

Fast & Easy Interface to MESSENGER Mission Data

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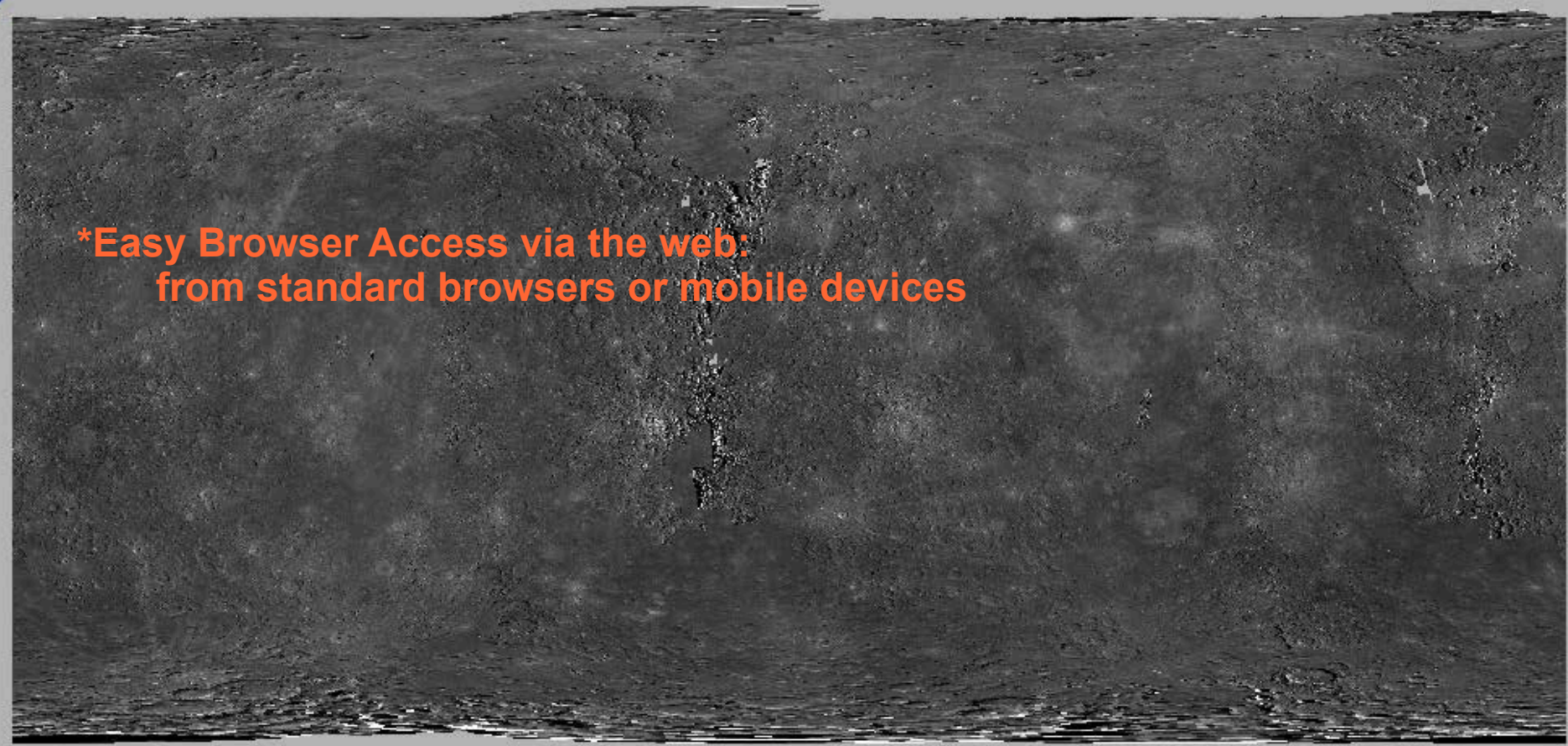
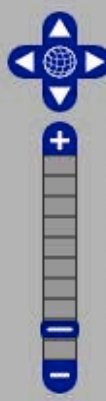
Projection: Equidistant Cylindrical

Map

Path

Search For:

Probes



***Easy Browser Access via the web,
from standard browsers or mobile devices**

1000 km
500 mi

16000 m/pix

Lat: 89.43643 Lon: -136.04192

Fast & Easy Interface to MESSENGER Mission Data

ACT-REACT QuickMap provides an easy-to-use yet powerful web interface for map related products.

Designed with the end-user in mind, QuickMap offers rapid access to data without the tedium of handling file format details and data archive structures.

For NASA satellite missions, and when used in conjunction with PIPE / MSHELL, it provides **MISSION PROGRESS MONITORING** in the form of:

- *Global and regional mosaics as the result of specific data collection campaigns*
- *Digital Elevation Models*
- *Instrument coverage views (where observations have taken place)*
- *Location overlays, e.g. latitude and longitude grid, recent featured images, sites of interest, ...*
- *Special products, e.g. master target collection status and master target mosaics*
- *Satellite position (based on JPL/NAIF/SPICE kernels), and automatic tracking of present position*
- *Ability to validate products and fuse data both within a mission and across servers.*

ACT-REACT QuickMap has similarities with other web based mapping applications such as Google Maps. But it differs by offering:

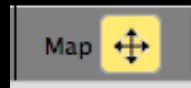
- Rapid data updates supporting mission progress
- On-the-fly product generation. Pre-caching of all possible products is not required.
- Product Search & Access tools
- Leverages on PIPE architecture, for capabilities of data ingestion, publishing and analysis (which has been proven over many NASA/NOAA/DoD Missions).

The following slides show the main features and usage of **ACT-REACT QuickMap**, along with some of the layers and data products from the **NASA MESSENGER** mission to Mercury, which are exposed via the QuickMap interface.

- Global imaging campaigns (MDIS instrument)
- Multispectral imaging (MASCS instrument)
- Satellite tracking
- Digital terrain elevation models (MLA , MDIS, ...)
- Data access and query capabilities (link to NASA PDS)

QuickMap: Navigate around

Map Navigation mode



Zoom

- Double-click to zoom in
- Shift + Drag to zoom to the selected area
- Zoom bar: click on [+]/[-] to change zoom level and on the globe icon to display the whole map
- Change map scale by selecting the desired resolution from the drop-down menu
- Keyboard: use the [+] and [-] keys to zoom in and out



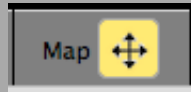
Pan

- Click and drag the map
- Keyboard: use the arrow keys to pan around
- Enter Latitude / Longitude

Recenter

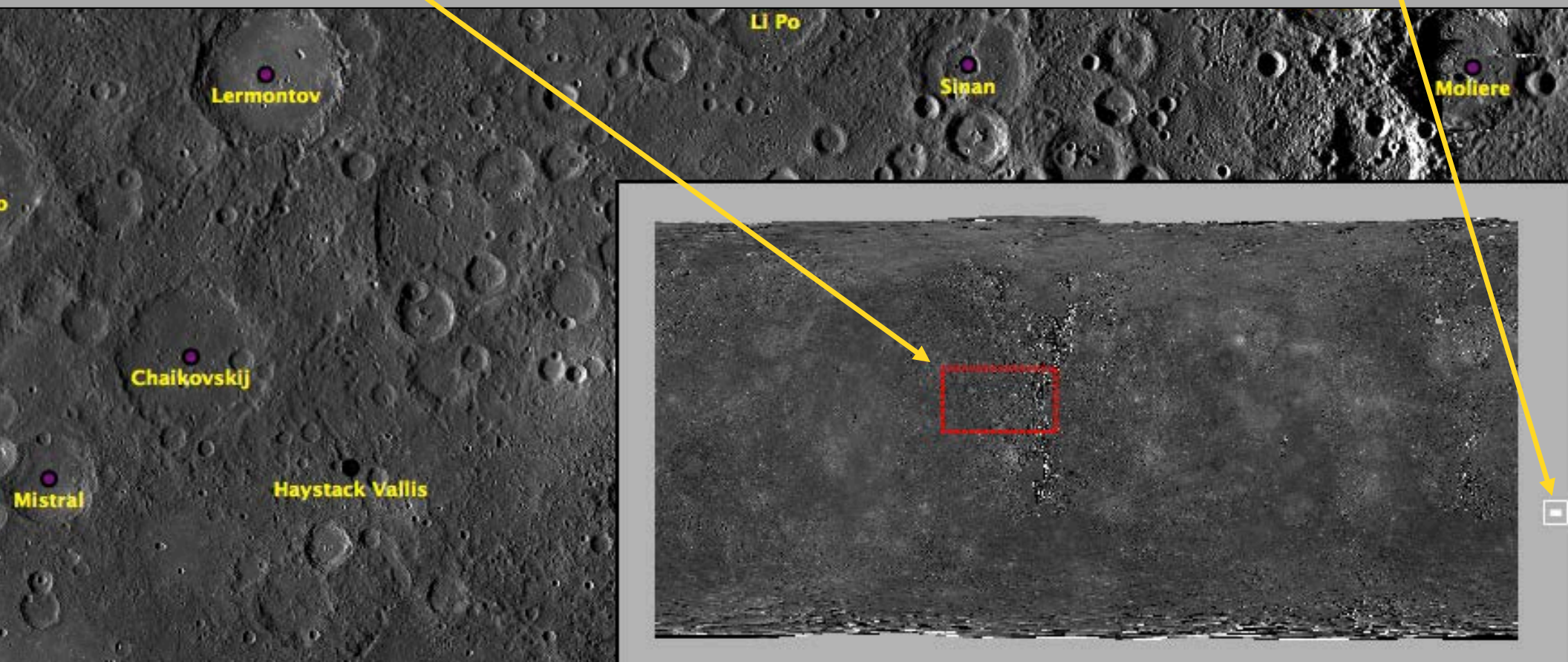
QuickMap: Navigate around

Map Navigation mode



Context Map

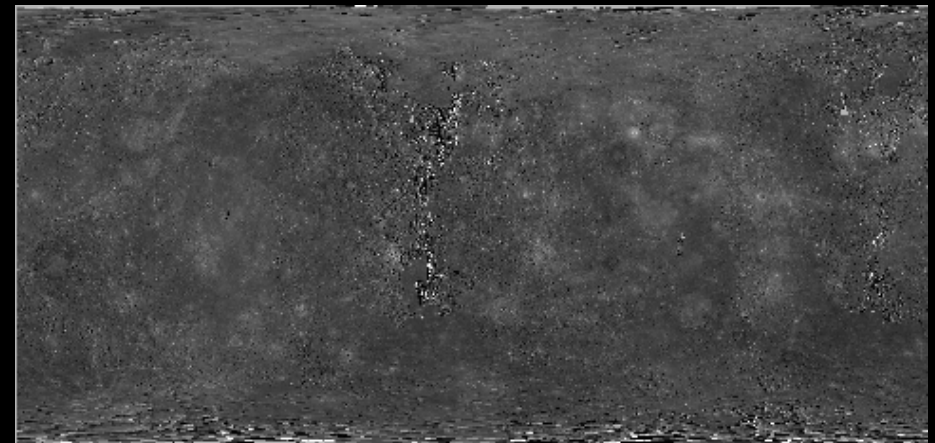
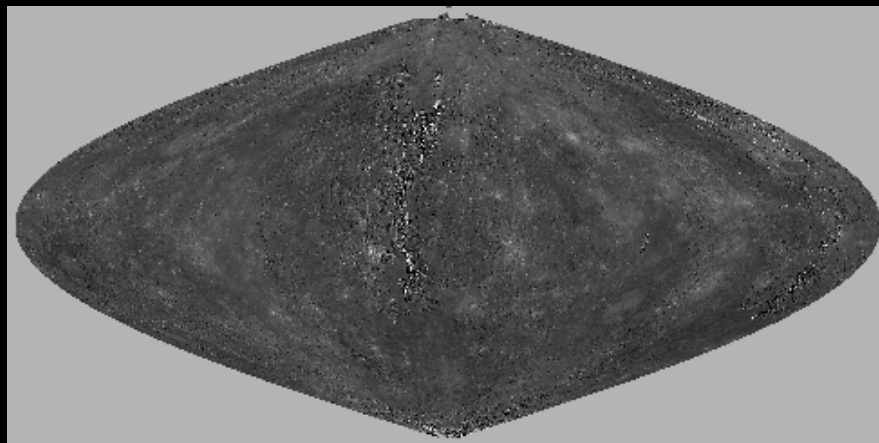
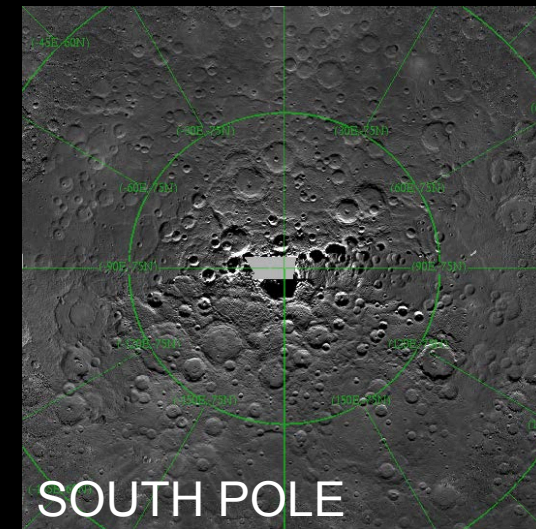
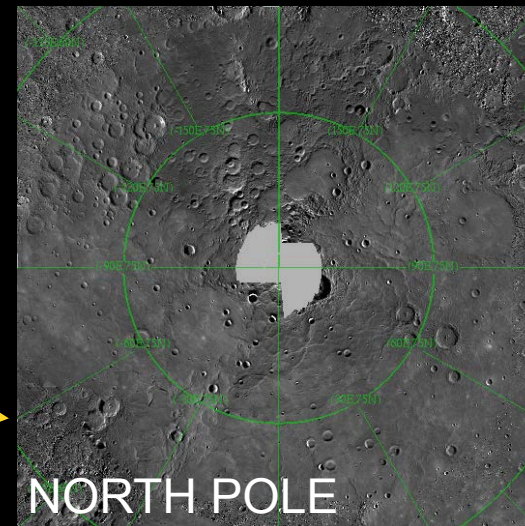
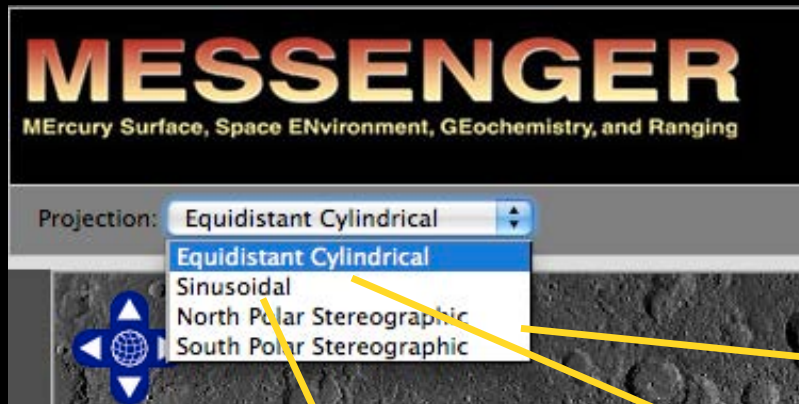
- Display and hide the context map by clicking on the [+] / [-] button near the lower right corner
- Drag around the red area to jump to a different location



QuickMap: Navigate around

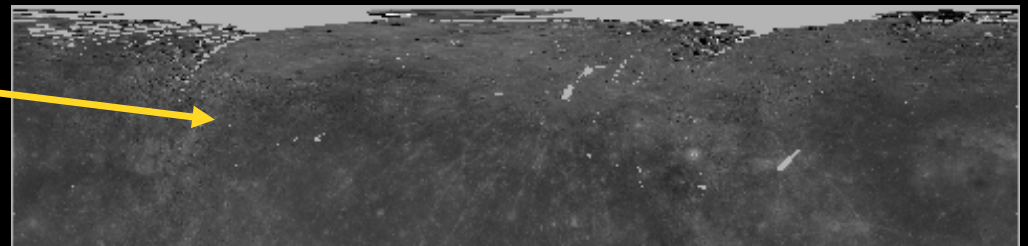
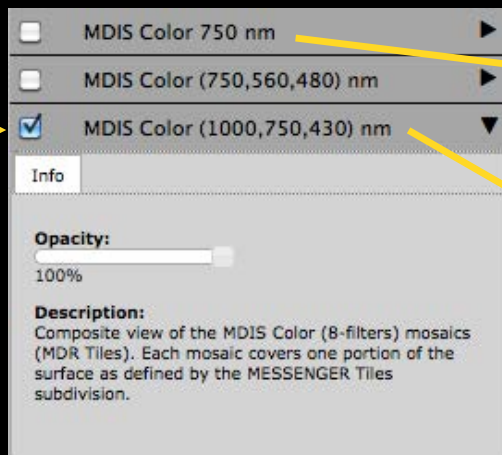
Polar views cover from
+/-65 degrees latitude
to pole

Change Map projection:

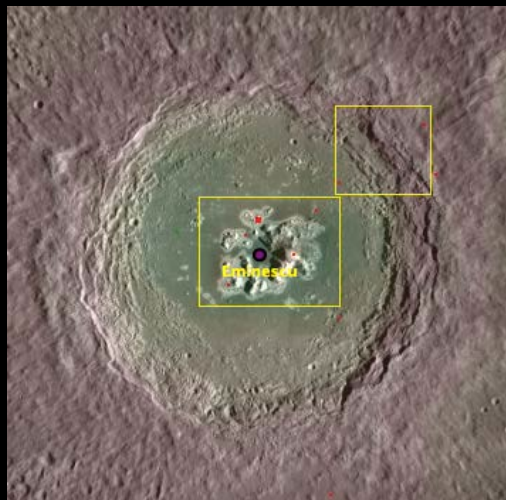


QuickMap: Navigate around

Choose between available layers by using the left panel:



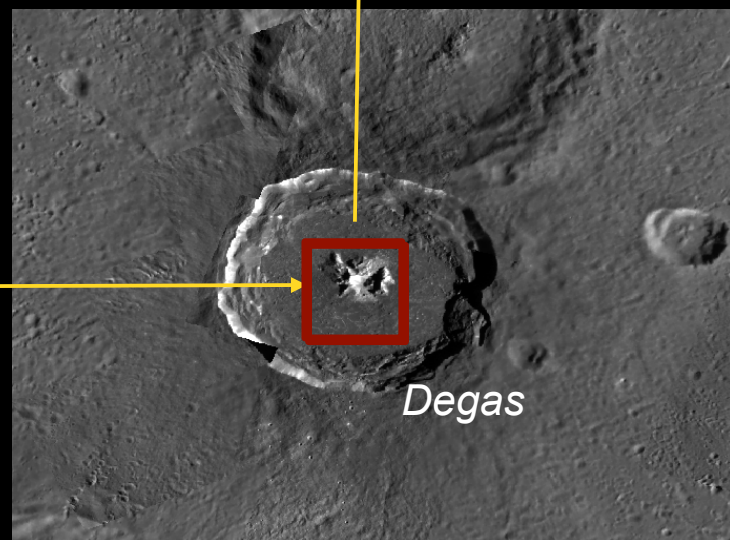
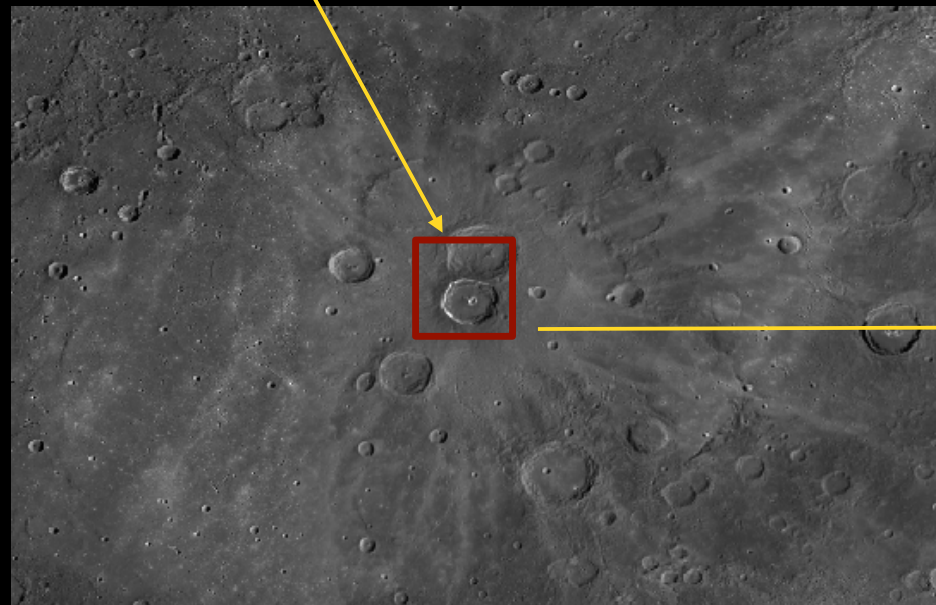
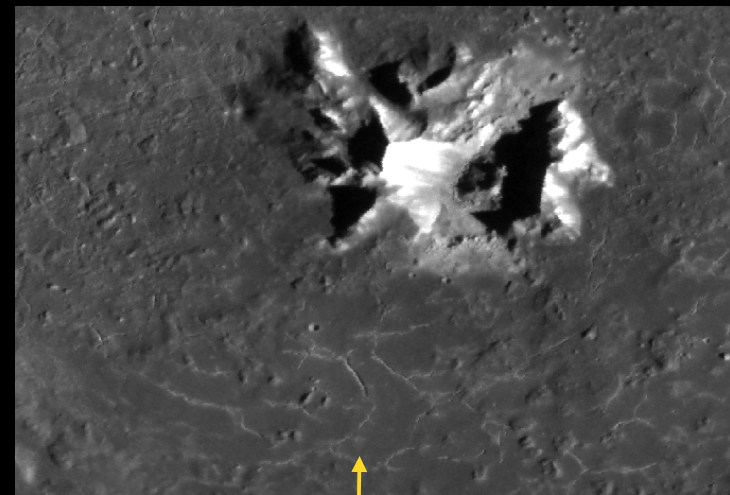
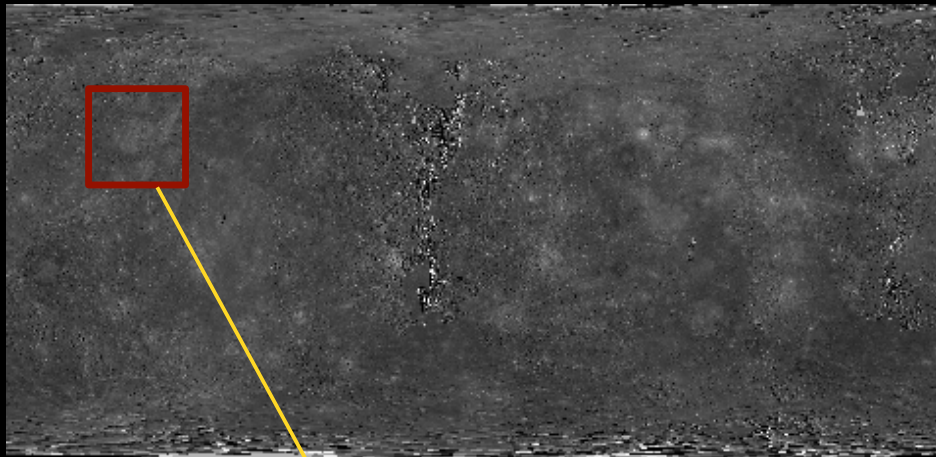
... and combine them:



Example of a composite view showing semi-transparent terrain elevation map, morphologic base map, named features and outlines of regions targeted for further high-resolution imaging.

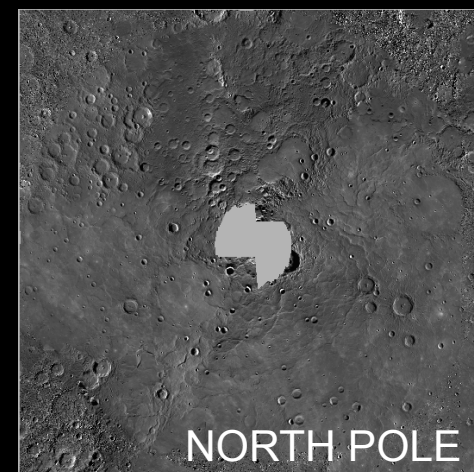
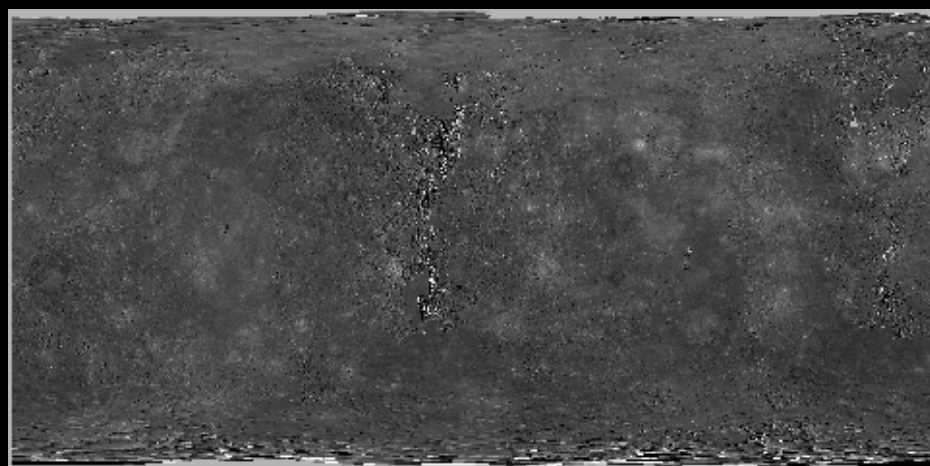
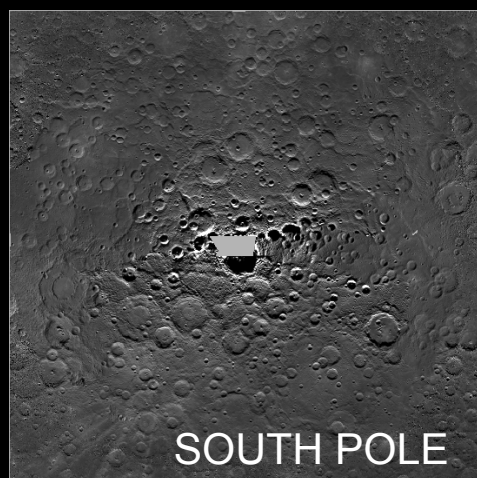
QuickMap: Navigate around

Zoom from whole globe to extreme detail

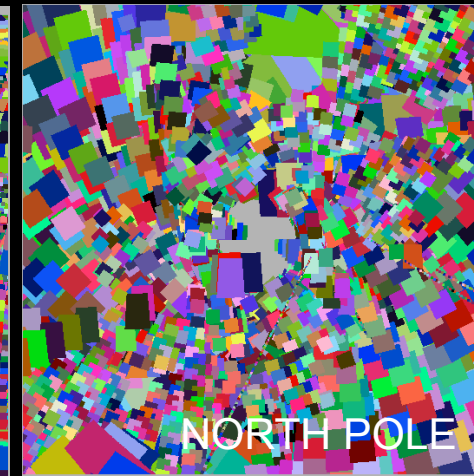
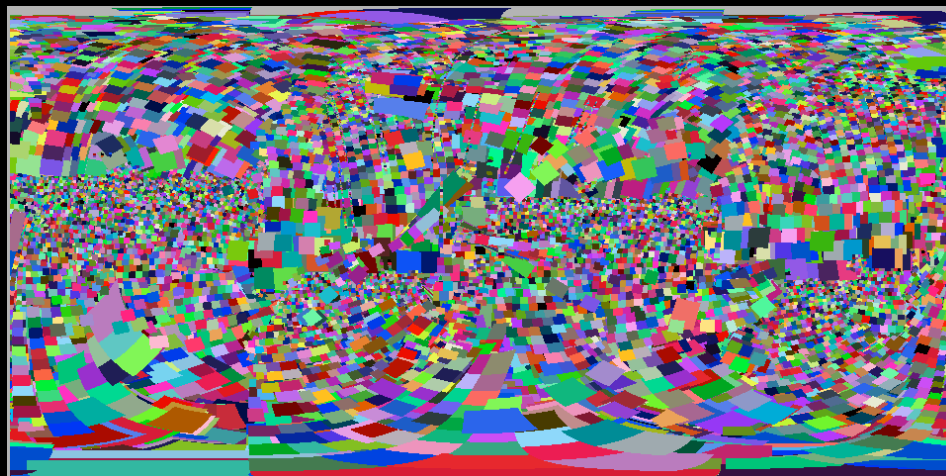
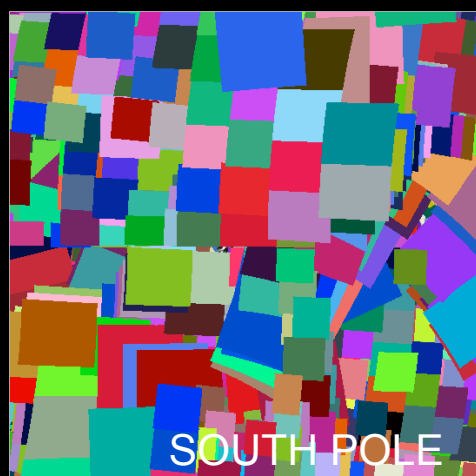


MDIS global monochrome mosaic

The following mosaic has been generated by calibrating, projecting, filtering and assembling about **35,000 images** collected so far by the MDIS Wide and Narrow angle cameras

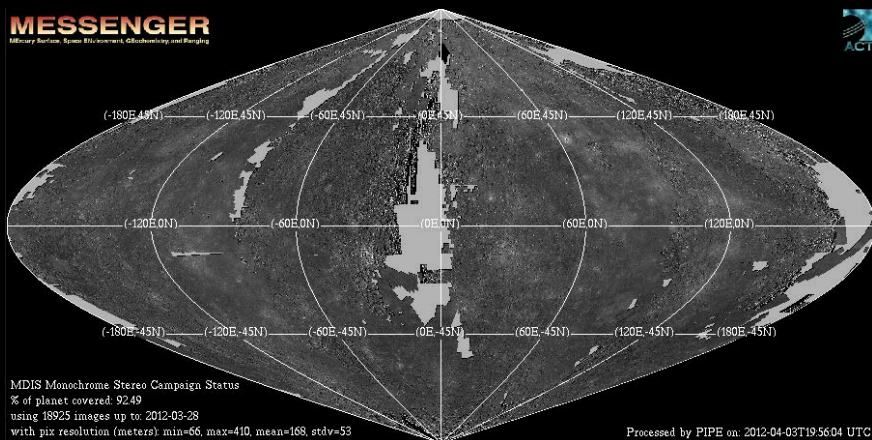


Each 'patch' is an individual image making up the global mosaic:

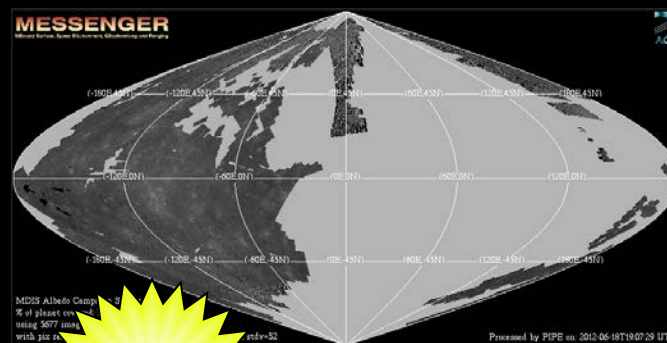


MDIS global mosaics campaigns

Additional global mosaics are being built to address specific scientific needs; their progress can be monitored via ACT-REACT QuickMap:

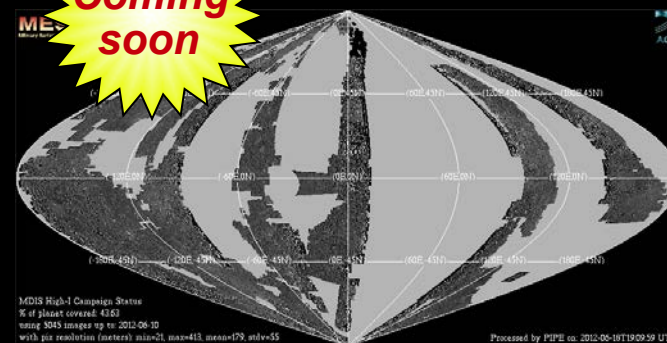


Stereo basemap (photogrammetry)

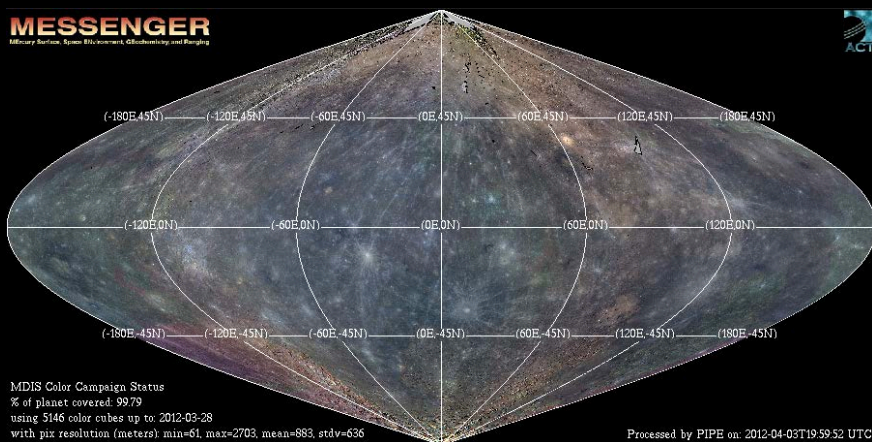


Albedo map (minimized shadows)

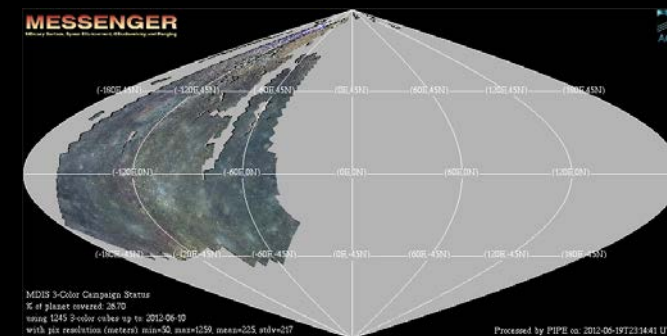
Coming soon



High solar incidence map (with shadows)



Eight colors (multispectral imaging)

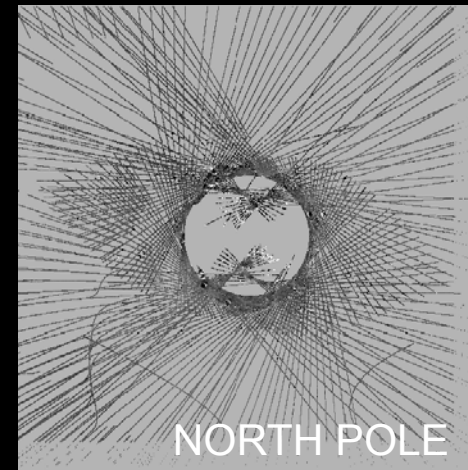
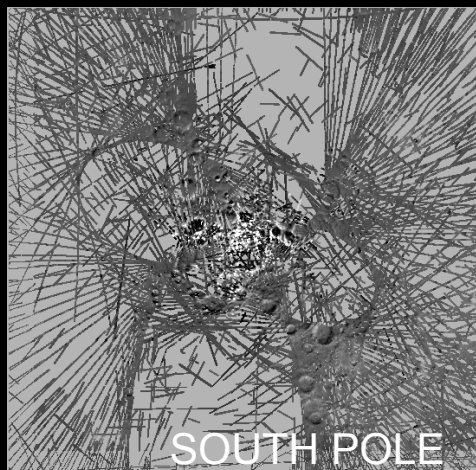


Three colors High resolution map

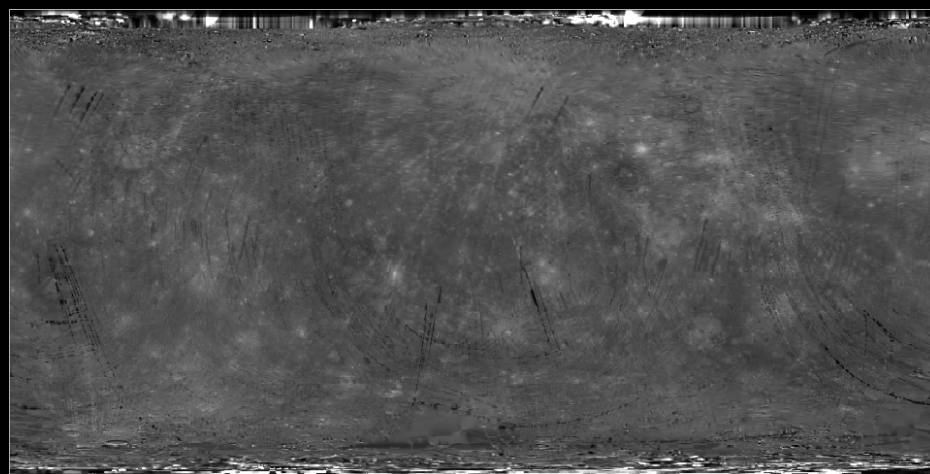
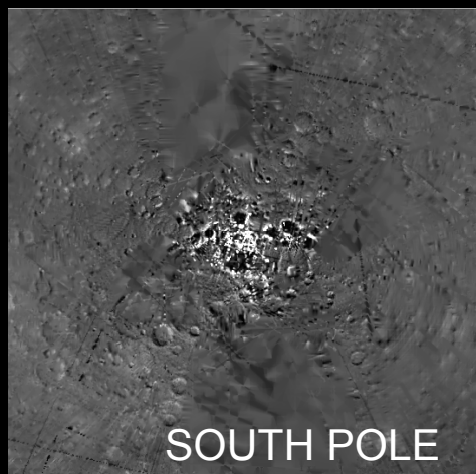
Coming soon

MASCS/VIRS global mosaic

The following mosaic has been generated by calibrating, projecting, filtering and assembling about **2 million observations** collected so far by the MASCS/VIRS instrument



The **interpolated version** is easier to compare with MDIS global mosaics:



Location Overlays

Overlay layers help identify and search locations of interest:

- Latitude/Longitude grid
- Mercury and MESSENGER charts
- Mercury named features and images highlighted by the MESSENGER team members

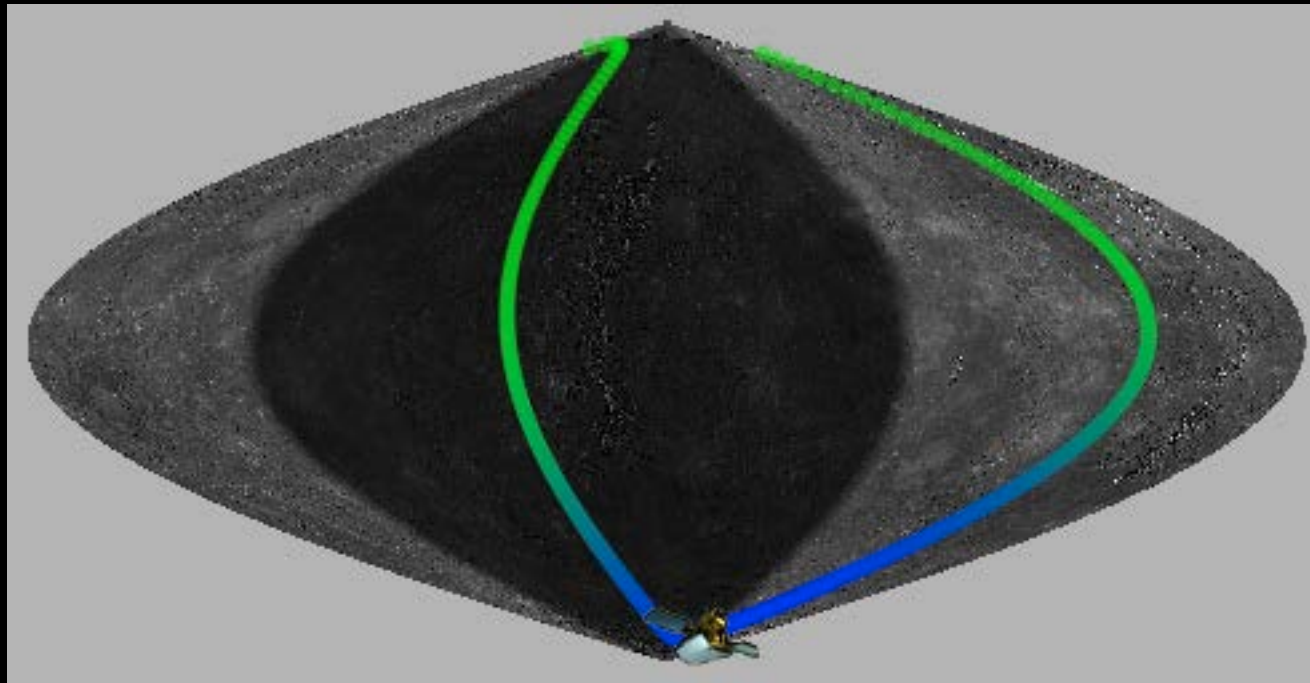


The screenshot shows the 'Layers' panel on the left with 'MESSENGER Featured images' checked. Below it is a search bar with 'hollow' entered and a 'Search' button circled in red. A yellow arrow points from the text 'Search features' to this search bar. The search results list several hollows, with 'The Sleepy Hollows of Mercury' being the most prominent. On the right, a map of Mercury shows several hollows highlighted with colored circles and labels: 'Heart of Darkness' (red), 'Lonely Hollow' (orange), and 'The Sleepy Hollows of Mercury' (green). A yellow arrow points from the 'Lonely Hollow' label to a corresponding feature in the top-right image.

Search features →

Location Overlays

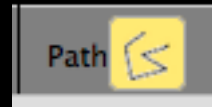
It is always possible to get a real time update of where the spacecraft is and see the portion of the planet which is illuminated by the sun.



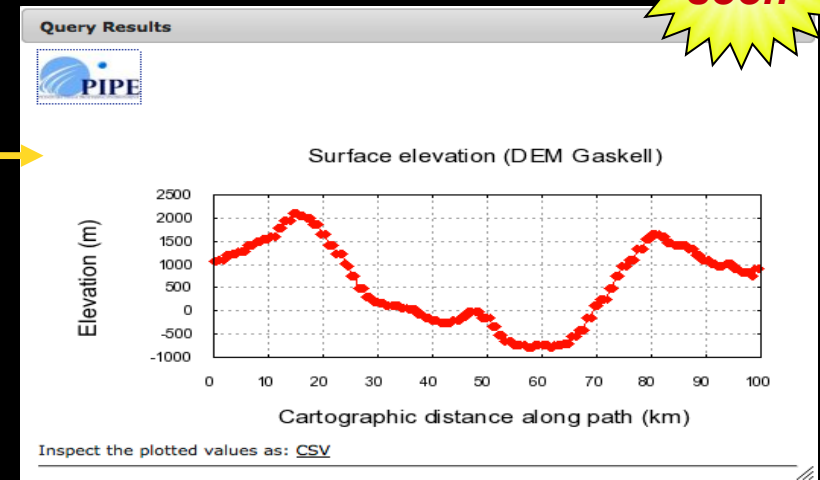
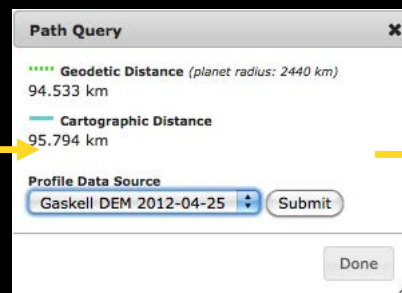
Global sinusoidal view, depicting the trajectory and the position of the MESSENGER spacecraft while it is leaving the dark side and entering the illuminated area of mercury.

Product Search & Access tools

Switch from *map navigation* to *path* mode



Draw a path on the map (single click to add a vertex, double click when done)



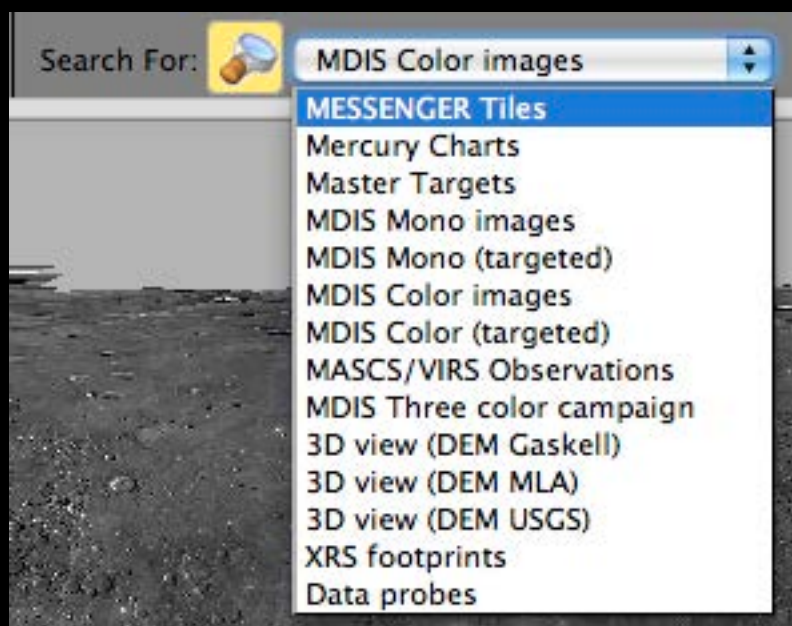
Coming soon

This example shows how to extract elevation profiles over a selected path

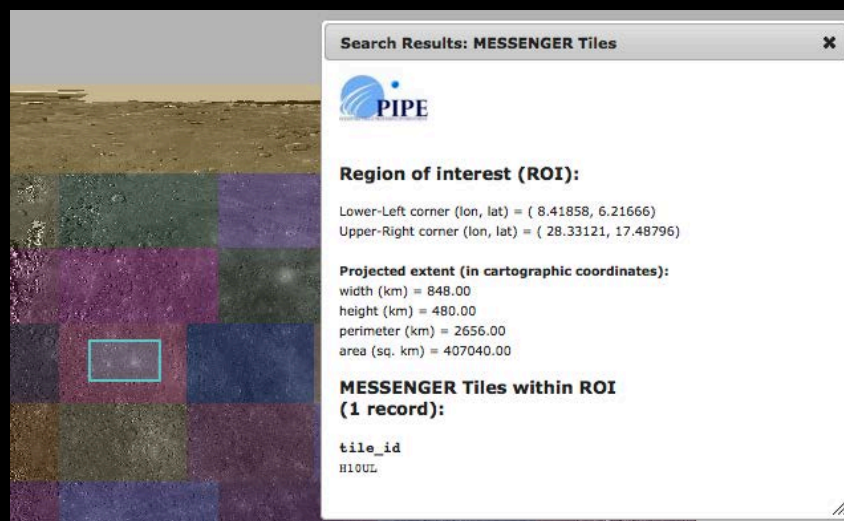
Product Search & Access tools

Switch from *map navigation* to *search* mode and select the desired item

Drag a rectangle over an area of interest to request additional information.

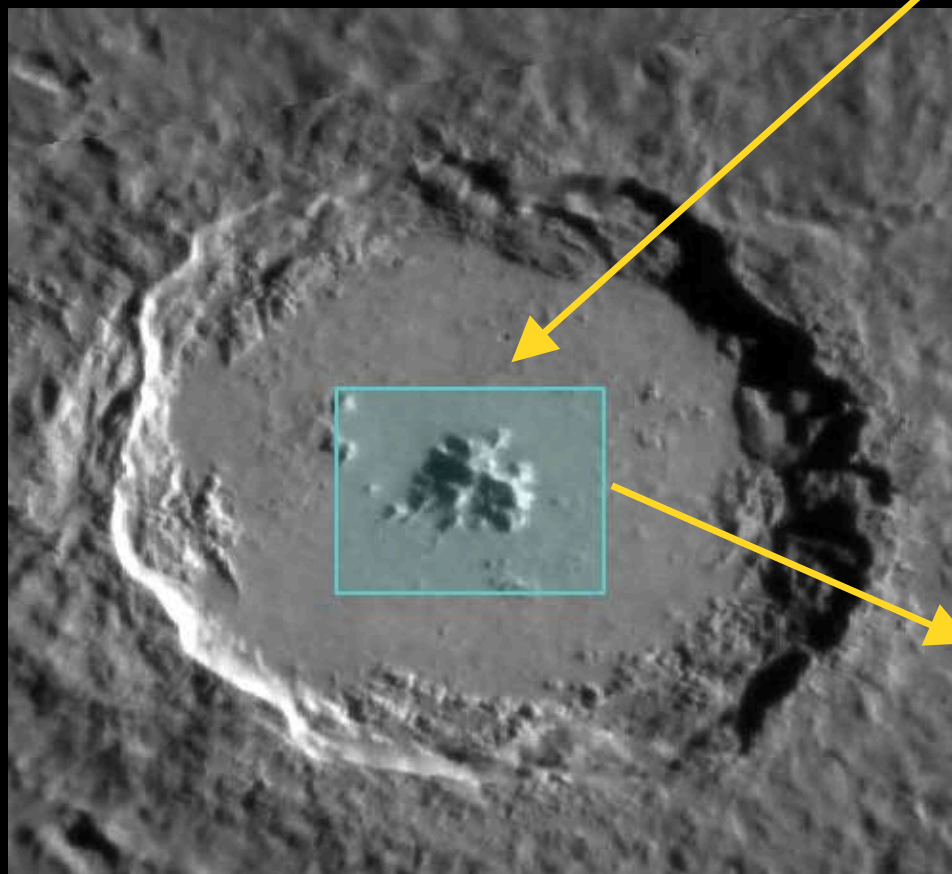
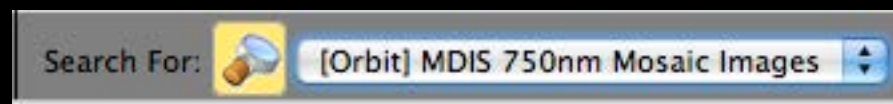


In this example, the result box provides the ID of the selected MESSENGER Tile



Product Search & Access tools

Example: search for images covering the provided region of interest and download them from **PDS** (valid for already published products)



Search Results: [Orbit] MDIS 750nm Mosaic Images

Region of interest (ROI):
Lower-Left corner (lon, lat) = (12.07092,-34.31644)
Upper-Right corner (lon, lat) = (12.89278,-33.68830)

Projected extent (in cartographic coordinates):
width (km) = 35.00
height (km) = 26.75
perimeter (km) = 123.50
area (sq. km) = 936.25

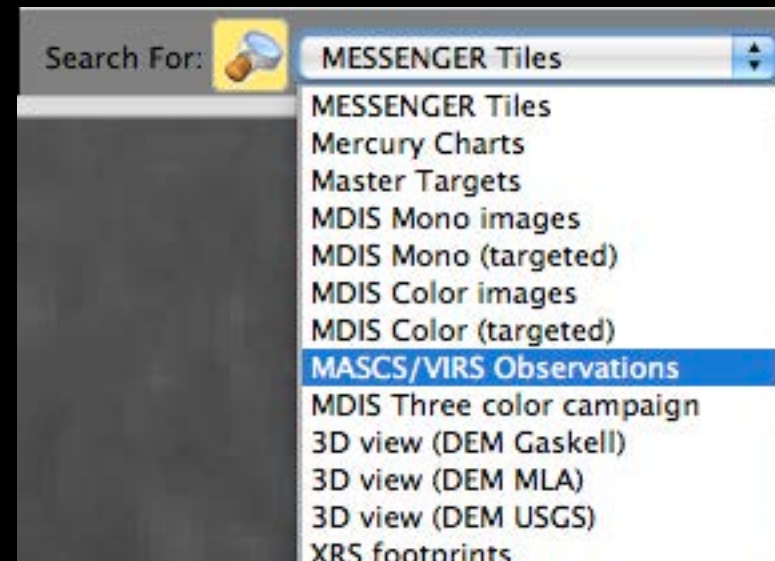
[Orbit] PDS-released 750nm images within ROI (32 records):

filename, date	
CW0210441772G_IP_3.IMG	Download , 2011_094
CW0210445606G_IP_3.IMG	-- Download , 2011_094
CW0210448810G_IP_3.IMG	-- Download , 2011_094
CW0210478979G_IP_3.IMG	-- Download , 2011_095
CW0210482017G_IP_3.IMG	-- Download , 2011_095
CW0210486196G_IP_3.IMG	-- Download , 2011_095
CW0210489889G_IP_3.IMG	-- Download , 2011_095
CW0210527243G_IP_3.IMG	-- Download , 2011_095

Link to PDS

Product Search & Access tools

Example showing how access **MASCS/VIRS** spectrometer observations



In this example, the result box provides information and links for further inspection about the selected MASCS/VIRS multi-spectral measurements

Search Results: MASCS/VIRS Observations

Region corners (lon, lat): Cartographic extent:

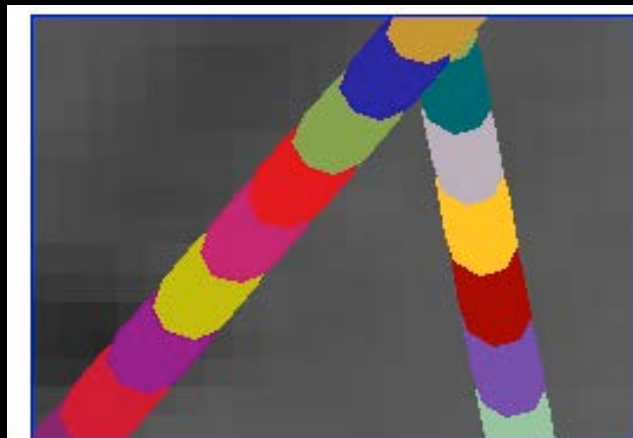
Upper-Left: (50.08750, 3.42744)	width (km) = 10.50
Lower-Right: (50.33406, 3.25485)	height (km) = 7.35
	perimeter (km) = 35.70
	area (sq. km) = 77.17

VIRS footprints within ROI (17 records):

MBT, UTC, I (avg), E (avg), P (avg), area (km^2), metric
234960235.264, 12013T16:39:28, 55.30, 25.19, 77.83, 2.62, 5.08
234960236.514, 12013T16:39:30, 55.30, 25.18, 77.83, 2.61, 5.07
234960237.764, 12013T16:39:31, 55.31, 25.17, 77.83, 2.61, 5.07
234960239.014, 12013T16:39:32, 55.32, 25.16, 77.83, 2.61, 5.07
234960240.264, 12013T16:39:33, 55.32, 25.16, 77.83, 2.61, 5.07
234960241.514, 12013T16:39:35, 55.33, 25.15, 77.83, 2.60, 5.06
234960242.764, 12013T16:39:36, 55.34, 25.14, 77.83, 2.60, 5.05

Product Search & Access tools

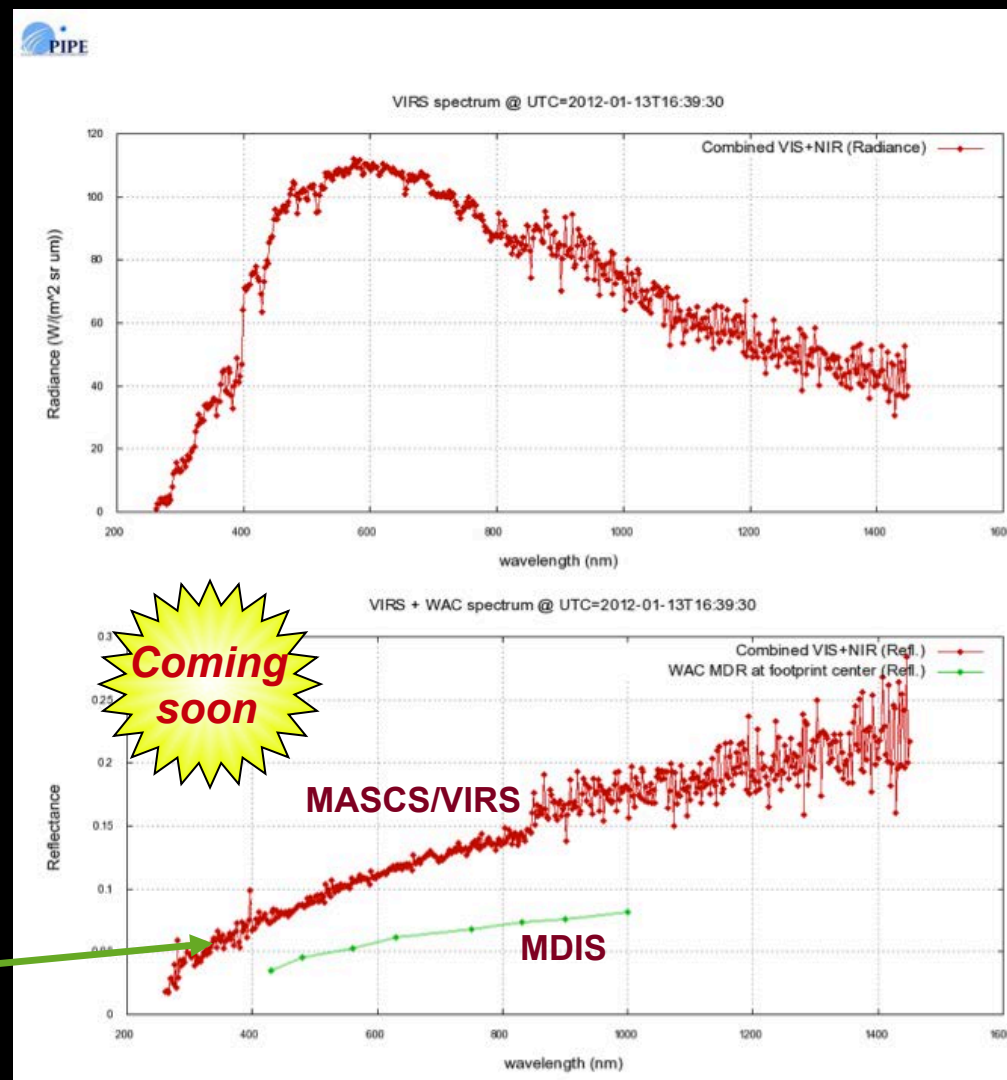
It is possible to inspect the spectrum of each single **MASCS/VIRS** spectrometer observation, and **compare** it on-the fly with the **MDIS** spectrum measured on the same spot:



(click footprints or links to access detailed information)

VIRS footprints within ROI (17 records):

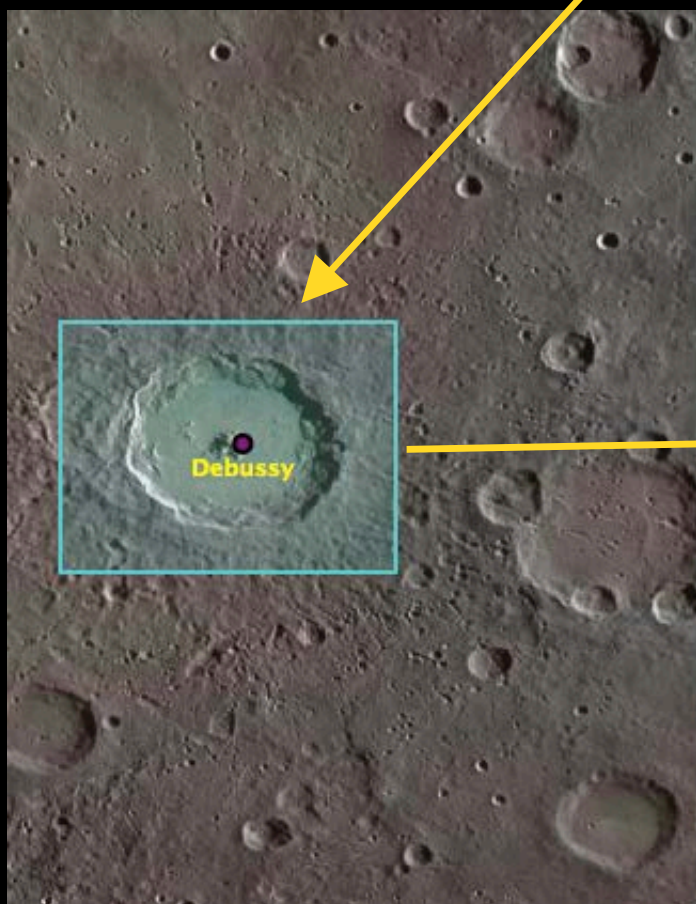
MET, UTC, I (avg), E (avg), P (avg), area (km ²), metric
234960235.264, 12013T16:39:28, 55.30, 25.10, 77.83, 2.62, 5.08
234960236.514, 12013T16:39:30, 55.30, 25.18, 77.83, 2.61, 5.07
234960237.764, 12013T16:39:31, 55.31, 25.17, 77.83, 2.61, 5.07



Product Search & Access tools

Example: using terrain elevation data and a morphologic basemap to create 3D ground views

Search For: 3D view (DEM Gaskell)



Search Results: 3D view (DEM Gaskell)



Region corners (lon, lat):

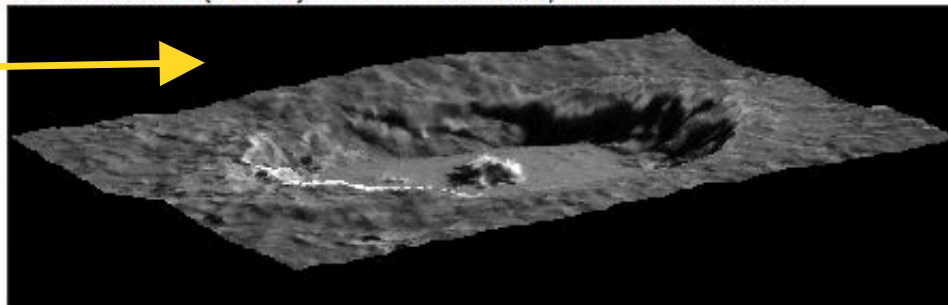
Upper-Left:
(10.68548, -32.63455)
Lower-Right:
(14.37214, -35.38193)

Cartographic extent:

width (km) = 157.00
height (km) = 117.00
perimeter (km) = 548.00
area (sq. km) = 18369.00

MDIS mono mosaic draped on top of the Gaskell elevation model (4x exagg.)

Scene elevation (meters): min = 2438045.00, max = 2441865.00



Vertical exaggeration: [1x] [2x] [3x] [4x]
Rotation angle (deg.): 30
Tilt angle (deg.): 75
View size: [small] [large]

Visualization Options

Coming soon

Permalink

While navigating the map, it is always possible to access a link that can be bookmarked for future inspection and / or shared with other people.

The screenshot displays the ACT-REACT QuickMap interface. On the left is a 'Layers' panel with a list of data layers. The 'Global Mosaic Campaigns' section is expanded, showing various MASC/VIRS and MDIS mosaic options. The 'MDIS Monochrome (solar day 1)' layer is selected with a checkmark. Below the layers panel is a 'Basemaps' section. The main map area shows a color-coded topographic map of Mercury with several craters. A scale bar at the bottom left indicates 10 km and 10 miles. A zoom control is visible on the left side of the map. In the bottom right corner, there is a 'Permalink' button, which is circled in yellow. An arrow points from the text 'Right-click and copy link' to this button. The bottom status bar shows the current zoom level (250 m/pix), latitude (39.97156), and longitude (53.42220). There are also links for '[report issues/suggestions]' and '[overview]'.

Right-click and copy link

[Permalink]

[report issues/suggestions] [overview]

Live Demo...

Questions?

Suggestions?

Ideas?