



JMARS Tutorial

Maps by Instrument

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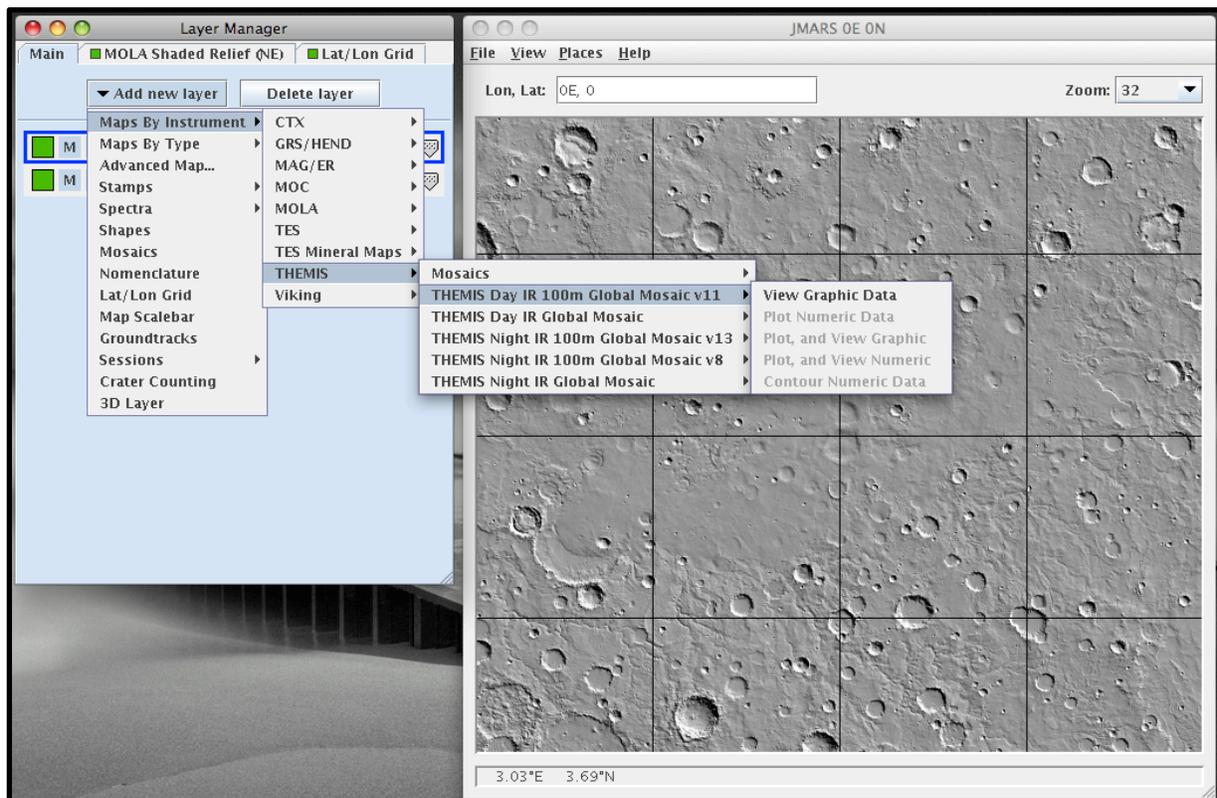
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THEMIS

THEMIS IR data is an excellent tool to add to visual data. IR data will add variations in shades of gray demonstrating differing rock/sand types and may highlight specific features that cannot be easily seen in visual data. Day IR shows variations based on how quickly the rock/sand absorbs heat and Night IR shows variations based on how quickly the rock/sand releases heat.

- In Day IR, bedrock appears dark and as it gets more broken up it gets brighter. Sand and dust appear bright white.
- Both Day and Night IR highlight wind streaks really well. It's much easier to see their details in IR rather than in VIS.

To access THEMIS IR data start by clicking "Add new layer":



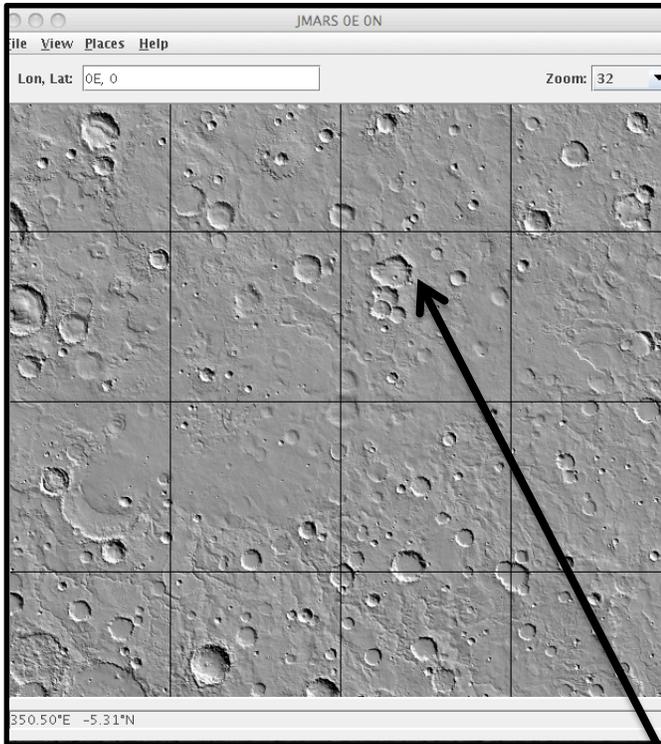
> For Day IR Data Choose:

Maps By Instrument > THEMIS > THEMIS Day IR 100m Global Mosaic v11 > View Graphic Data

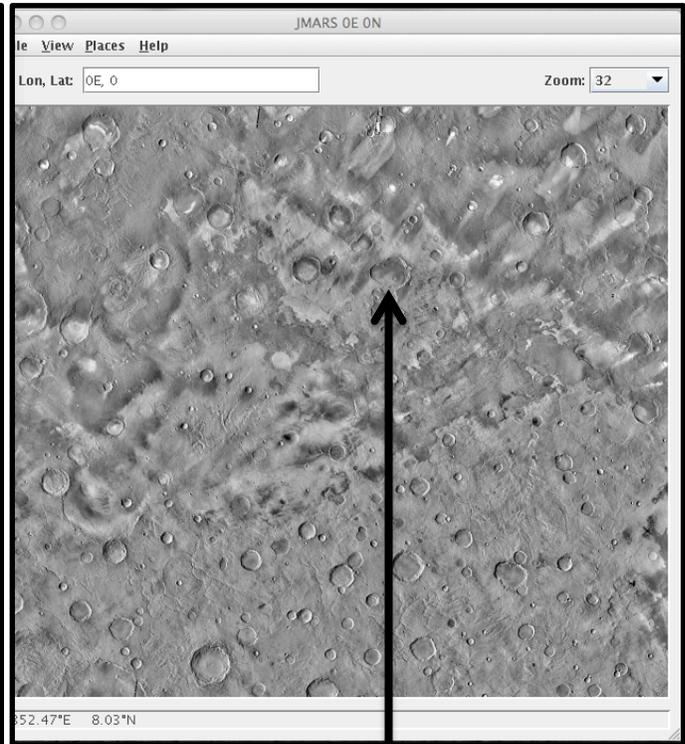
> For Night IR Data Choose:

Maps By Instrument > THEMIS > THEMIS Night IR 100m Global Mosaic v13 > View Graphic Data

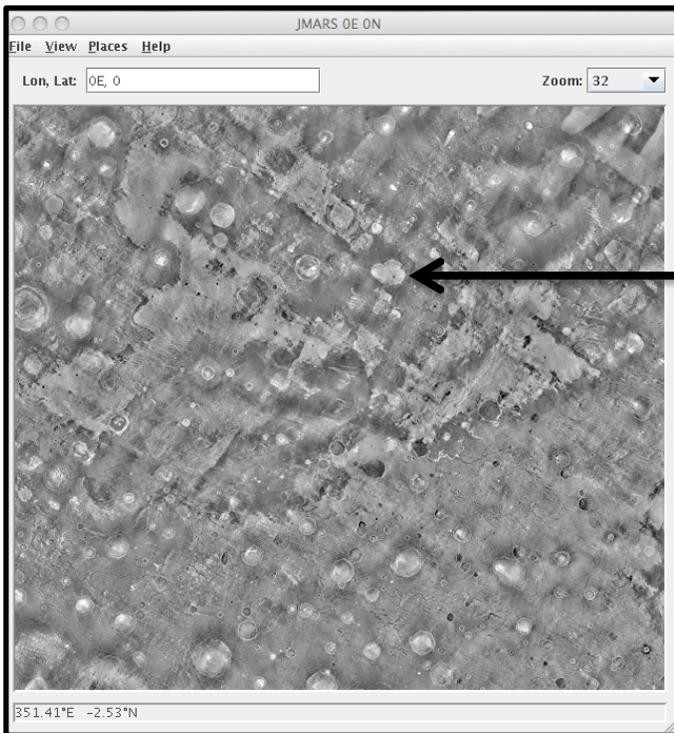
MOLA Shaded Relief Layer



THEMIS Day IR 100m Global Mosaic



THEMIS Night IR 100m Global Mosaic



The same features can be identified in layer, but with contrasting information. For example, this oddly shaped crater can be identified in all 3 layers.

Sometimes more contrast in the image can provide additional help in viewing specific features. Within the *THEMIS Day and Night IR Layers*, a Color Stretcher can be added to increase the contrast.

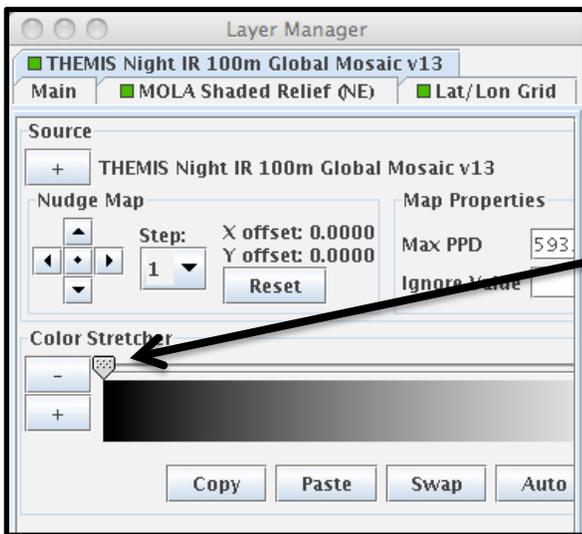
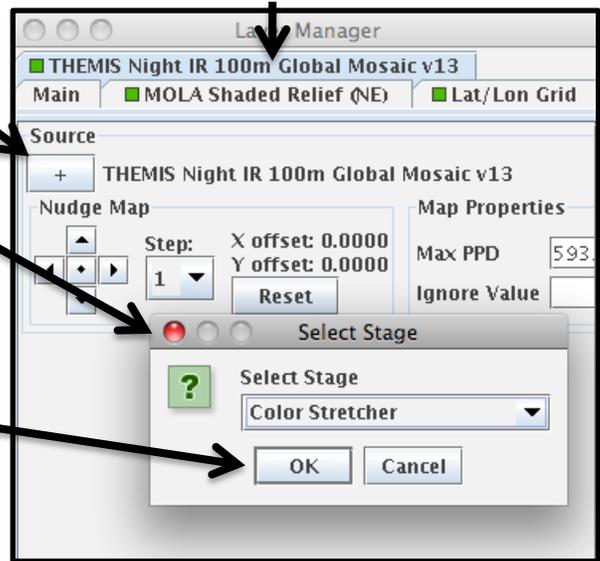
To access the Color Stretcher:

> Click on the THEMIS Night (or Day) IR 100m *Global Mosaic* tab at the top of the *Layer Manager*.

> Next, click the “+” under the *Source*.

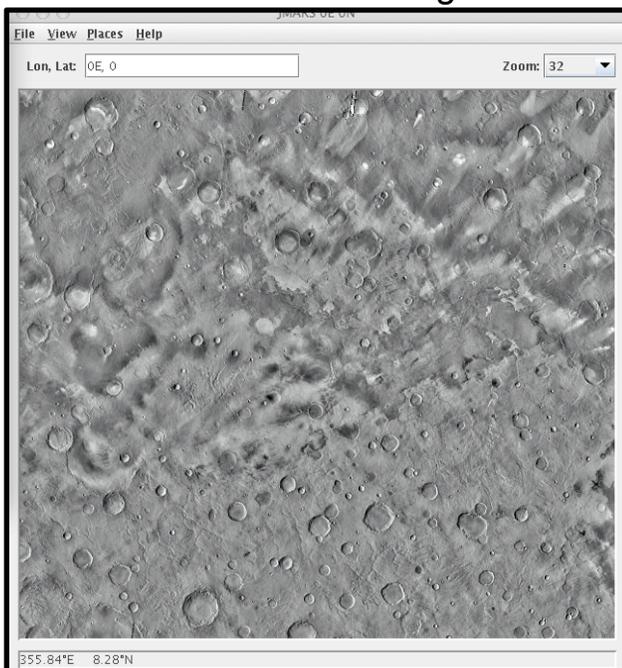
> After clicking the “+” sign, this *Select Stage* box will appear on your screen.

> If the *Select Stage* box says *Color Stretcher*, select “OK”. If it does not say *Color Stretcher*, use the drop down arrow to select *Color Stretcher* and hit “OK”.

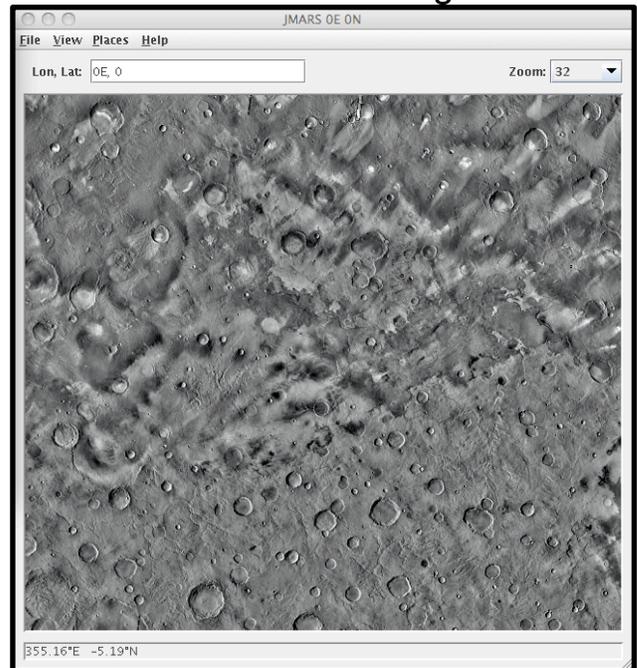


You can now move the handle left and right to “stretch” the image and create more contrast. The stretch will be different for each area, so you will need to adjust the setting until the image has the right contrast for you.

Before Stretching



After Stretching

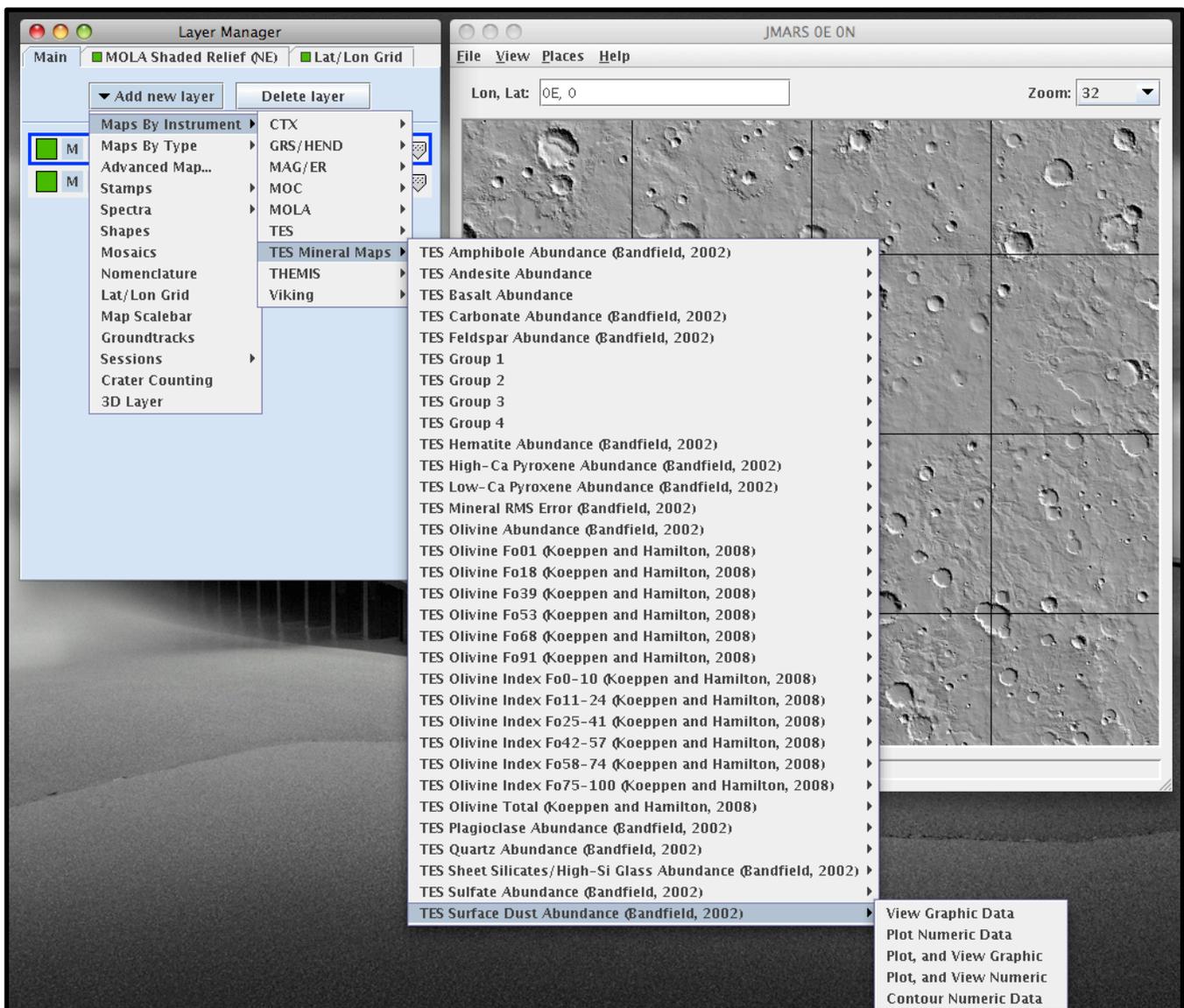


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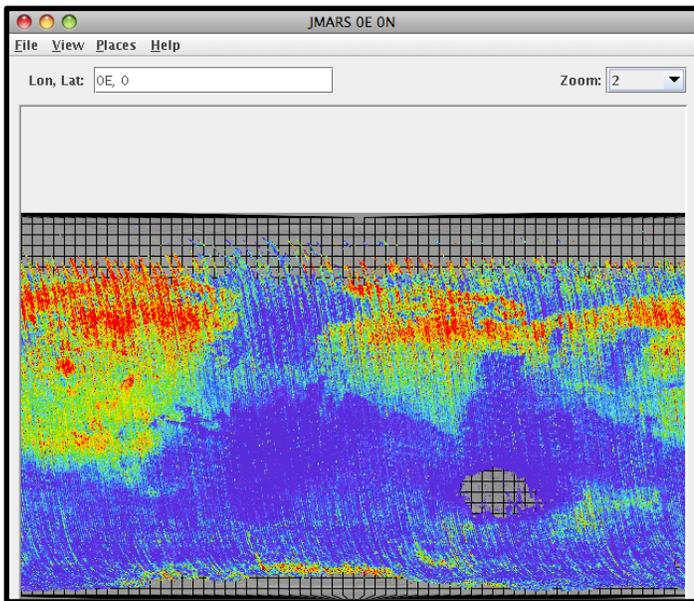
TES Mineral Maps

Thermal Emission Spectrometer (TES) instrument measures the thermal infrared energy (heat) emitted from Mars in many infrared "colors." This technique, called thermal emission spectroscopy, can tell us much about the geology and atmosphere of Mars. This particular layer will generate maps representing the abundance of specific minerals, for example, hematite. Red is a high abundance of the mineral, while blue is low abundance.

To access *TES Mineral Maps* start by clicking "Add New Layer."

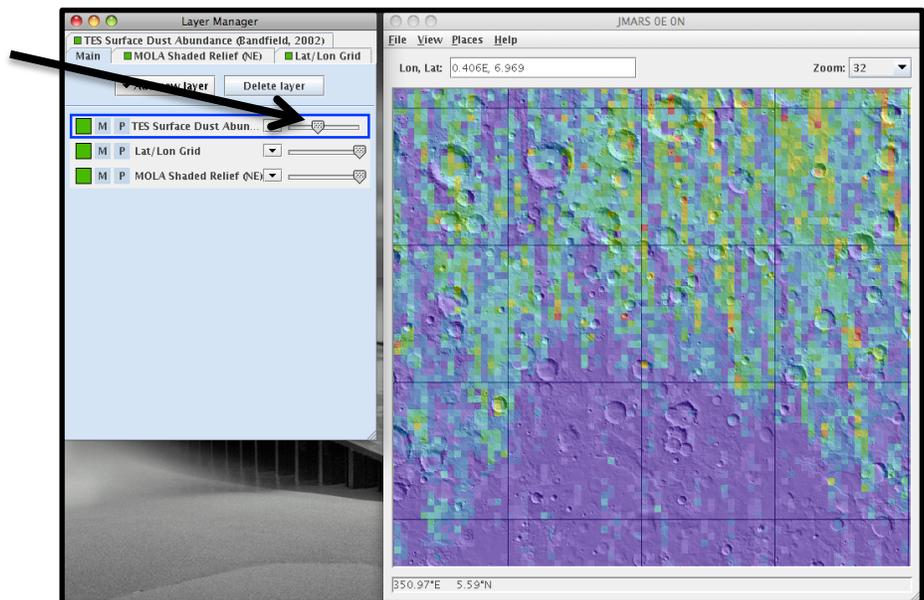


> Choose Maps By Instrument > TES Mineral Maps > TES Surface Dust Abundance > View Graphic Data.



Zoom out to “2” to get a more global view of the mineral abundance, zoom in to get more specific data.

Don't forget you can use the slider handle to make the layer transparent for viewing features beneath the image. You can also move the layer further down in the list so that it runs as a background instead of lying directly in top of your images and/or maps.



Use these same procedures for any of the TES mineral maps. The following is a list of maps that may be of particular interest to MSIP teams:

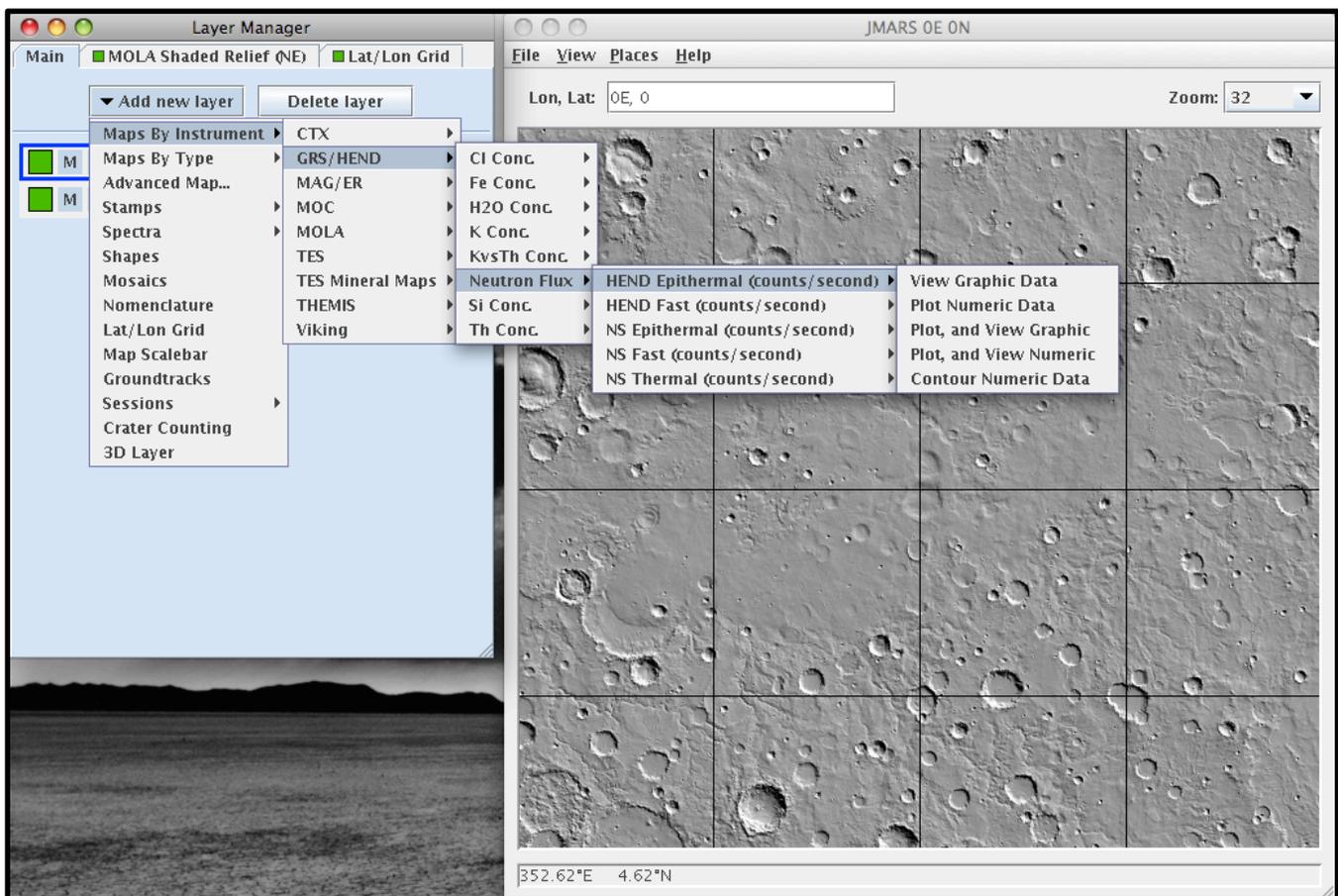
1. **TES Basalt Abundance** – This mineral map gives the abundance of a specific volcanic rock type (Basalt)
2. **TES Carbonate Abundance** – This mineral map gives the abundance of carbonates, which are often related on Earth to past or present life.
3. **TES Hematite Abundance** – This mineral map gives the abundance of hematite, a specialized mineral that forms in the presence of standing water interacting with iron over a long period of time.
4. **TES Surface Dust Abundance** – This mineral map gives the abundance of dust across the planet. This data might be helpful in dust devil track, polar spot, or wind streak research.

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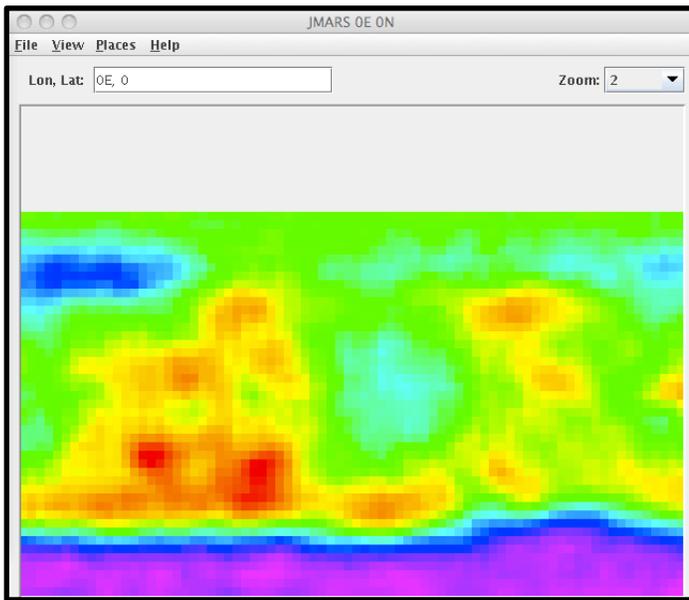
HEND Epithermal Neutrons

High Energy Neutron Detector (HEND) measured the reflection of neutrons off of Mars surface. The reflection of these neutrons provided important information about the distribution of water-ice in subsurface layers on the surface. Red is a low abundance of water ice, while blue is high abundance.

To access the *HEND Epithermal Neutron Map* start by clicking “Add New Layer.”

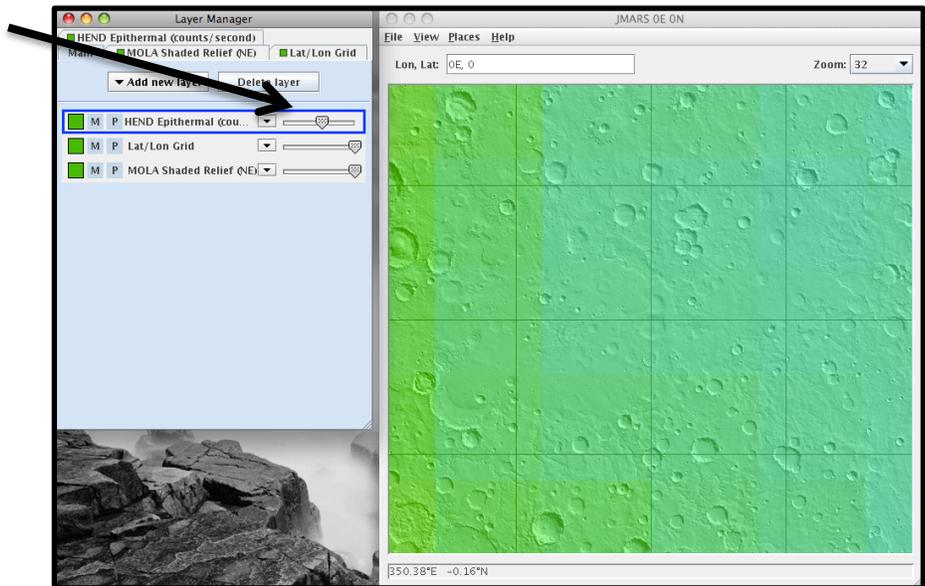


> Choose Maps By Instrument > GRS/HEND > Neutron Flux > HEND Epithermal (counts/second) > View Graphic Data.



Zoom out to “2” to get a more global view of the neutron abundance, zoom in to get more specific data.

Don't forget you can use the slider handle to make the layer transparent for viewing features beneath the image. You can also move the layer further down in the list so that it runs as a background instead of lying directly in top of your images and/or maps.

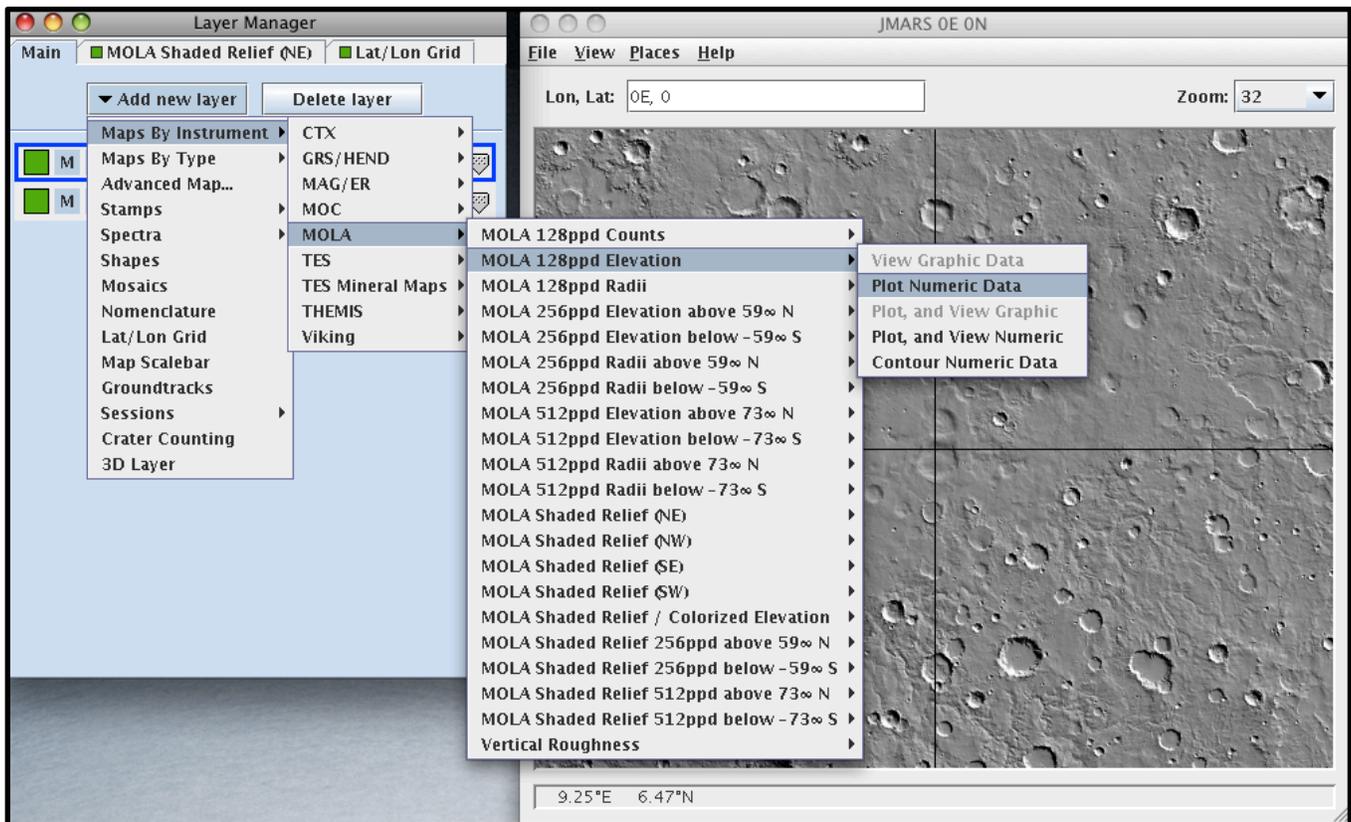


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MOLA 128ppd Elevation

Mars Orbital Laser Altimeter (MOLA) 128ppd is a shaded relief version of the *Colorized MOLA Elevation map*. The MOLA map was created using lasers. The satellite will send the signal down to the planet and measure the amount of time it takes the frequency to return generating an elevation map.

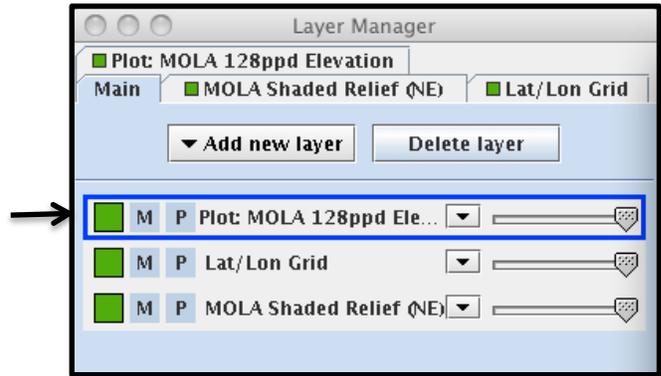
To access the *MOLA 128ppd elevation map* start by clicking “Add New Layer.”



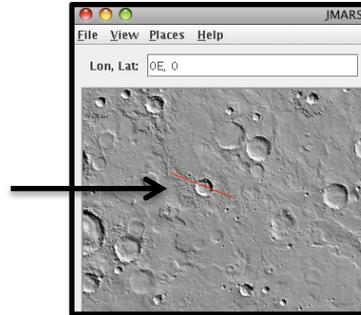
> Choose Maps By Instrument > MOLA > MOLA 128ppd Elevation > Plot Numeric Data.

To measure the depth of a feature using **MOLA 128ppd** elevation:

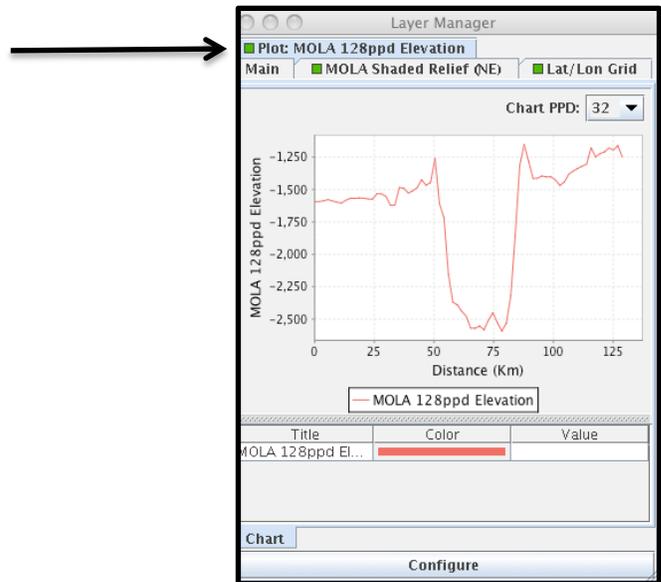
1. Verify the blue box is around the **Plot: MOLA 128ppd** elevation in the *Layer Manager*.



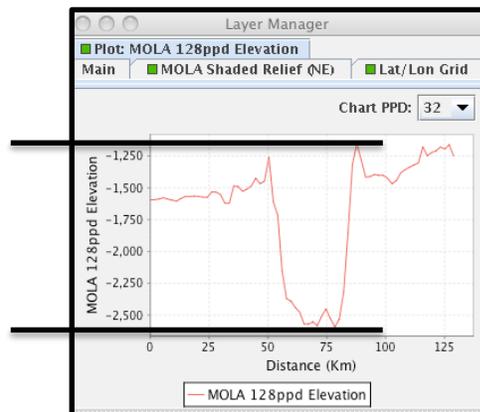
2. Click once in the *Planet View* screen to start a line, click twice to end the line. The line will change from yellow to red once you double-click.



3. Click on the **Plot: MOLA 128ppd Elevation** tab to view the elevation graph.

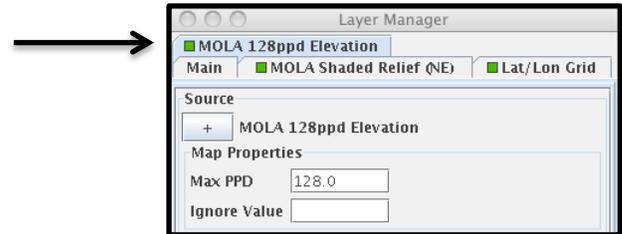


4. To determine depth, subtract the lowest elevation from the highest elevation. In this example, the depth of the crater is 1400 m.

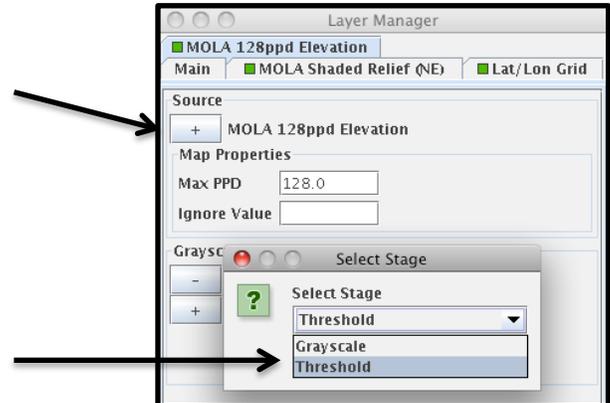


To isolate data at a specific range of elevations use *Plot and View Numeric Data* when adding a new layer:

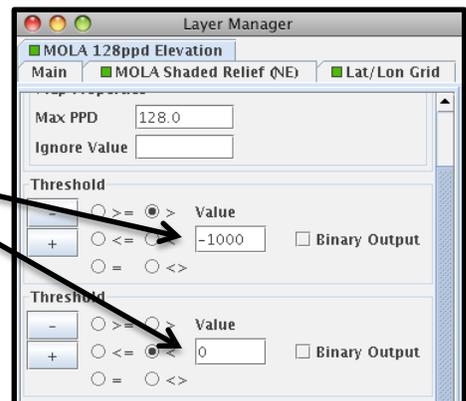
1. Click on the **MOLA 128ppd Elevation** *tab* in the Layer Manager.



2. Click the “+” sign next to the **MOLA 128ppd Elevation** then choose “Threshold.”

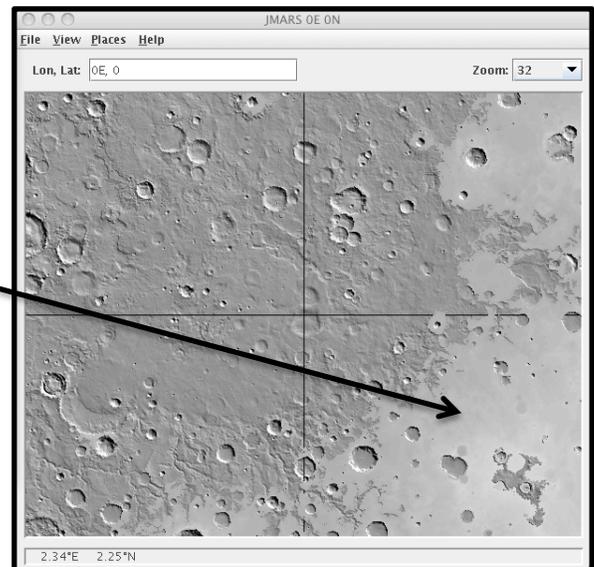


3. Complete this step twice to create two threshold barriers.



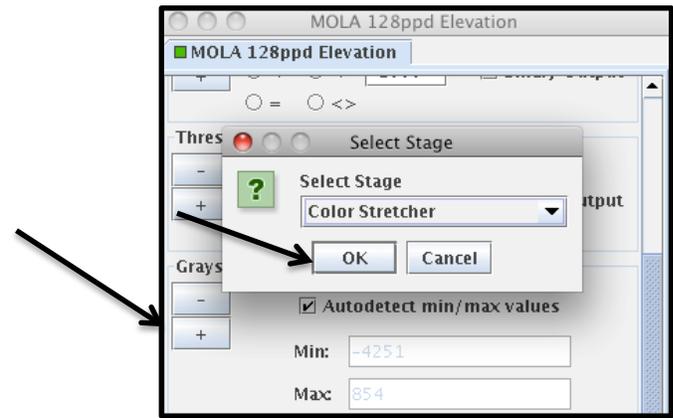
4. Choose the elevation band you would like to highlight using the $<$, $>$, and $=$ along with choosing elevation range numbers.

5. The elevation band will be highlighted in a color on your *Planet View Window*.

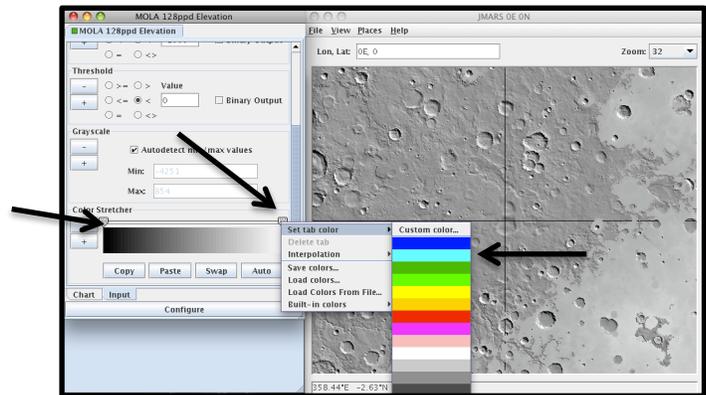


To change the color of the highlighted elevation band:

1. Click the “+” sign under the *Grayscale* and choose *Color Stretcher*.



2. Right click on the tab arrow, select “*Set Tab Color,*” and choose a color. To create a solid color, complete this step also using the left tab arrow.



3. When finished, the highlighted elevation should look all one color. Remember, you can make the color level less opaque by using the slider in the main view of the *Layer Manager*.

