



Cartography and Imaging
Sciences Node

Jet Propulsion Laboratory

U.S. Geological Survey

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

AKA The Imaging Node (“Imaging,” IMG, PDS-IMG)

PI, Science Lead: Lisa Gaddis (USGS, Astrogeology)

Co-I, Technical Lead: Myche McAuley (JPL)



Cartography and Imaging Sciences Node

Jet Propulsion Laboratory

U.S. Geological Survey

- Curator of NASA's larger digital image collections from past, present and future planetary missions

- Terrestrial planets, icy satellites
- **~1.5 PB, 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, DEMs, 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

<https://pds-imaging.jpl.nasa.gov/>

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, Charon

<https://pds-imaging.jpl.nasa.gov/>



Jet Propulsion Laboratory

Cartography and Imaging Sciences Node

U.S. Geological Survey

• **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.)



Cartography and Imaging Sciences Node

Jet Propulsion Laboratory

U.S. Geological Survey

DATA DELIVERY SYSTEMS (1 OF 2)

Photojournal

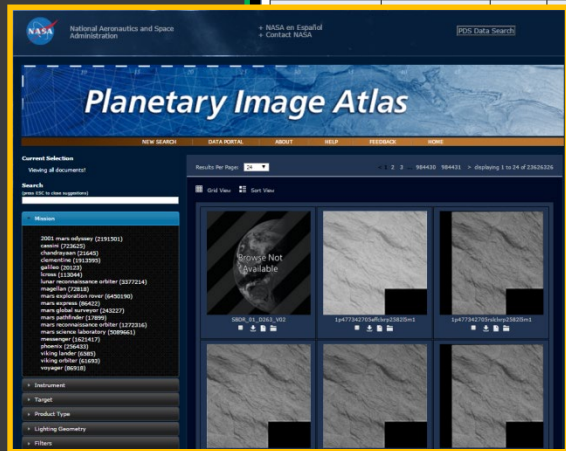
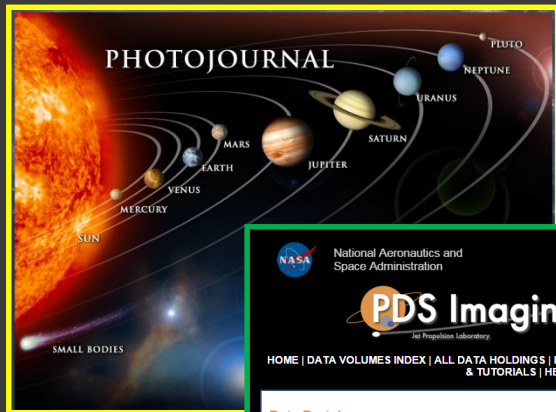
- Press-release images, other quick-release “pretty pictures”
- <https://photojournal.jpl.nasa.gov/>

Data Portal

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

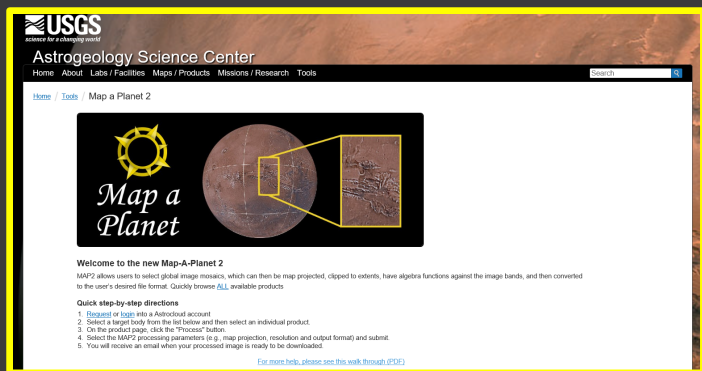
Planetary Image Atlas

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



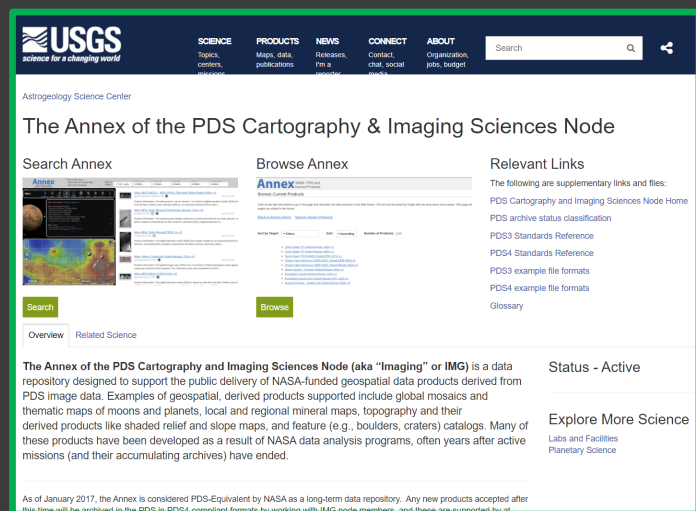
<https://pds-imaging.jpl.nasa.gov/>

DATA DELIVERY SYSTEMS (2 OF 2)



Map-a-Planet (MAP)

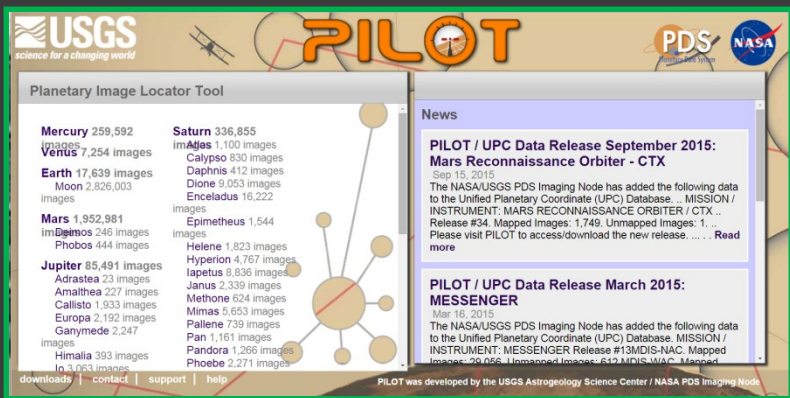
- Delivers map-projected mosaics & derived data
- Basemaps for EDR searches at IMG and GEO
- Standardized Web Mapping Services (WMS) for ~all mapped bodies
- Supports cartographic extraction and some processing of data products
- <https://astrogeology.usgs.gov/tools/map-a-planet-2>



Imaging Node Annex

- Repository for geospatial products derived from PDS products
 - Mosaics, maps, shapefiles, tables
- Retains heritage to source data & metadata
- Links to publications, accuracy information, etc.
- <https://www.usgs.gov/centers/astrogeology-science-center/science/annex-pds-cartography-imaging-sciences-node>

<https://pds-imaging.jpl.nasa.gov/>



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
	Enceladus 16,222 images
Mars 1,952,981 images	Epimetheus 1,544 images
Deimos 246 images	Helene 1,823 images
Phobos 444 images	Hyperion 4,767 images
Jupiter 85,491 images	Iapetus 8,836 images
Acradtea 23 images	Janus 2,339 images
Amalthea 227 images	Methone 624 images
Callisto 1,933 images	Mimas 5,653 images
Europa 2,192 images	Pallene 739 images
Ganymede 2,247 images	Pan 1,161 images
Himalia 393 images	Pandora 1,266 images
Io 1,753 images	Phobos 2,271 images

News

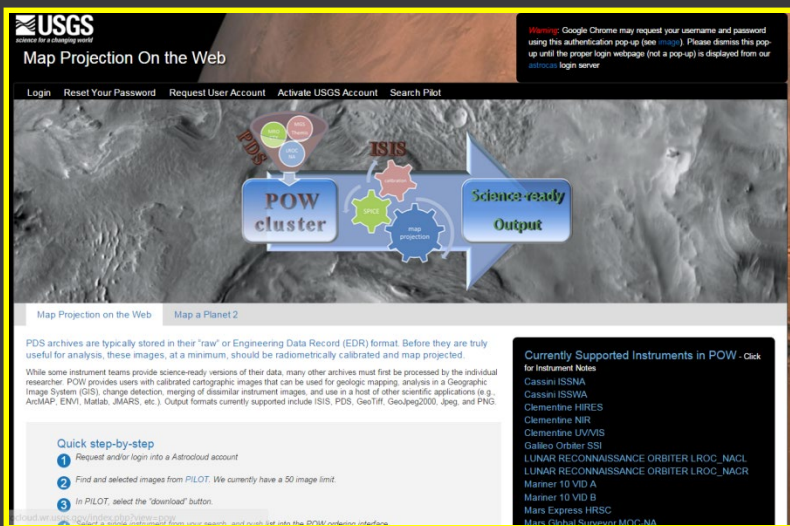
PILOT / UPC Data Release September 2015: Mars Reconnaissance Orbiter - CTX
 Sep 15, 2015
 The NASA/USGS PDS Imaging Node has added the following data to the Unified Planetary Coordinate (UPC) Database. MISSION / INSTRUMENT: MARS RECONNAISSANCE ORBITER / CTX ... Release #34. Mapped Images: 1,749. Unmapped 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 #13MDIS-NAC. Mapped Images: 20,056. Unmapped Images: 6,171. MDIS-UMAC. Mapped

DATA PROCESSING SYSTEMS

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 IMG node data holdings supported
- Geospatial and parameter search of PDS EDR image archives
- Ties to online POW processing tools
- <https://pilot.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

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.

Click a single instrument from your search, and click list into the POW selection interface.

Currently Supported Instruments in POW. Click for Instrument Notes

- Cassini ISSNA
- Cassini ISSWA
- 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

Projection on the Web (POW)

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

<https://pds-imaging.jpl.nasa.gov/>

CONTACT INFORMATION

PI, Science Lead: Lisa Gaddis

- USGS Astrogeology Science Center, Flagstaff, AZ
- lgaddis@usgs.gov
- 928-556-7053

Co-I, Technical Lead: Myche McAuley

- Jet Propulsion Laboratory, Pasadena, CA
- michael.mcauley@jpl.nasa.gov
- 818-434-2170

