- Marsiner 10 VID B
- Mars Express HRSC
- Mars Global Surveyor MOC NA

<http://img.pds.nasa.gov/>

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