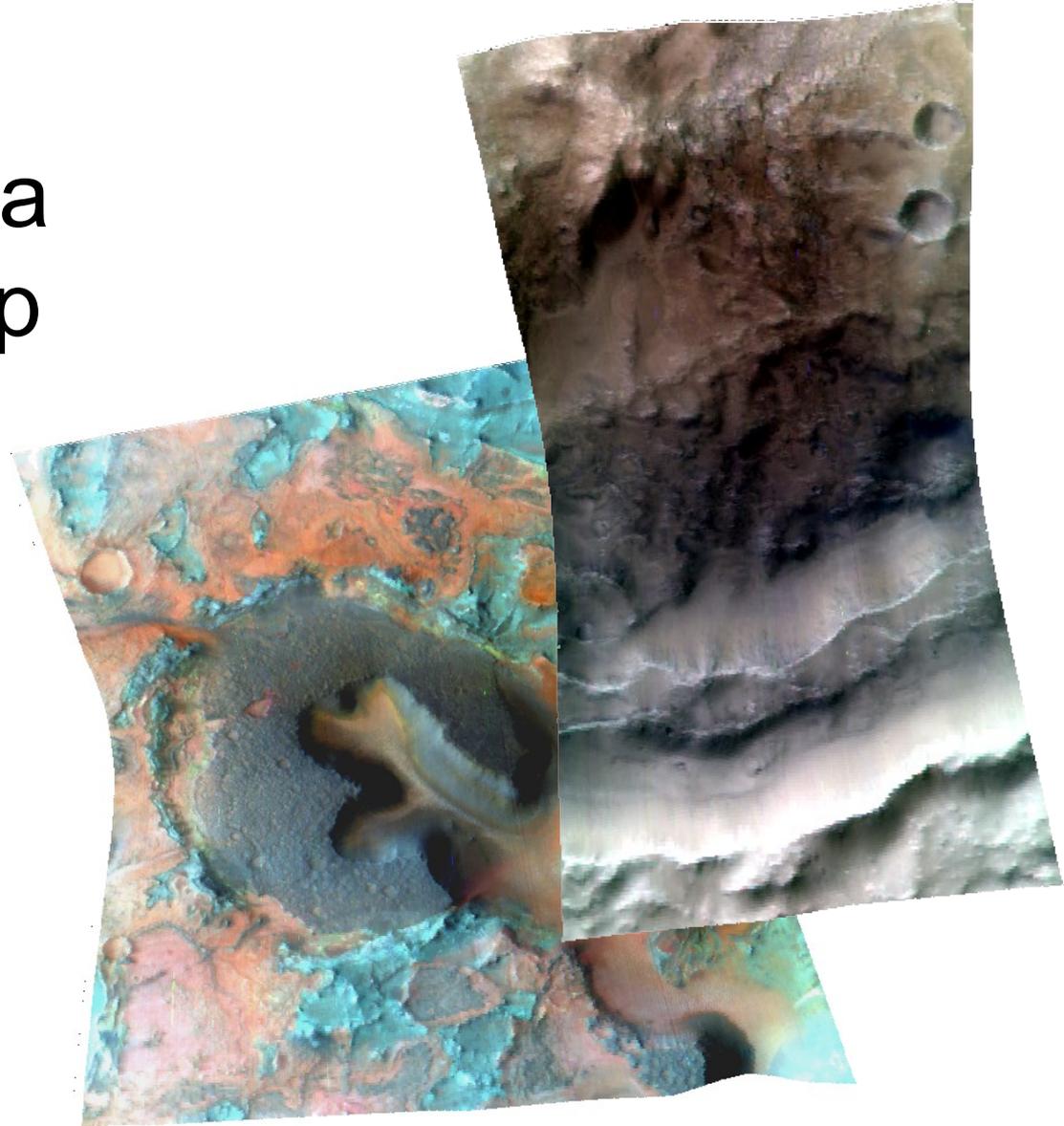


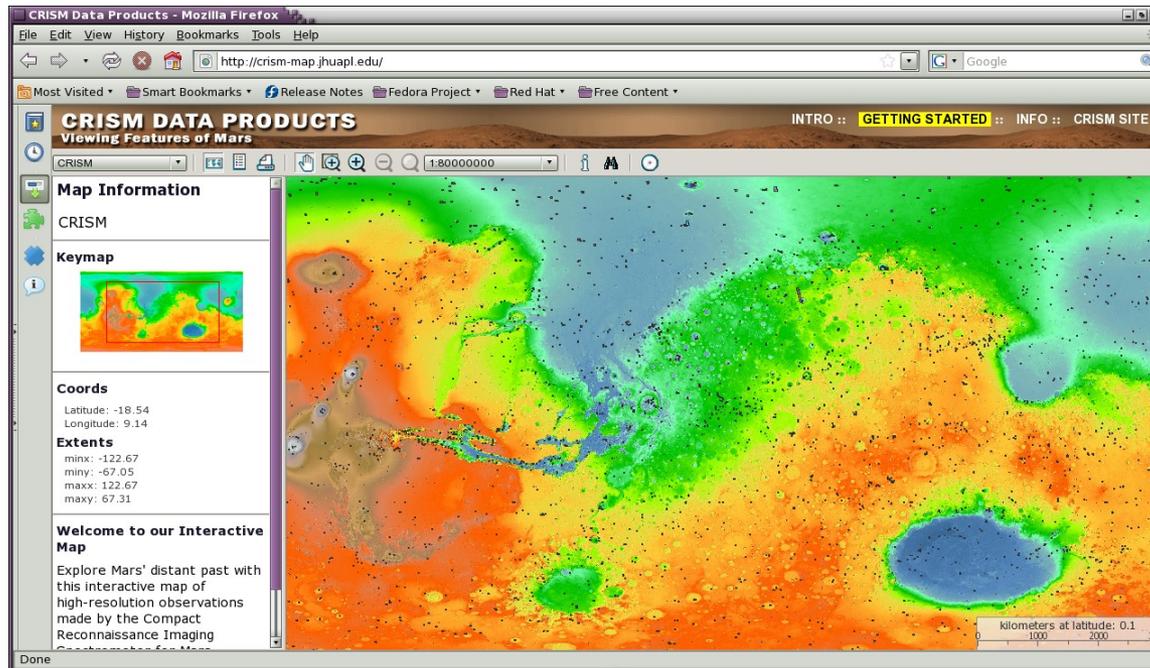
Finding your data with CRISM-map

CRISM workshop

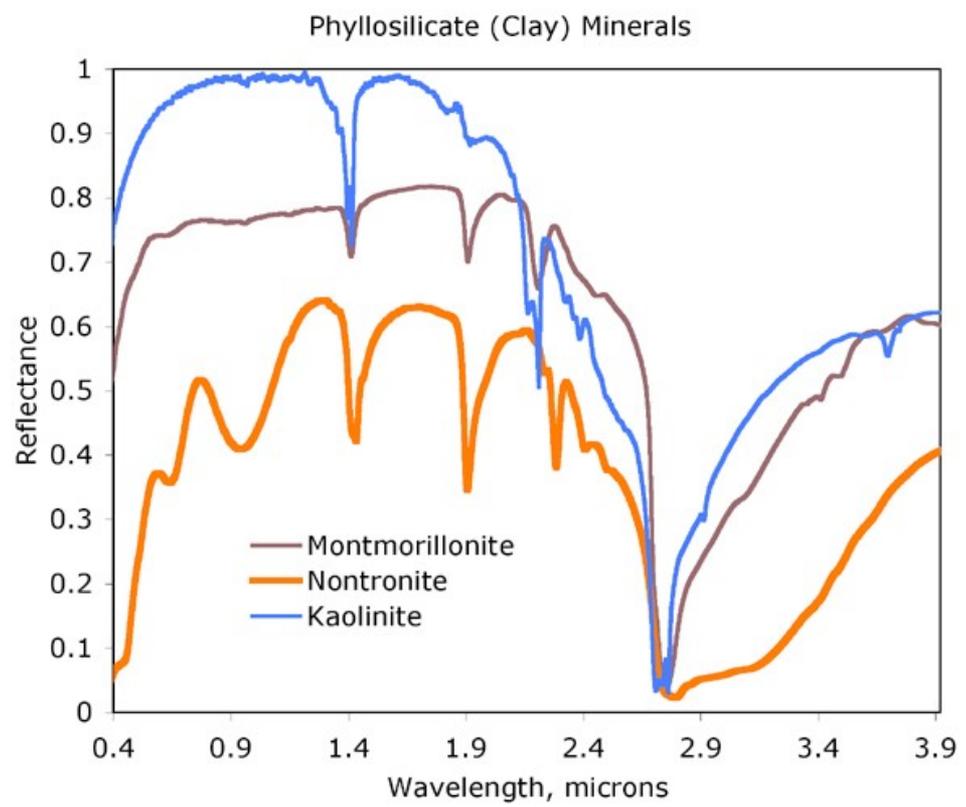
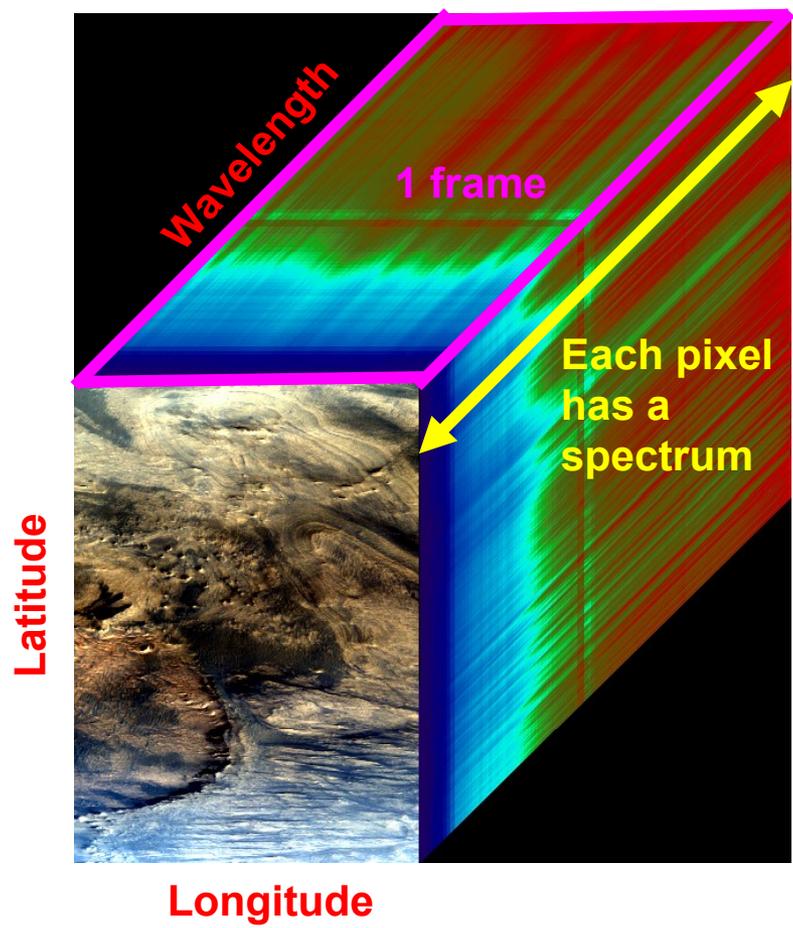
March 22, 2009



- Great tool to find exciting CRISM observations
 - Possesses all targeted CRISM data delivered to PDS
 - Uses browse products for rapidly identifying and briefly assessing an observation
 - **But not sufficient for mineral identification**
 - » Typical requires more detailed spectral analyses
 - Links to processed CRISM data and HIRISE and CTX images in coordinated observations



Url: <http://crism-map.jhuapl.edu>



A single image is taken in 544 colors

Each pixel has a spectrum that can be compared with "fingerprints" of different minerals.

S Detector - VNIR



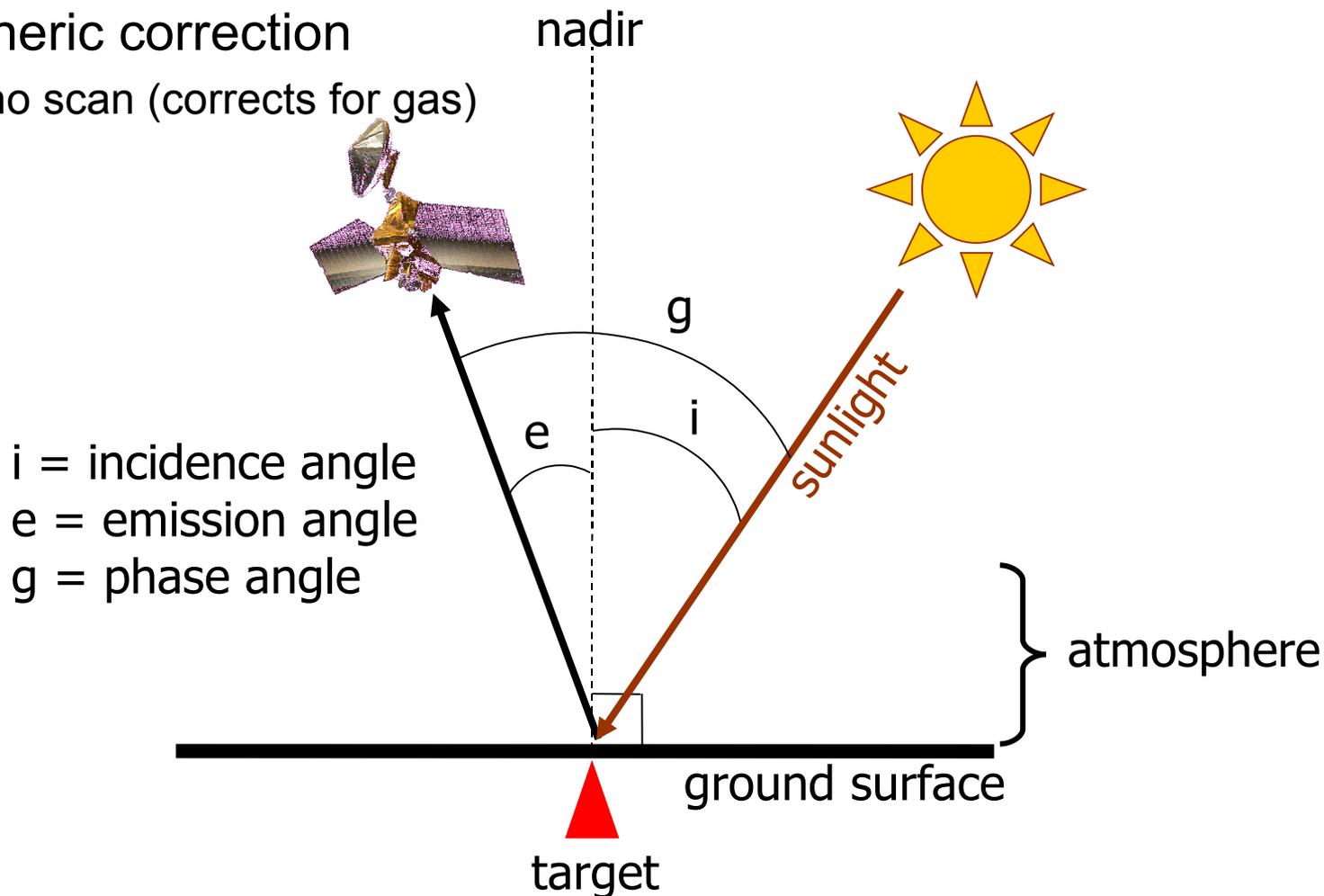
R=0.71 μm
G=0.60 μm
B=0.53 μm

L Detector - IR

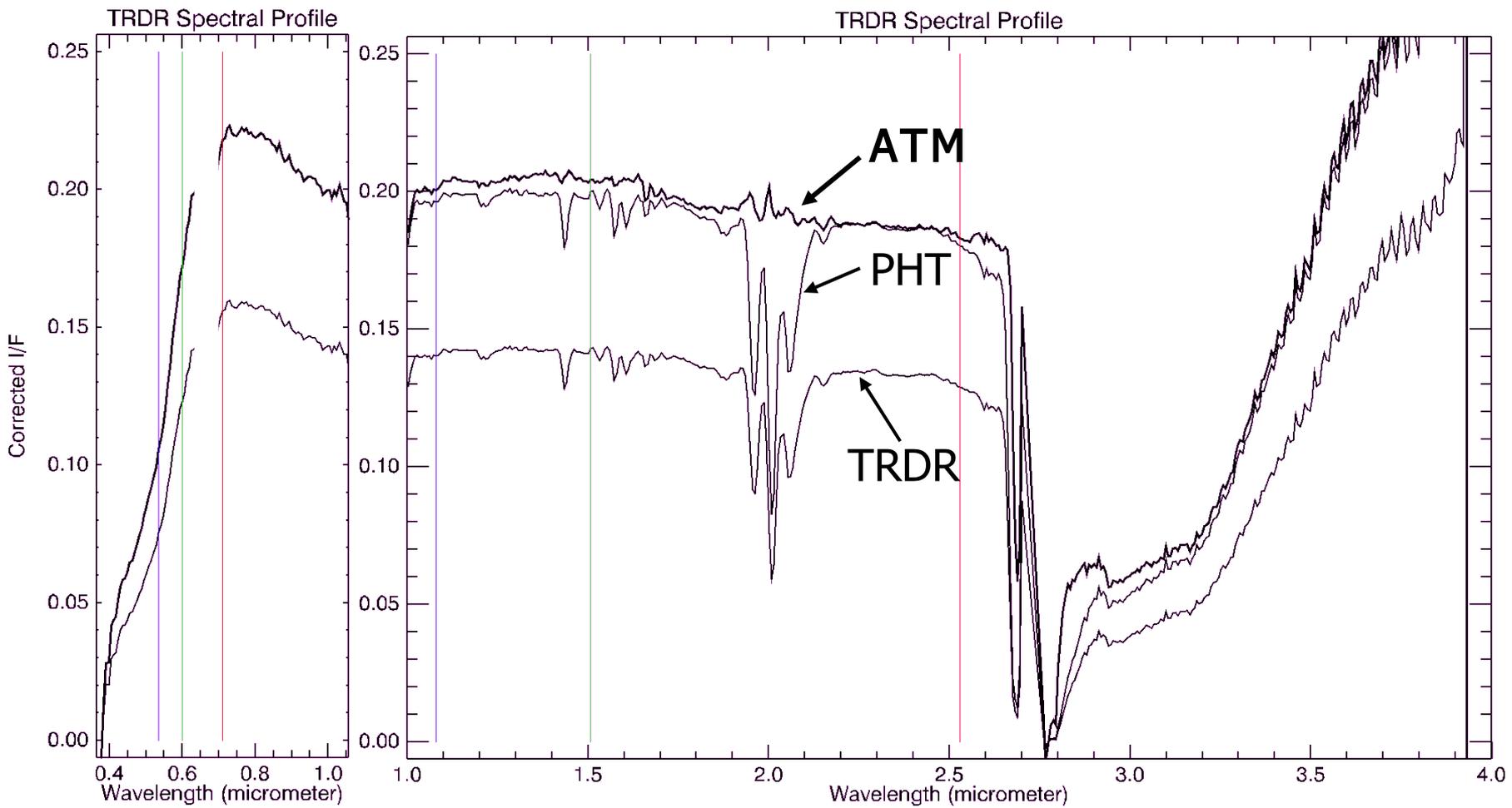


R=2.53 μm
G=1.51 μm
B=1.08 μm

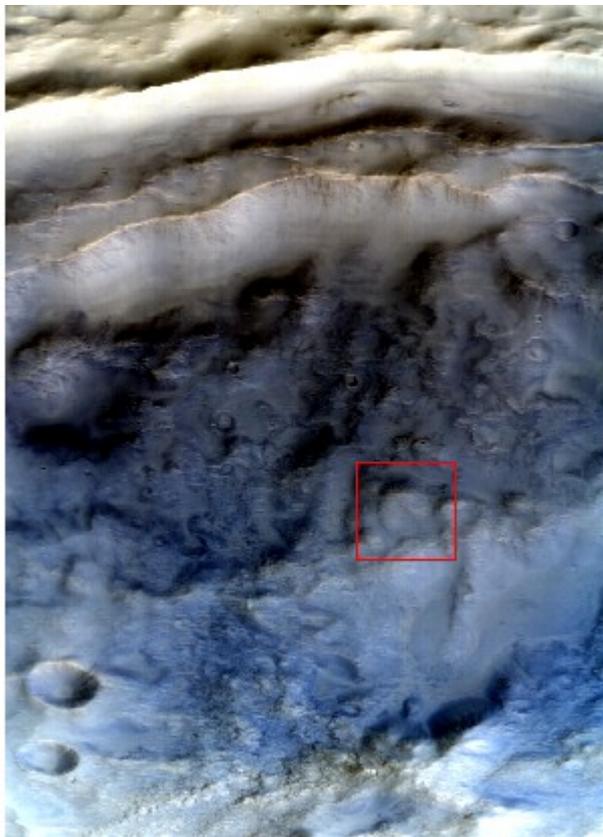
- Instrument calibration
- Standardize observation geometry
 - Photometric correction ($1/\cos [i]$)
- Atmospheric correction
 - Volcano scan (corrects for gas)



The influence on spectra - from Raw to Atm corrected



S Detector - VNIR



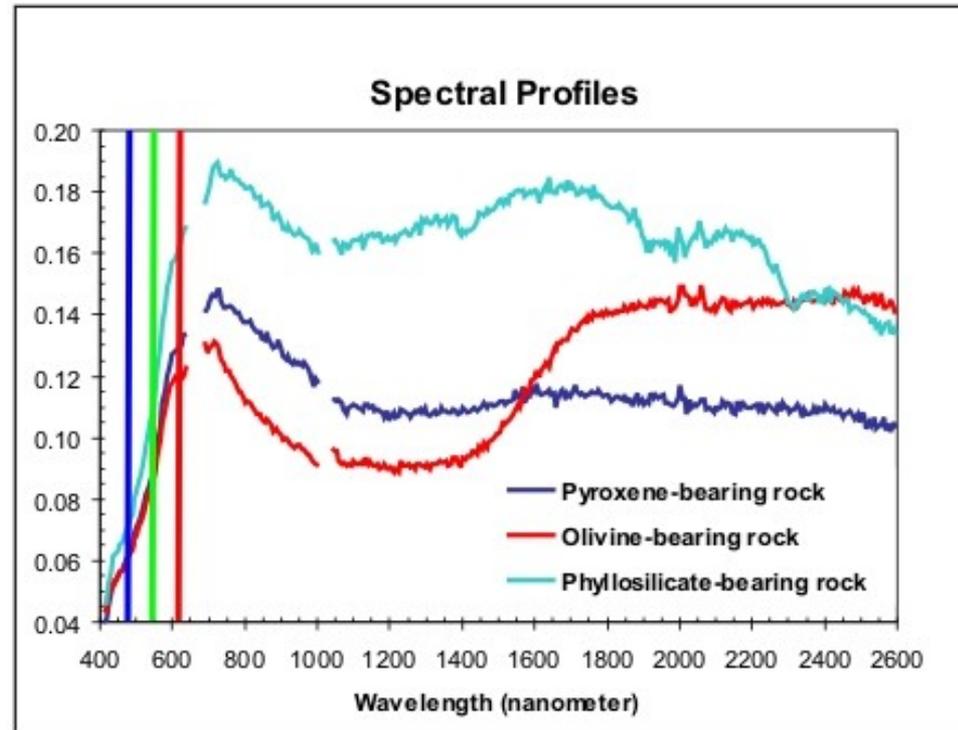
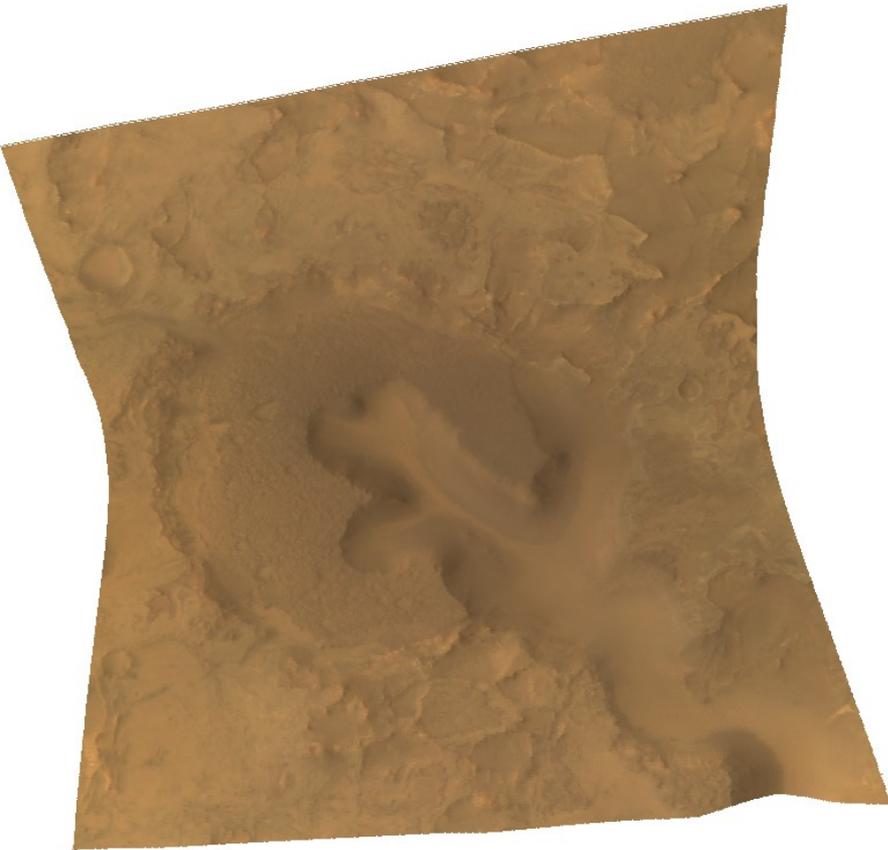
R=0.71 μm
G=0.60 μm
B=0.53 μm

L Detector - IR



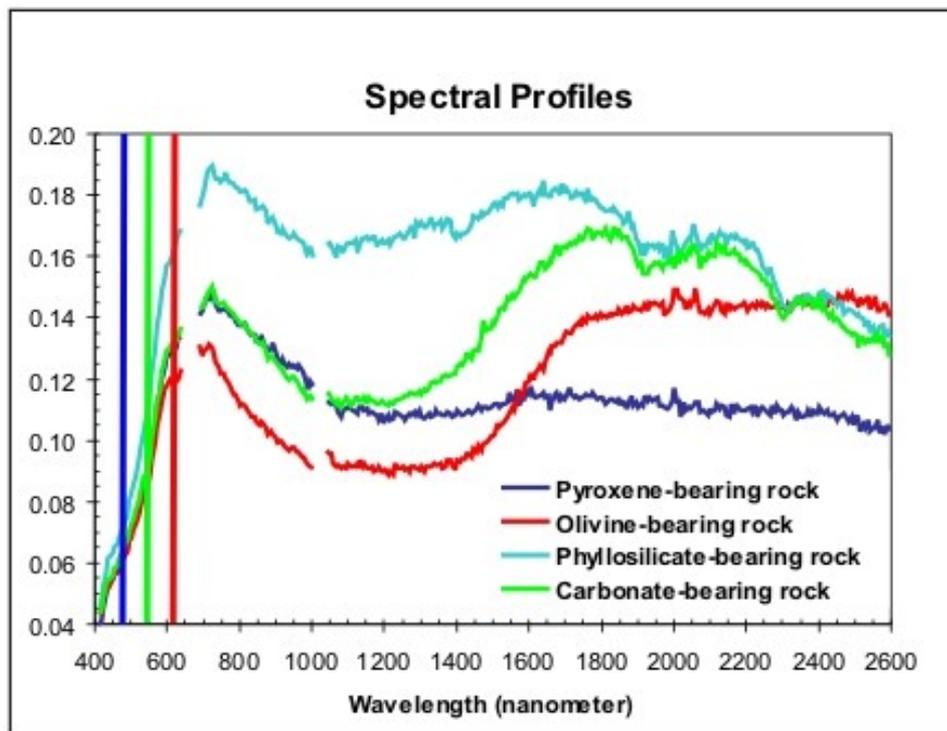
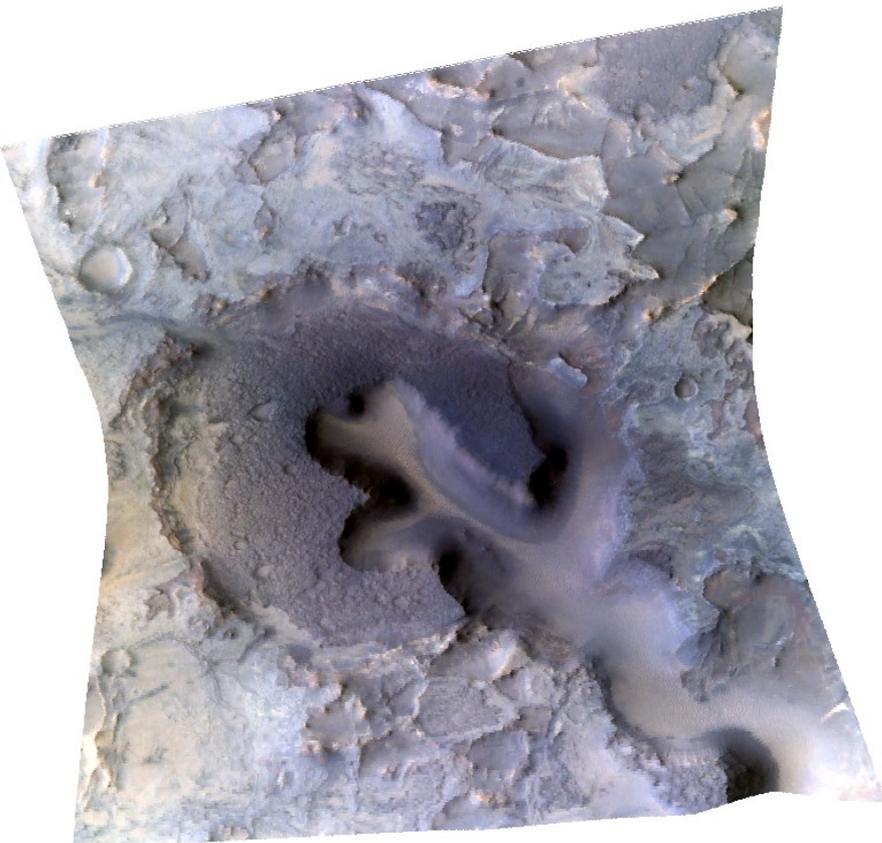
R=2.53 μm
G=1.51 μm
B=1.08 μm

NOTE: Browse products are crudely destriped only



This is how part of the Martian highlands looks to the human eye. The image was taken Jan. 12, 2007.

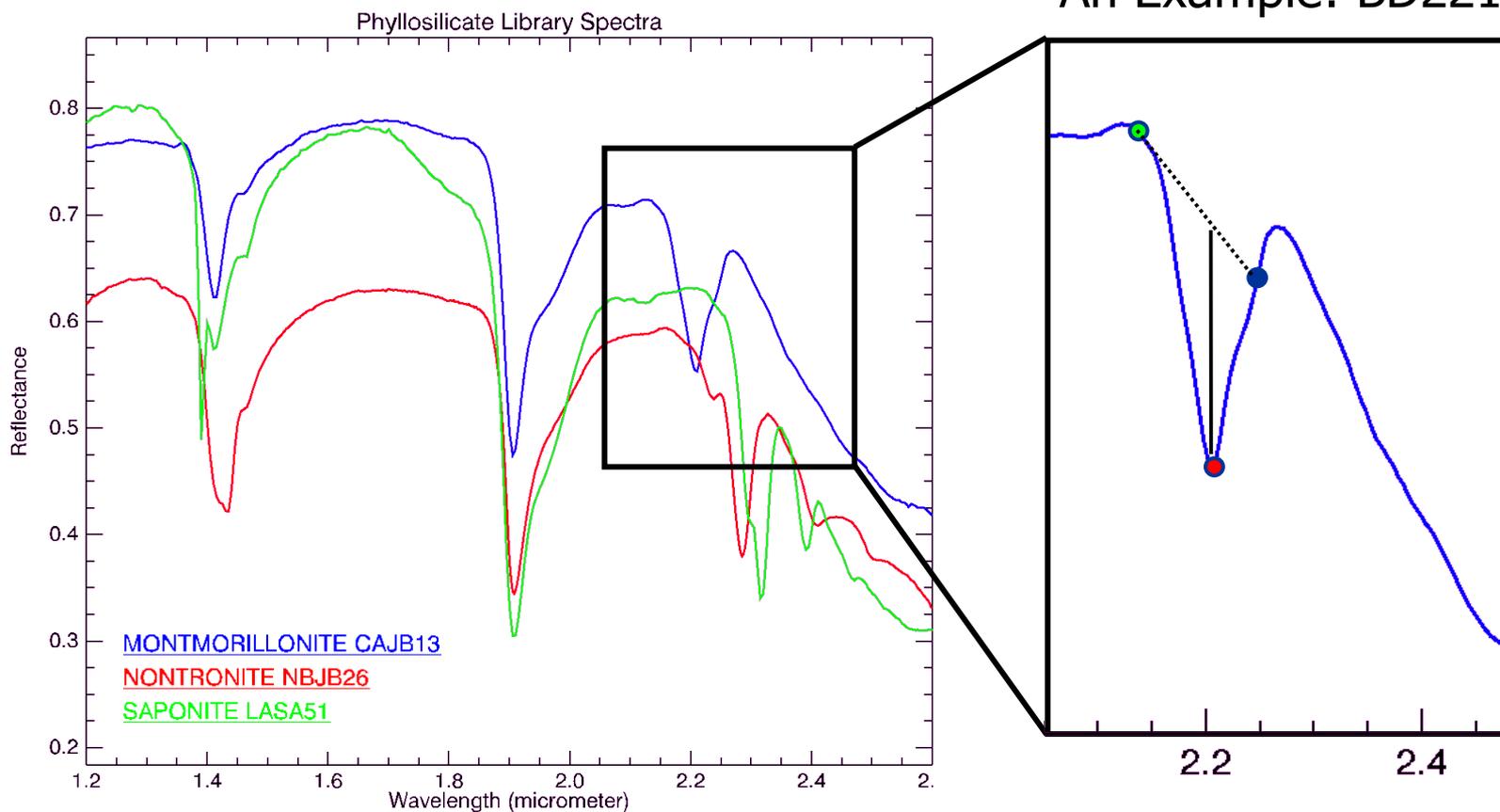
The spectrum shows that olivine, pyroxene, and clay are present, but at visible wavelengths everything is dominated by red iron oxides.



Computer enhancement can bring out subtle color differences, but still the scene is blanketed by red iron oxides that hide the underlying rocks.

Facilitates finding certain mineral absorptions

An Example: BD2210



Summary Parameter Composites (Browse Products)



OLINDEX

0 - 0.03

1 μ m spectral shape
and band position
keyed to fayalite



LCPINDEX

0 - 0.1

1 and 2 μ m spectral
shape and band position
keyed low-calcium
pyroxene



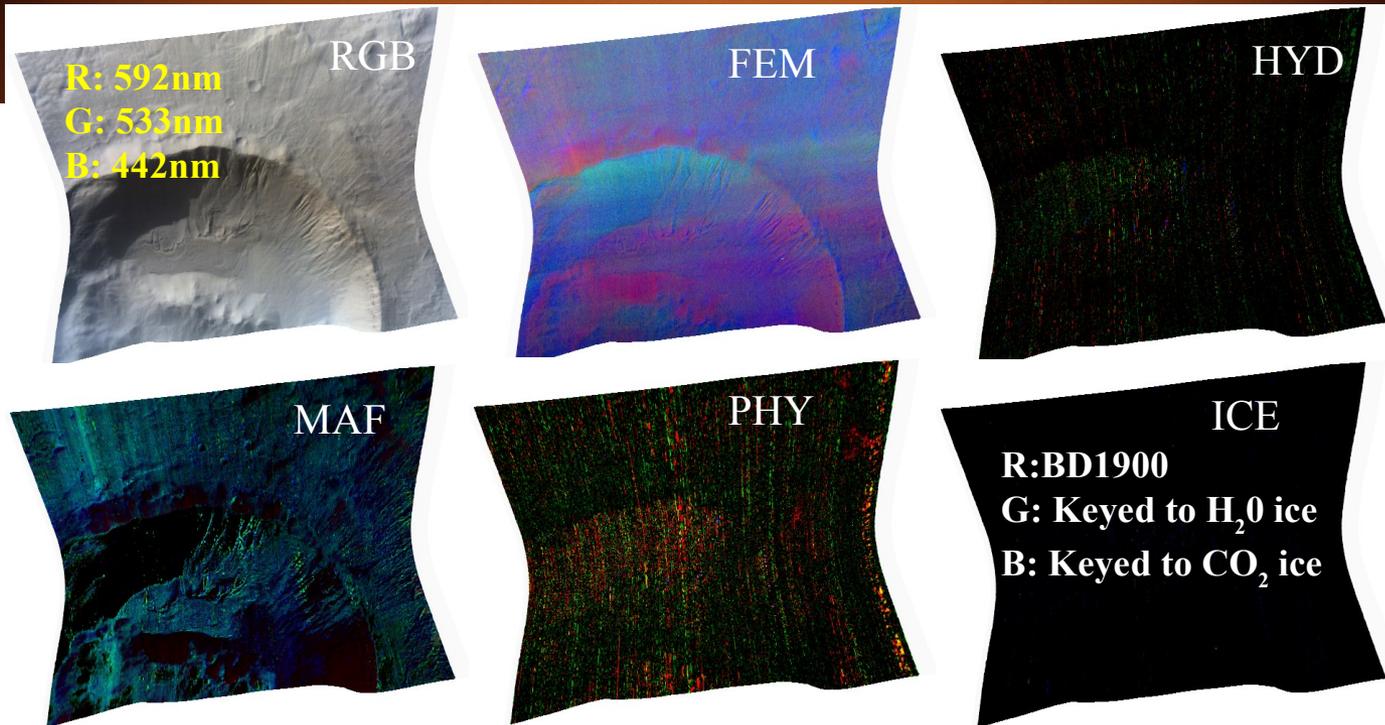
HCPINDEX

0 - 0.15

1 and 2 μ m spectral
shape and band position
keyed to high calcium
pyroxene



MAF



- Surface brightness provided by VNIR RGB and IR IRA
 - Visible RGB and Infrared albedo
- Compositional information is concentrated in VNIR FEM, and IR MAF, PHY and HYD
- Water of CO₂ ice is concentrated in IR ICE
- **Beware – all are susceptible to detector, incidence angle, surface slopes, shade and atmospheric lighting condition**

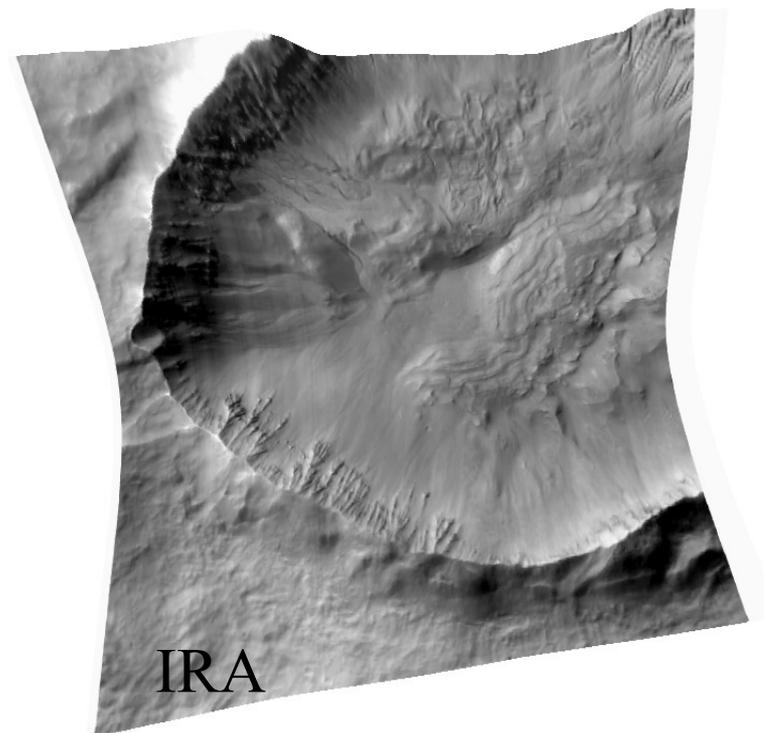
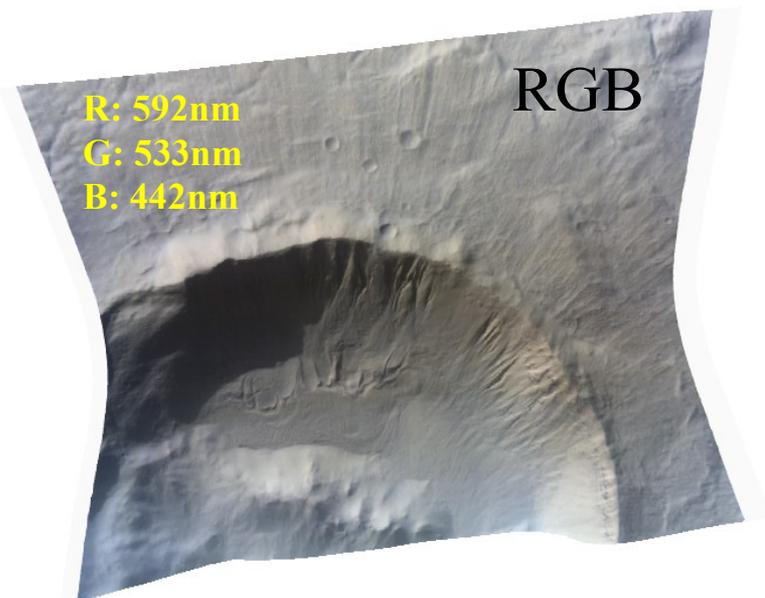
- Surface brightness and geological context

- Visible RGB image

- R = 592nm G = 533 nm B = 442 nm
- Stretched over full dynamic range of data

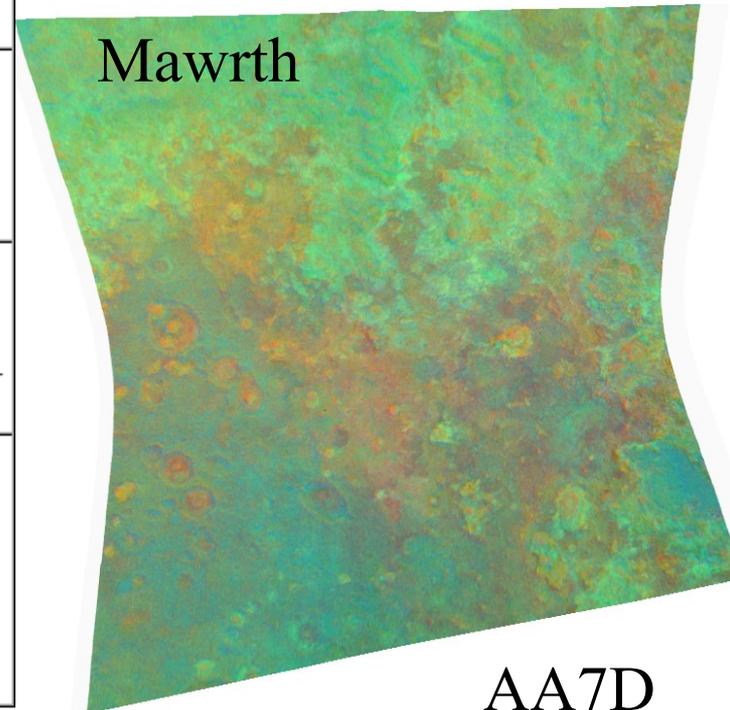
- Infrared albedo

- 1300nm albedo – takes advantage of hyperspectral character of data to reduce noise
- Stretched over full dynamic range of data



- VNIR FEM provides information related to iron minerals
- Good for finding significant dust coverage
 - High red content throughout the scene – indicates significant dust coverage
 - More green and bluer the cleaner the scene.

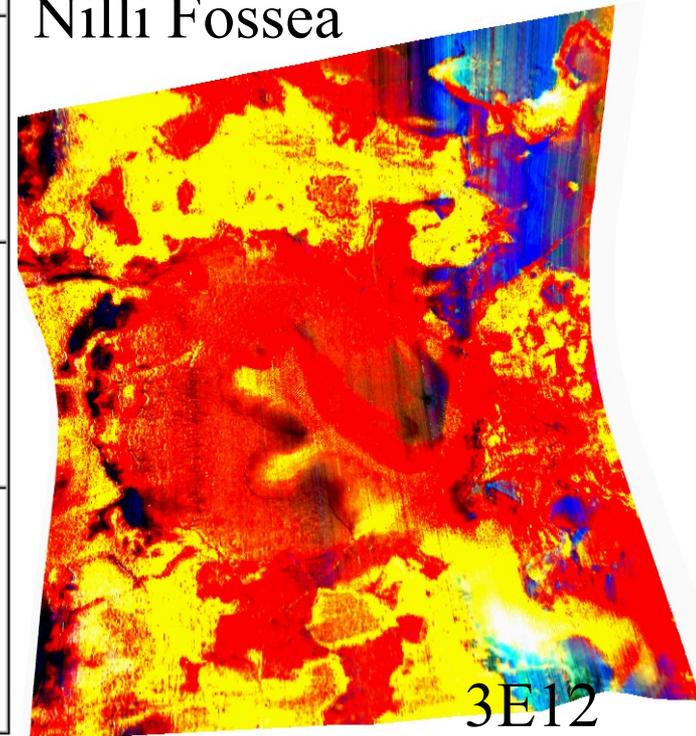
Channel	Parameter	Scaling	Significance	Cautions
Red	Depth of 530-nm band; relative to a continuum between 440 and 709 nm (BD530*)	0.00-0.17 to 0-250	Higher values indicate greater content or larger particle size of some fine-grained oxidized iron minerals	Higher values also occur where the atmosphere is dusty, or where dusty atmosphere overlies shadowed slopes
Green	Height of inflection at 600 nm; relative to a continuum between 440 and 709 nm (SH600*)	0.10-0.17 to 0-250	Higher values correlated with coatings or rinds present on rocks, and with some crystalline ferric oxides	Higher values also occur in hazy atmosphere, over shaded slopes, where there is a high solar incidence angle, and over ice
Blue	Integrated area in 1-micron band; from 830-1023 nm, relative to a flat continuum tangent to the reflectance peak near 750 nm (BD11000VIS*)	0.000-0.025 to 0-250	Higher values indicate greater content or larger particle size of iron minerals, especially olivine and pyroxene	Weakly sensitive to crystalline ferric oxides



- IR MAF provides information related to mineralogy of iron-containing minerals
 - Unaltered igneous minerals such as olivine and pyroxene
 - Altered minerals including iron-rich phyllosilicates

Channel	Parameter Description and Name	Scaling	Significance	Cautions
Red	Olivine index; measures brightness at 1695 nm relative to a weighted average at 1080-1470 nm (OLINDEX*)	0.00-0.13 to 0-250	Higher values indicate greater content or larger particle size of olivine or iron-containing phyllosilicates	Dusty regions or atmospheric dust (both of which can be recognized in vnir_fem) may cause elevated values. Higher values can also result from illumination effects on sunward slopes
Green	Low-calcium pyroxene index; measures brightness contrast at 1080 and 2067 nm relative to 1330 nm (LCPINDEX*)	0.0-0.1 to 0-250	Higher values indicate greater content or larger particle size of pyroxene; favors low-Ca pyroxene	Higher values can also result from illumination effects on shaded slopes
Blue	High-calcium pyroxene index; measures brightness contrast at 1080 and 2067 nm relative to 1470 nm Å (HCPINDEX*)	0.0-0.2 to 0-250	Higher values indicate greater content or larger particle size of pyroxene; favors high-Ca pyroxene	Weakly sensitive to ice

Nilli Fosse



- IR PHY provides information related to hydroxylated minerals including phyllosilicates

Channel	Parameter Description and Name	Scaling	Significance	Cautions
Red	Index for presence of Fe-OH and Mg-OH containing minerals; measures brightness around 2320 nm relative to 2170 nm (D2300*)	0.005-0.020 to 0-250	Higher values indicate greater content or larger particle size of iron/magnesium phyllosilicates	Weakly sensitive to shaded slopes and strong brightness boundaries. Intermittent detector artifacts at edges of images
Green	Depth of 2210-nm band due to Al-OH or Si-OH in minerals; relative to a continuum between Å 2140 and 2250 nm (BD2210*)	0.005-0.020 to 0-250	Higher values indicate greater content or larger particle size of aluminum phyllosilicates or hydrated silica	Weakly sensitive to shaded slopes and strong brightness boundaries. Intermittent detector artifacts at edges of images
Blue	Depth of 1900-nm band due to bound water; relative to a continuum between 1874 and 2006 nm (BD1900*)	0.01-0.04 to 0-250	Higher values indicate greater content or larger particle size of hydrated minerals	Also sensitive to water ice surface frost or atmospheric hazes that are accentuated at low solar incidence angles

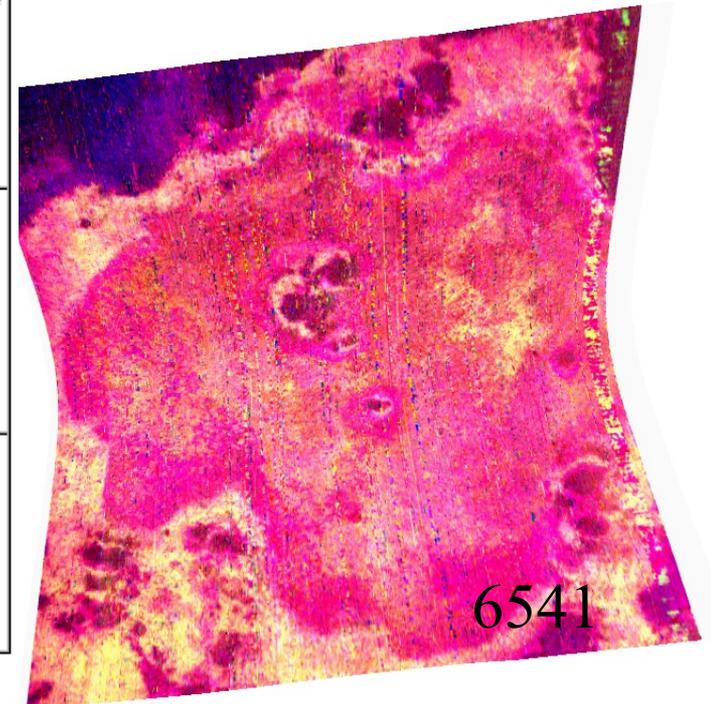
Nili Fossae



- IR HYD provides information related to bound water in minerals, usually sulfates but in some cases phyllosilicates, hydrated glass, or other minerals

Channel	Parameter Description and Name	Scaling	Significance	Cautions
Red	"Sulfate" index, a measure of bound water or ice; measures the drop in reflectance from near 2300 nm to near 2400 nm (SINDEX*)	0.00-0.03 to 0-250	Higher values indicate greater content or larger particle size of minerals or glasses with bound, dissolved, or adsorbed molecular water, especially sulfates	This parameter is sensitive to water ice and to dust and atmospheric ice hazes that are accentuated at low solar incidence angles
Green	Depth of 2100-nm band in monohydrated sulfates; relative to a continuum between 1930 and 2250 nm (BD2100*)	0.01-0.04 to 0-250	Higher values indicate greater content or larger particle size of monohydrated sulfates	Also sensitive to water ice surface frost or atmospheric hazes that are accentuated at low solar incidence angles
Blue	Depth of 1900-nm band due to bound water; relative to a continuum between 1874 and 2006 nm (BD1900*)	0.01-0.04 to 0-250	Higher values indicate greater content or larger particle size of hydrated minerals	Also sensitive to water ice surface frost or atmospheric hazes that are accentuated at low solar incidence angles

Meridiani



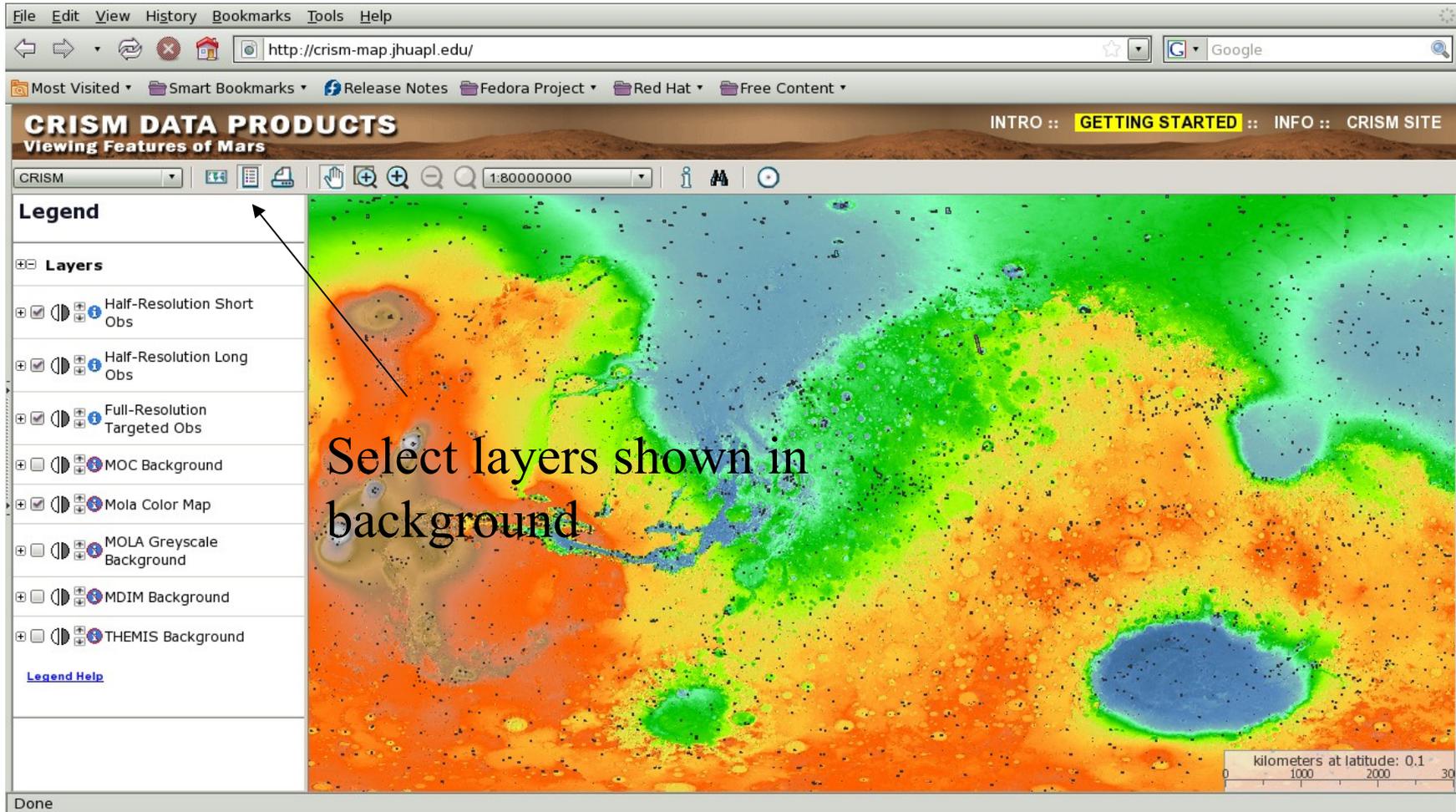
- IR ICE provides information related to water or carbon dioxide frost or ice.

North Polar cap

Channel	Parameter Description and Name	Scaling	Significance	Cautions
Red	1900-nm band depth, (BD1900*)	0.0-0.4 to 0-250	Leveraged for its sensitivity to water ice on the surface	Also sensitive to hydrated minerals and atmospheric water ice hazes
Green	Depth of 1500-nm band due to water ice; relative to a continuum between 1367 and 1808 nm (BD1500*)	0.00-0.65 to 0-250	Higher values indicate greater content or larger particle size of water ice frost	Also weakly sensitive to atmospheric water ice hazes that are accentuated at low solar incidence angles
Blue	Depth of 1435-nm band due to CO2 ice; relative to a continuum between 1370 and 1470 nm (BD1435*)	0.00-0.35 to 0-250	Higher values indicate greater content or larger particle size of carbon dioxide ice	Weakly sensitive to hydroxylated minerals including phyllosilicates



Each black spot is a CRISM targeted observation



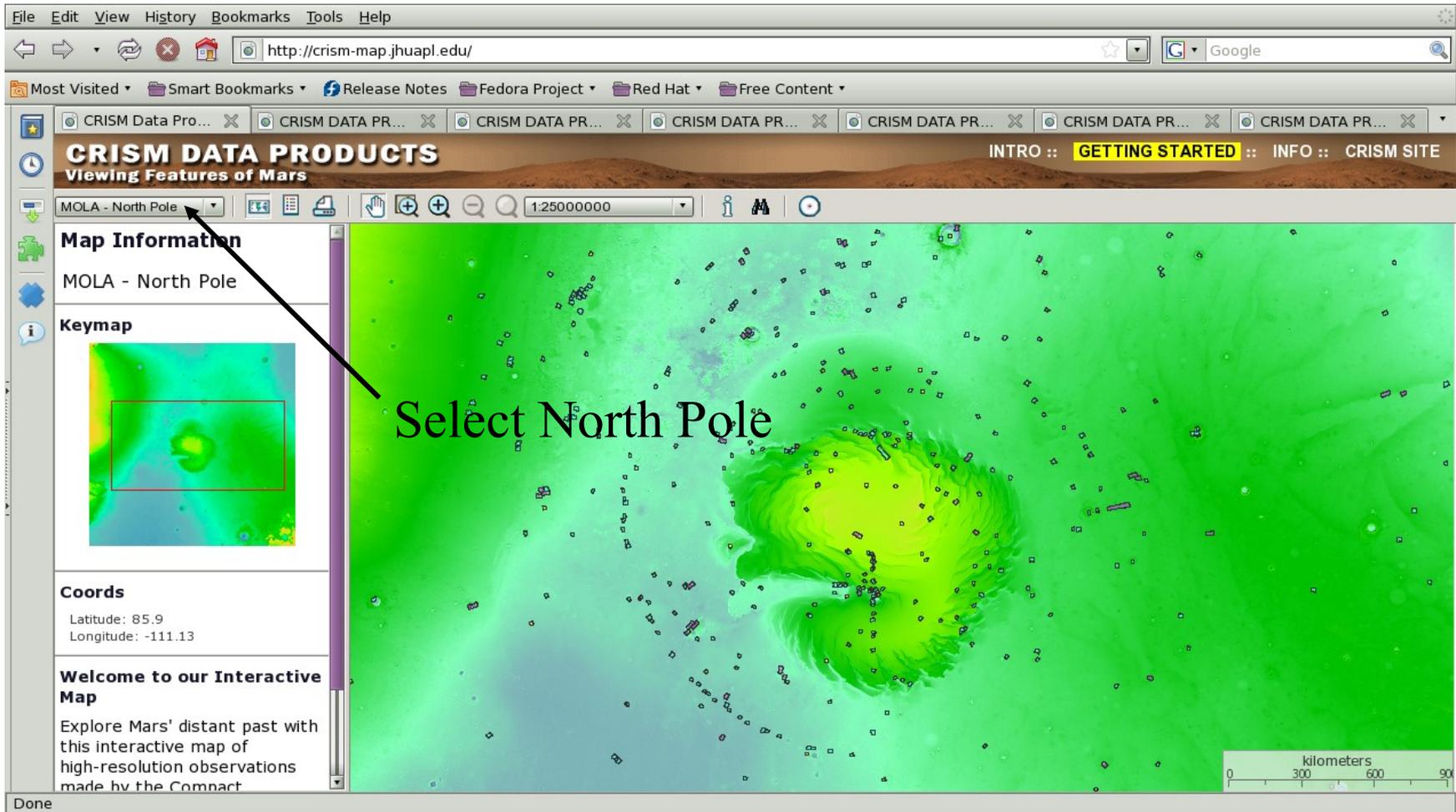
The screenshot shows a web browser window displaying the CRISM Data Products interface. The browser address bar shows <http://crism-map.jhuapl.edu/>. The page title is "CRISM DATA PRODUCTS" with a subtitle "Viewing Features of Mars". The navigation menu includes "INTRO :: GETTING STARTED :: INFO :: CRISM SITE". The main content area shows a map of Mars with a legend on the left. The legend is titled "Legend" and contains a "Layers" section with the following items:

- Half-Resolution Short Obs
- Half-Resolution Long Obs
- Full-Resolution Targeted Obs
- MOC Background
- Mola Color Map
- MOLA Greyscale Background
- MDIM Background
- THEMIS Background

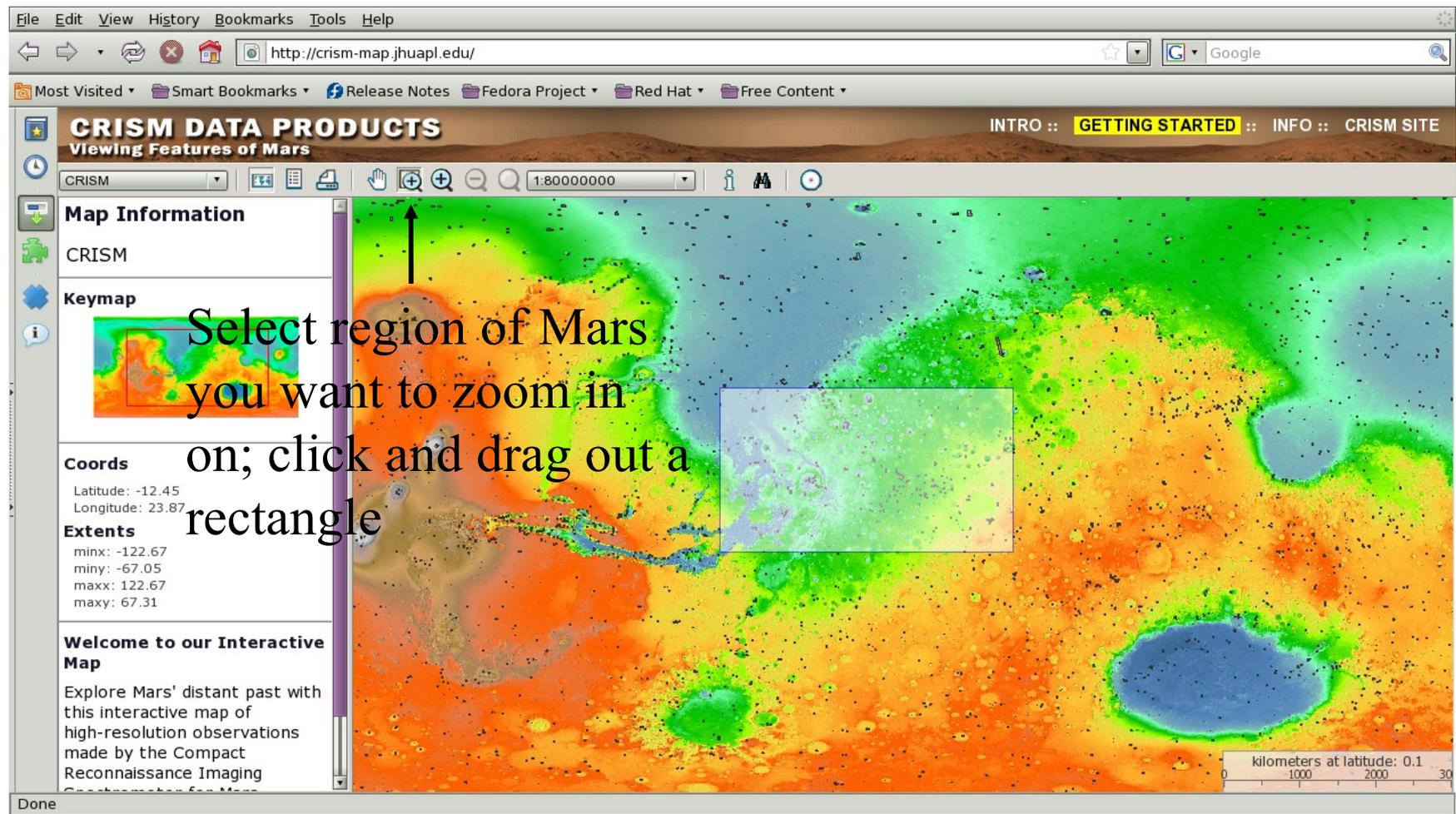
A black arrow points from the text "Select layers shown in background" to the legend. The map itself shows a color-coded topographic map of Mars with numerous black dots representing targeted observations. A scale bar at the bottom right indicates "kilometers at latitude: 0.1" with markers at 0, 1000, 2000, and 30. The browser status bar at the bottom shows "Done".

Three types of targeted observations - FRT, HRS and HRL

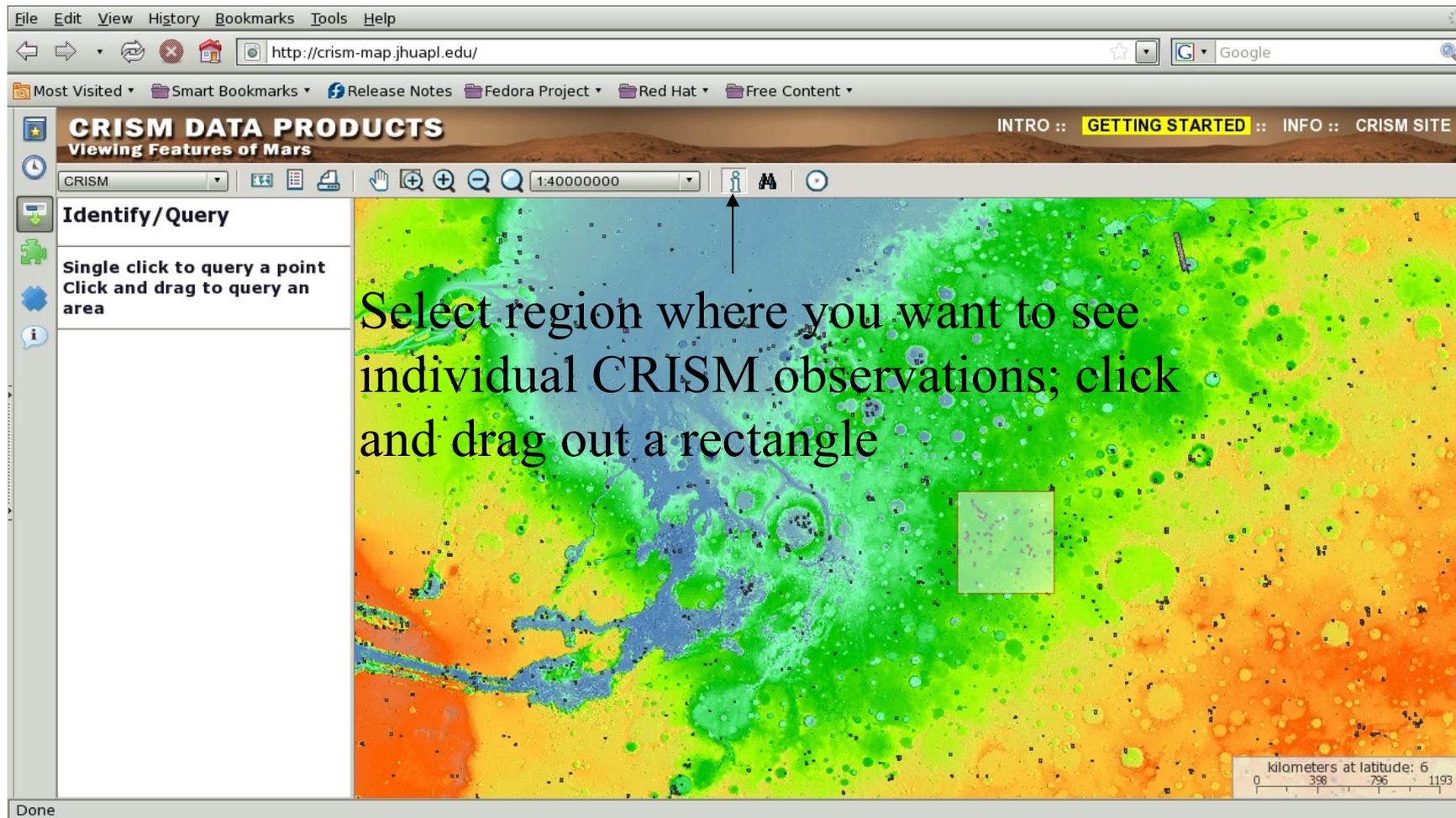
Each black spot is a CRISM targeted observation



The screenshot shows a web browser window with the URL <http://crism-map.jhuapl.edu/>. The page title is "CRISM DATA PRODUCTS" and the subtitle is "Viewing Features of Mars". The main content area displays a topographic map of Mars with a dropdown menu set to "MOLA - North Pole". A black arrow points from the text "Select North Pole" to the dropdown menu. The map shows a large polar ice cap in the center, surrounded by a ring of lowlands. A scale bar at the bottom right indicates distances in kilometers (0, 300, 600, 900). The left sidebar contains "Map Information" (MOLA - North Pole), "Keymap" (a small thumbnail map), "Coords" (Latitude: 85.9, Longitude: -111.13), and a "Welcome to our Interactive Map" message.



The screenshot shows a web browser window with the URL <http://crism-map.jhuapl.edu/>. The page title is "CRISM DATA PRODUCTS" and the subtitle is "Viewing Features of Mars". The main content area displays a color-coded topographic map of Mars. A blue rectangle highlights a specific region of interest on the map. A black arrow points from the text "Select region of Mars you want to zoom in on; click and drag out a rectangle" to this highlighted area. On the left side, there is a "Map Information" sidebar with a "Keymap" section showing a small overview map with a red rectangle indicating the current view's location. Below the keymap, the "Coords" section shows Latitude: -12.45 and Longitude: 23.87. The "Extents" section shows minx: -122.67, miny: -67.05, maxx: 122.67, and maxy: 67.31. At the bottom right of the map, there is a scale bar labeled "kilometers at latitude: 0.1" with markings at 0, 1000, 2000, and 30. The browser's address bar and navigation buttons are visible at the top.



File Edit View History Bookmarks Tools Help

http://crism-map.jhuapl.edu/

Most Visited Smart Bookmarks Release Notes Fedora Project Red Hat Free Content

CRISM DATA PRODUCTS
Viewing Features of Mars

INTRO :: **GETTING STARTED** :: INFO :: CRISM SITE

CRISM 1:40000000

Identify/Query

Single click to query a point
Click and drag to query an area

Select region where you want to see individual CRISM observations; click and drag out a rectangle

kilometers at latitude: 6
0 396 796 1193

Done

File Edit View History Bookmarks Tools Help

http://crism-map.jhuapl.edu/

Most Visited Smart Bookmarks Release Notes Fedora Project Red Hat Free Content

CRISM DATA PRODUCTS

Viewing Features of Mars

CRISM 1:40000000

INTRO :: **GETTING STARTED** :: INFO :: CRISM SITE

Identify/Query

Single click to query a point
Click and drag to query an area

Layer Name: **Full-Res Targeted Obs**
Observations (limited output): 10

Observation	Sensor	Zoom to Obs
000028A1	L	
000028C1	L	
0000334D	L	
00003CE0	L	
00003E24	L	
0000410F	L	
00004616	L	

Select "L" sensor to see browse products

kilometers at latitude: 6
0 398 796 1193

Done

CRISM Each individual observation web page



File Edit View History Bookmarks Tools Help

http://crism-map.jhuapl.edu/details.php?data=frt_webmap_polygons&shape=398&x=-6.808425&y=8.08546

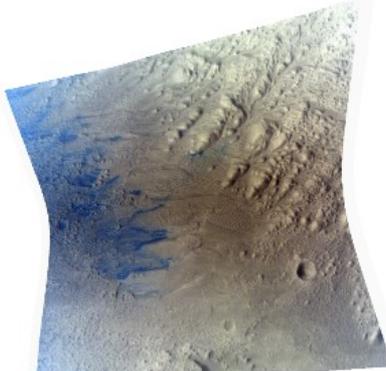
CRISM Data Products CRISM DATA PRODUCTS

CRISM DATA PRODUCTS

Viewing Features of Mars

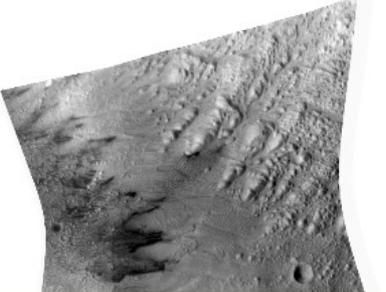
BROWSE PRODUCTS

vnir_rgb
Enhanced visible color
red = 592nm
green = 533 nm
blue = 492nm



Downloads:
• [PNG](#)
• [PNG w/ geo_grid](#)
• [Map/Stretch Info](#)

ir_ira
IR surface brightness
gray level = brightness at 1330nm.



Downloads:
• [PNG](#)
• [PNG w/ geo_grid](#)
• [Map/Stretch Info](#)

ABOUT BROWSE PRODUCTS

[Interpreting the Browse Products](#)
[Visible and Near-infrared \(VNIR\) Browse Products](#)
[Infrared \(IR\) Browse Products](#)

ACCESS TO MRO DATA IN THE PDS

The following links provide direct access to the PDS archive of calibrated CRISM data for this observation, as well as to CTX or HiRISE images coordinated with it.

[VNIR image data, calibrated to units of I/F](#)
[VNIR geometric information, in several units](#)
[IR image data, calibrated to units of I/F](#)
[IR geometric information, in several units](#)

[Accompanying CRISM emission phase function data, and CTX and HiRISE coordinated images](#)

OBSERVATION DETAILS

File	FRT000049CA_07_IF165S_TRR2.LBL
Comment	COORD Target - 2892 Faulted Layers in Impact Crater in Meridiani Planum
Year/Day of Year	2007_067
Observation Class	FRT
Observation Id	000049CA
Image Count within Observation Sequence	07
File Type	IF

Done

Observation 49CA

File Edit View History Bookmarks Tools Help

http://crism-map.jhuapl.edu/details.php?data=frit_webmap_polygons&shape=398&x=-6.808425&y=8.08546

Most Visited Smart Bookmarks Release Notes Fedora Project Red Hat Free Content

CRISM DATA PRODUCTS

Viewing Features of Mars

BROWSE PRODUCTS

vnir_rgb
Enhanced visible color
green = 533 nm
blue = 492nm

Download:

- PNG
- PNG w/ geo_grid
- Map/Stretch Info

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[Accompanying CRISM emission phase function data, and CTX and HiRISE coordinated images](#)

ir_ira

Surface brightness

gray level = brightness at 1330nm.

Download:

- PNG w/ geo_grid
- Map/Stretch Info

OBSERVATION DETAILS

File	FRT000
Coord	COORD in Merid
Year/Day of Year	2007_06
Observation Class	FRT
Observation Id	000049
Image Count within Observation Sequence	07
IF	IF

Click on image or PNG for full resolution image

Click on PNG with grid to get lat-long grid; on Map Stretch Info to link to text file with projection and stretch information for each RGB channel.

Links to the PDS

File Edit View History Bookmarks Tools Help

http://crism-map.jhuapl.edu/details.php?data=frt_webmap_polygons&shape=398&x=-6.808425&y=8.08546

Most Visited Smart Bookmarks Release Notes Fedora Project Red Hat Free Content

CRISM Data Products CRISM DATA PRODUCTS

Click images above to enlarge.

Solar Longitude	196.704
Incidence Angle	56.4
Emission Angle	22.3
Phase Angle	67.6
Lines	450
Samples	640
Image Start Time	2007-03-08T16:59:13.559
Image Stop Time	2007-03-08T17:01:13.286
Start Spacecraft Clock Count	"2/0857840372.31648"
Stop Spacecraft Clock Count	"2/0857840492.13714"
Center Latitude	8.08546
Center Longitude	-6.808425

Observational details (e.g., time when image was acquired)

VISIBLE AND IR DERIVED PRODUCTS

vnir_fem

Oxidized iron minerals

red = BD530 (ferric minerals)

green = SH600 nm (coatings)

blue = BDI1000nm (variety of iron minerals)

Downloads:

- [PNG](#)
- [PNG w/ geo_grid](#)
- [Map/Stretch Info](#)

ir_maf

Mafic mineralogy

red = OLINDEX (olivine or iron phyllosilicates)

green = LCPINDEX (low-Ca pyroxene)

blue = HCPINDEX (high-Ca pyroxene)

Downloads:

- [PNG](#)
- [PNG w/ geo_grid](#)
- [Map/Stretch Info](#)

ir_phy

Hydroxylated silicates

red = BD2300 (Fe/Mg phyllosilicate)

green = BD2210 (Al phyllosilicate or hydrated glass)

blue = BD1900 (hydrated sulfates, clays, glass, or water ice)

Downloads:

- [PNG](#)
- [PNG w/ geo_grid](#)
- [Map/Stretch Info](#)

ir_hyd

Bound water

red = SINDEXT (water-containing minerals or water ice)

green = BD2100 (monohydrated sulfates or water ice)

blue = BD1900nm. (hydrated)

Downloads:

- [PNG](#)
- [PNG w/ geo_grid](#)
- [Map/Stretch Info](#)

ir_ice

Water and CO2 ice

red = BD1900 (water ice or hydrated sulfates, clays, or glass)

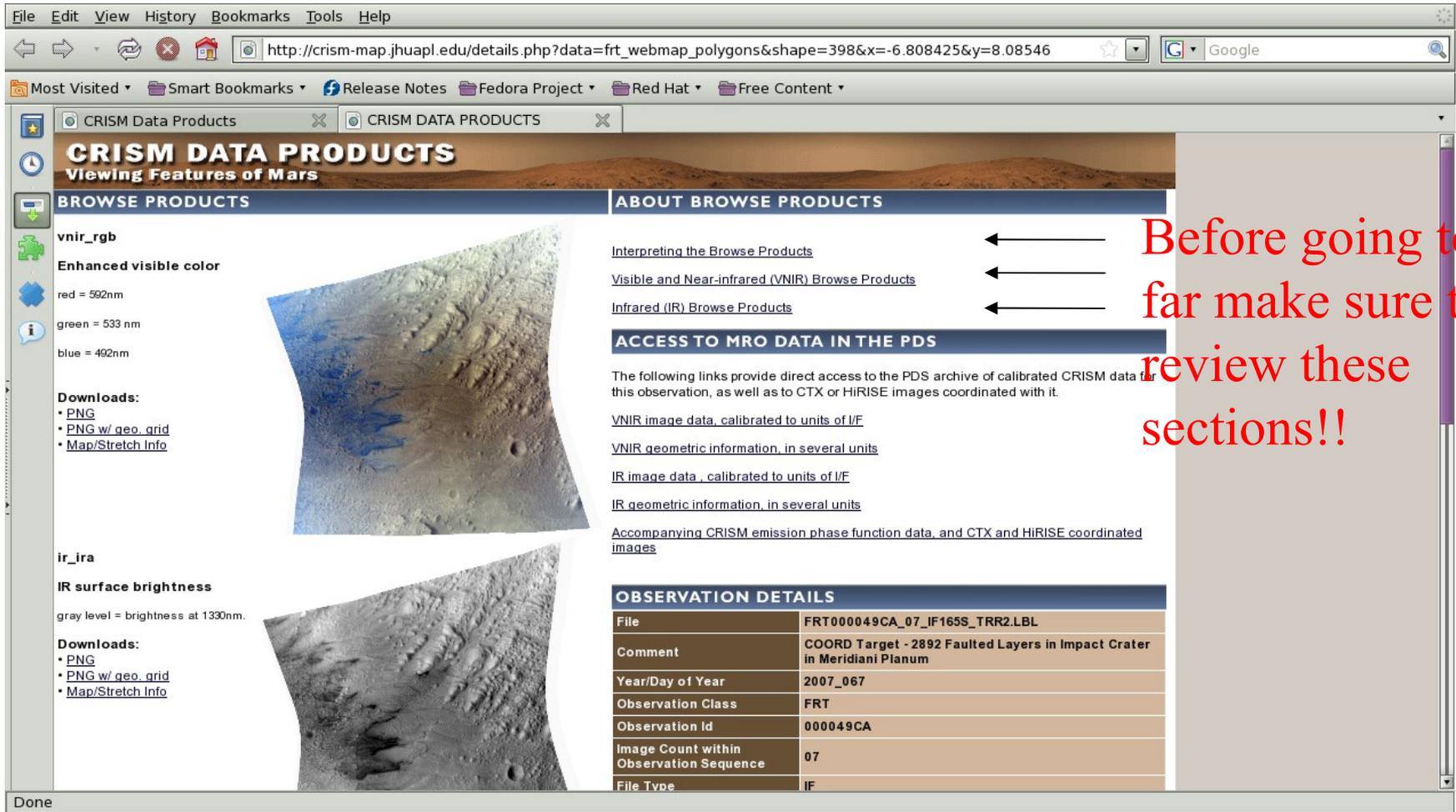
green = BD1500 (water ice)

blue = BD1435 (CO2 ice)

Downloads:

- [PNG](#)
- [PNG w/ geo_grid](#)
- [Map/Stretch Info](#)

http://crism-map.jhuapl.edu/images/browseimages/2007_067/FRT000049CA/FRT000049CA_07_IF165L_HYD1.png



CRISM DATA PRODUCTS
Viewing Features of Mars

BROWSE PRODUCTS

vnir_rgb
Enhanced visible color
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blue = 492nm

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- PNG w/ geo_grid
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IR surface brightness
gray level = brightness at 1330nm.

Downloads:

- PNG
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- Map/Stretch Info

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[IR geometric information, in several units](#)

[Accompanying CRISM emission phase function data, and CTX and HiRISE coordinated images](#)

OBSERVATION DETAILS

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Comment	COORD Target - 2892 Faulted Layers in Impact Crater in Meridiani Planum
Year/Day of Year	2007_067
Observation Class	FRT
Observation Id	000049CA
Image Count within Observation Sequence	07
File Type	IF

Before going to far make sure to review these sections!!

Also use your common sense – you're just seeing spectral indices and they don't just respond to minerals!

http://crism-map.jhuapl.edu/popinterpret.php

CRISM DATA PRODUCTS

Viewing Features of Mars

Interpreting the Browse Products

CRISM browse products are intended to provide a high-level overview of the contents of calibrated image data, and are not meant for quantitative analysis or to be interpreted with an awareness of possible false detections due to illumination or instrumental effects. However, every effort was made in the construction of the browse products to preserve useful information and the dynamic range of the original calibrated data. In addition, the mapping information specified with the map/stretch information for each product is sufficient to register the browse images with other data sets. Typically registration errors are about 200 m or less.

Two versions of the data provide an overview of surface brightness. **vnir_rgb** is enhanced color over the visible range, and **ir_ira** is brightness at a wavelength near 1330 nm.

Compositional information on the surface is concentrated in four of the browse products (**vnir_fem**, **ir_maf**, **ir_phy**, and **ir_hyd**). Not all of the sites exhibit spectral evidence for mineralogical diversity. If a location is covered in dust, it appears red in **vnir_fem** and bland in the other products. Sites with diversity in igneous mineralogy will appear interesting in **ir_maf**. Sites with minerals formed by interaction of crustal rocks with liquid water will appear interesting in **ir_phy** and **ir_hyd**.

Sites that have water ice on the surface or as clouds will appear pink, yellow or green in **ir_ice**, whereas those with carbon dioxide frost on the surface will appear bluish.

In addition to those caveats, many of the parameters in the latter four browse products have dependencies on solar incidence angle, surface slopes, atmospheric conditions, detector artifacts, and response to phases other than what the products were intended to show. For example, **ir_phy** and **ir_hyd** can have bluish colors due to spectral effects of water ice, either as surface frosts or atmospheric hazes. Illumination geometry or atmospheric dust and ice hazes can create artifacts in **vnir_fem**, **ir_maf**, **ir_phy**, and **ir_hyd**. **ir_phy** is particularly susceptible to detector artifacts.

An excellent reference describing the parameters used in constructing **vnir_fem**, **ir_maf**, **ir_phy**, **ir_hyd**, and **ir_ice** is:

Pelkey, S. M., J. F. Mustard, S. Murchie, R. T. Clancy, M. Wolff, M. Smith, R. Milliken, J.-P. Bibring, A. Gendrin, F. Poulet, Y. Langevin, and B. Gondet, CRISM multispectral summary products: Parameterizing mineral diversity on Mars from reflectance, *J. Geophys. Res.*, 112, E08S14, doi:10.1029/2006JE002831, 2007.

[CRISM Data Products Usage Policy](#)

CLOSE WINDOW

Done

http://crism-map.jhuapl.edu/popvnir.php

CRISM DATA PRODUCTS

Viewing Features of Mars

Visible and Near-infrared (VNIR) Browse Products

Information in CRISM's 107 VNIR wavelengths (at 0.36-1.05 microns) is represented as two browse products.

The first is a false color red-green-blue (**vnir_rgb**) image constructed from 590, 530, and 440 nm wavelengths, that has been stretched to optimize the dynamic range at the site shown. Thus, the stretch varies from image to image. These data received an approximate correction for photometric effects, that is, differences in local solar time and the angle of sunlight to the surface. This correction was performed by dividing the brightness of Mars' surface at each wavelength ("I/F") by the cosine of the solar incidence angle (angle of sunlight to local vertical).

The second false color image (**vnir_fem**) provides information related to iron minerals. It is derived from spectral data that have been corrected for photometric effects. The parameter data have also been filtered to reduce the effect of detector noise.

Channel	Parameter	Scaling	Significance	Cautions
Red	Depth of 530-nm band; relative to a continuum between 440 and 709 nm (BD530*)	0.00-0.17 to 0-250	Higher values indicate greater content or larger particle size of some fine-grained oxidized iron minerals	Higher values also occur where the atmosphere is dusty, or where dusty atmosphere overlies shadowed slopes
Green	Height of inflection at 600 nm; relative to a continuum between 440 and 709 nm (SH600*)	0.10-0.17 to 0-250	Higher values correlated with coatings or rinds present on rocks, and with some crystalline ferric oxides	Higher values also occur in hazy atmosphere, over shaded slopes, where there is a high solar incidence angle, and over ice
Blue	Integrated area in 1-micron band; from 830-1023 nm, relative to a flat continuum tangent to the reflectance peak near 750 nm (BDI1000VIS*)	0.000-0.025 to 0-250	Higher values indicate greater content or larger particle size of iron minerals, especially olivine and pyroxene	Weakly sensitive to crystalline ferric oxides

http://crism-map.jhuapl.edu/popvnir.php

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If you find a good observation, and want others in the area

File Edit View History Bookmarks Tools Help

http://crism-map.jhuapl.edu/#

CRISM DATA PRODUCTS

Viewing Features of Mars

INTRO :: **GETTING STARTED** :: INFO :: CRISM SITE

CRISM 1:1500000

Identify/Query

Single click to query a point
Click and drag to query an area

Layer Name: **Full-Res Targeted Obs**
Observations: 0

Layer Name: **Half-Res Long Obs**
Observations: 1

Observation	Sensor	Zoom to Obs
00006895		

(Click on sensor for detailed info)

Layer Name: **Half-Res Short Obs**
Observations: 0

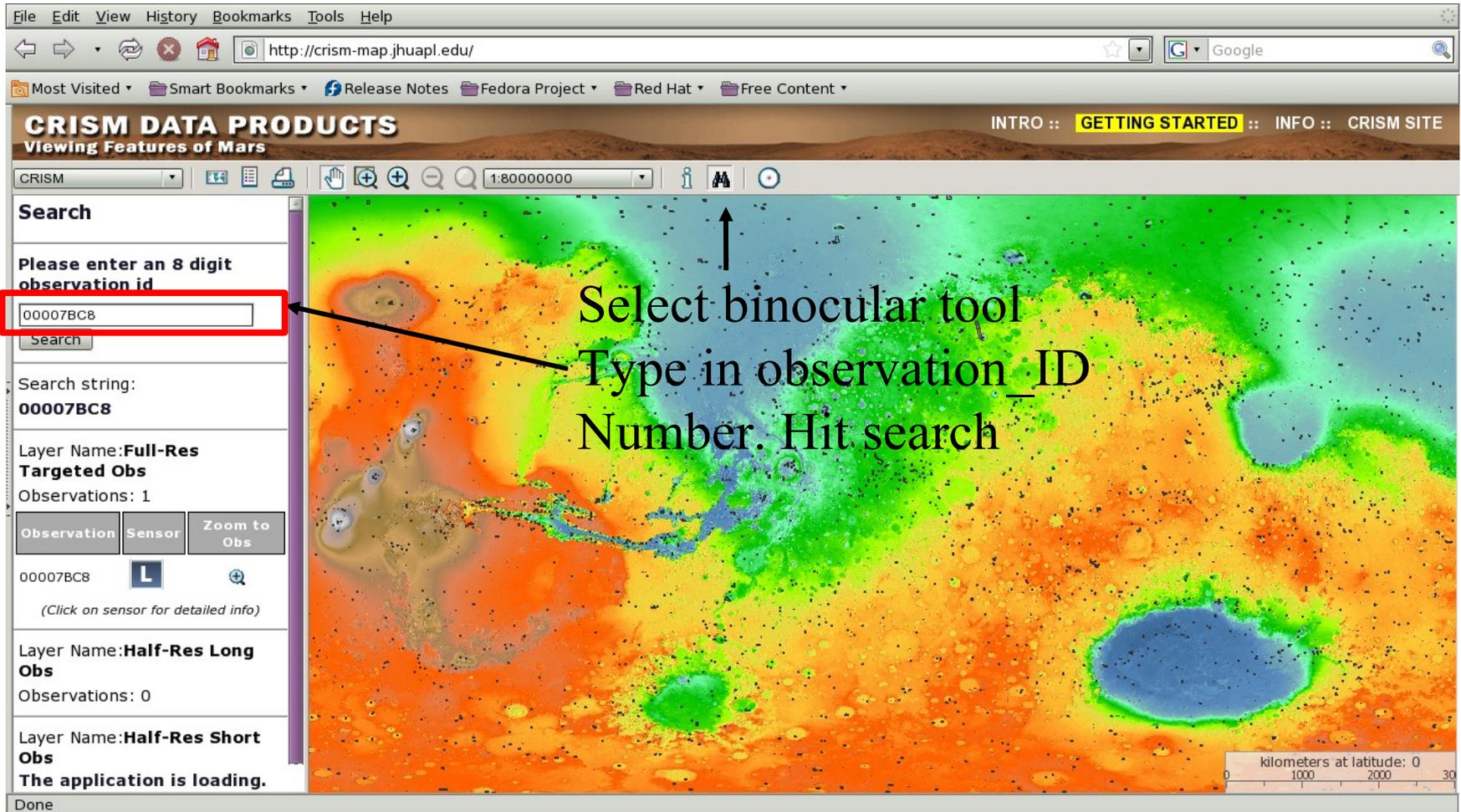
kilometers at latitude: 8.1

0 16 32 48

Done

Select zoom tool to focus on your specific observation.

If you find a good observation in the literature and you want more information on it.

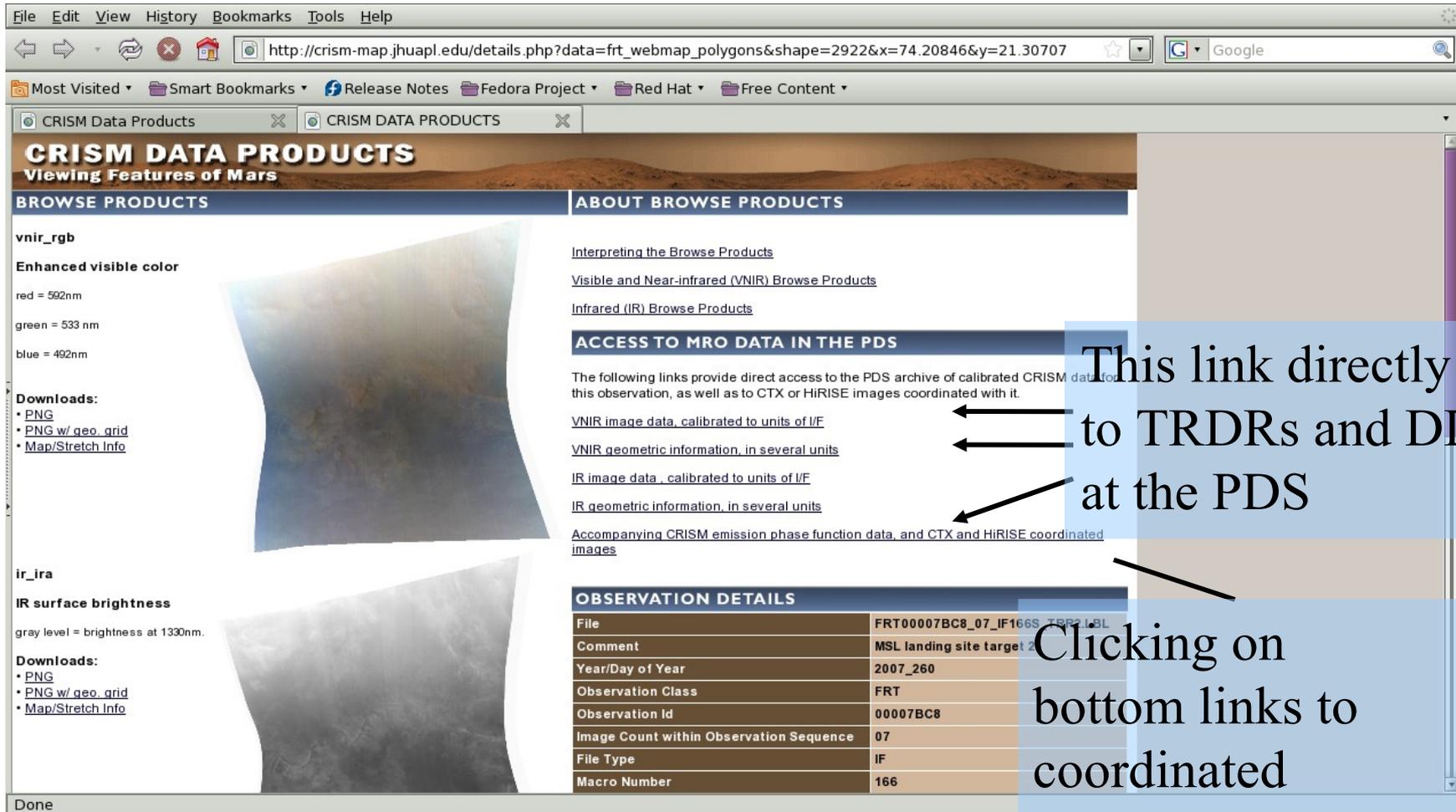


The screenshot shows a web browser window displaying the CRISM Data Products interface. The browser address bar shows the URL `http://crism-map.jhuapl.edu/`. The page title is "CRISM DATA PRODUCTS" with a subtitle "Viewing Features of Mars". The navigation menu includes "INTRO :: GETTING STARTED :: INFO :: CRISM SITE".

The interface features a search bar on the left side, which is highlighted with a red box. The search bar contains the text "00007BC8". Below the search bar, the search string is displayed as "00007BC8". The search results show one observation under the layer name "Full-Res Targeted Obs" with the observation ID "00007BC8". A button labeled "L" is visible next to the observation ID. Below the search results, the layer name "Half-Res Long Obs" is shown with 0 observations, and the layer name "Half-Res Short Obs" is shown with "The application is loading." status.

The main map area displays a color-coded topographic map of Mars. A black arrow points to the binocular tool icon in the map toolbar, and another black arrow points to the search bar. The text "Select binocular tool Type in observation_ID Number. Hit search" is overlaid on the map area.

The map toolbar includes a scale of 1:80000000 and a scale bar at the bottom right showing kilometers at latitude 0, with markers at 0, 1000, 2000, and 30.



The screenshot shows a web browser window with the URL `http://crism-map.jhuapl.edu/details.php?data=ftr_webmap_polygons&shape=2922&x=74.20846&y=21.30707`. The page title is "CRISM DATA PRODUCTS" and the subtitle is "Viewing Features of Mars".

BROWSE PRODUCTS

vnir_rgb
Enhanced visible color
red = 592nm
green = 533 nm
blue = 492nm

Downloads:

- [PNG](#)
- [PNG w/ geo_grid](#)
- [Map/Stretch Info](#)

ir_ira
IR surface brightness
gray level = brightness at 1330nm.

Downloads:

- [PNG](#)
- [PNG w/ geo_grid](#)
- [Map/Stretch Info](#)

ABOUT BROWSE PRODUCTS

[Interpreting the Browse Products](#)
[Visible and Near-infrared \(VNIR\) Browse Products](#)
[Infrared \(IR\) Browse Products](#)

ACCESS TO MRO DATA IN THE PDS

The following links provide direct access to the PDS archive of calibrated CRISM data for this observation, as well as to CTX or HiRISE images coordinated with it.

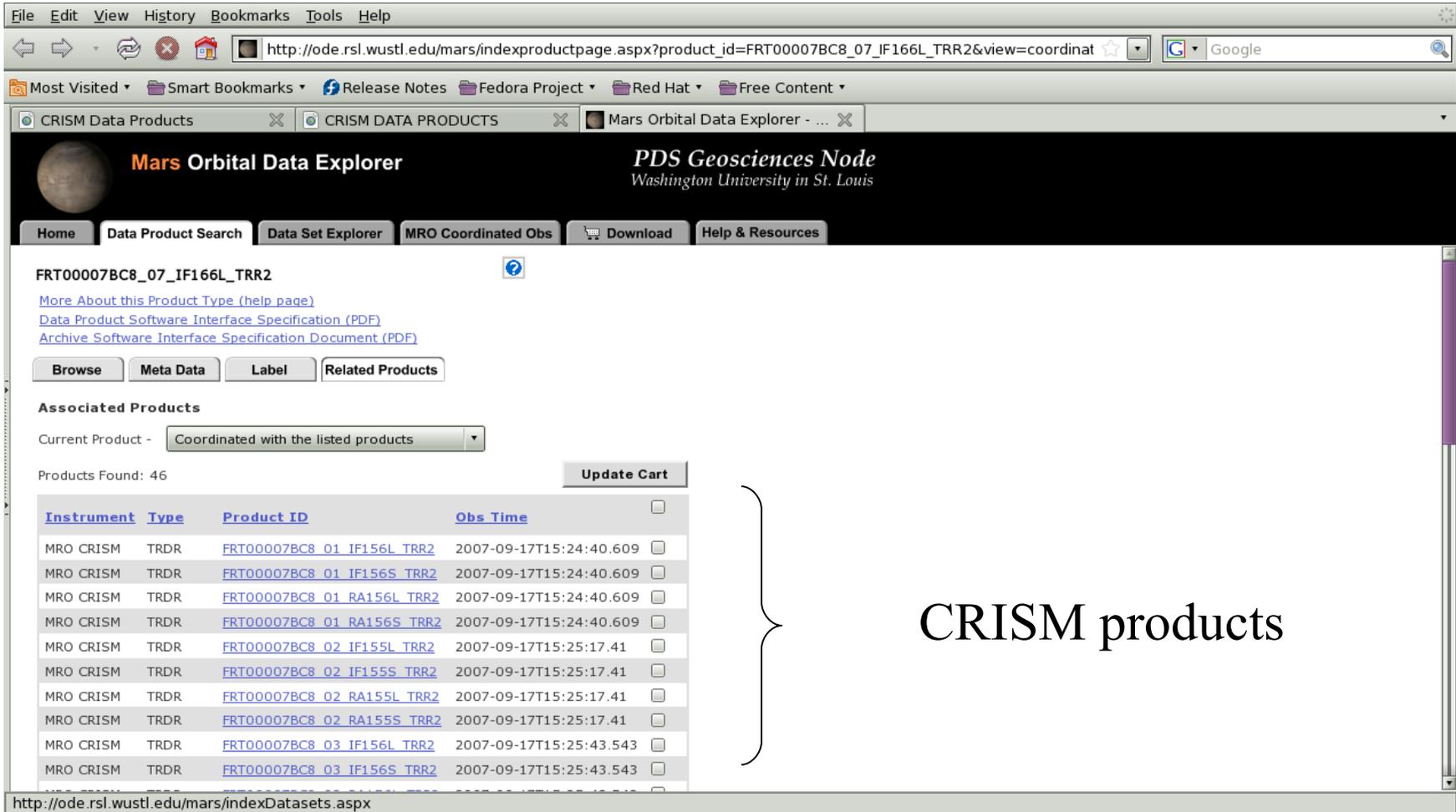
- [VNIR image data, calibrated to units of I/F](#)
- [VNIR geometric information, in several units](#)
- [IR image data, calibrated to units of I/F](#)
- [IR geometric information, in several units](#)
- [Accompanying CRISM emission phase function data, and CTX and HiRISE coordinated images](#)

OBSERVATION DETAILS

File	FRT00007BC8_07_IF166S_TBP213L
Comment	MSL landing site target 2
Year/Day of Year	2007_260
Observation Class	FRT
Observation Id	00007BC8
Image Count within Observation Sequence	07
File Type	IF
Macro Number	166

This link directly to TRDRs and DDRs at the PDS

Clicking on bottom links to coordinated HIRISE, CTX, CRISM TRDRs and EPFs if available



The screenshot shows a web browser window displaying the Mars Orbital Data Explorer (MRO) website. The browser's address bar shows the URL: `http://ode.rsl.wustl.edu/mars/indexproductpage.aspx?product_id=FRT00007BC8_07_IF166L_TRR2&view=coordinat`. The website header includes the text "Mars Orbital Data Explorer" and "PDS Geosciences Node Washington University in St. Louis". Below the header is a navigation menu with buttons for "Home", "Data Product Search", "Data Set Explorer", "MRO Coordinated Obs", "Download", and "Help & Resources".

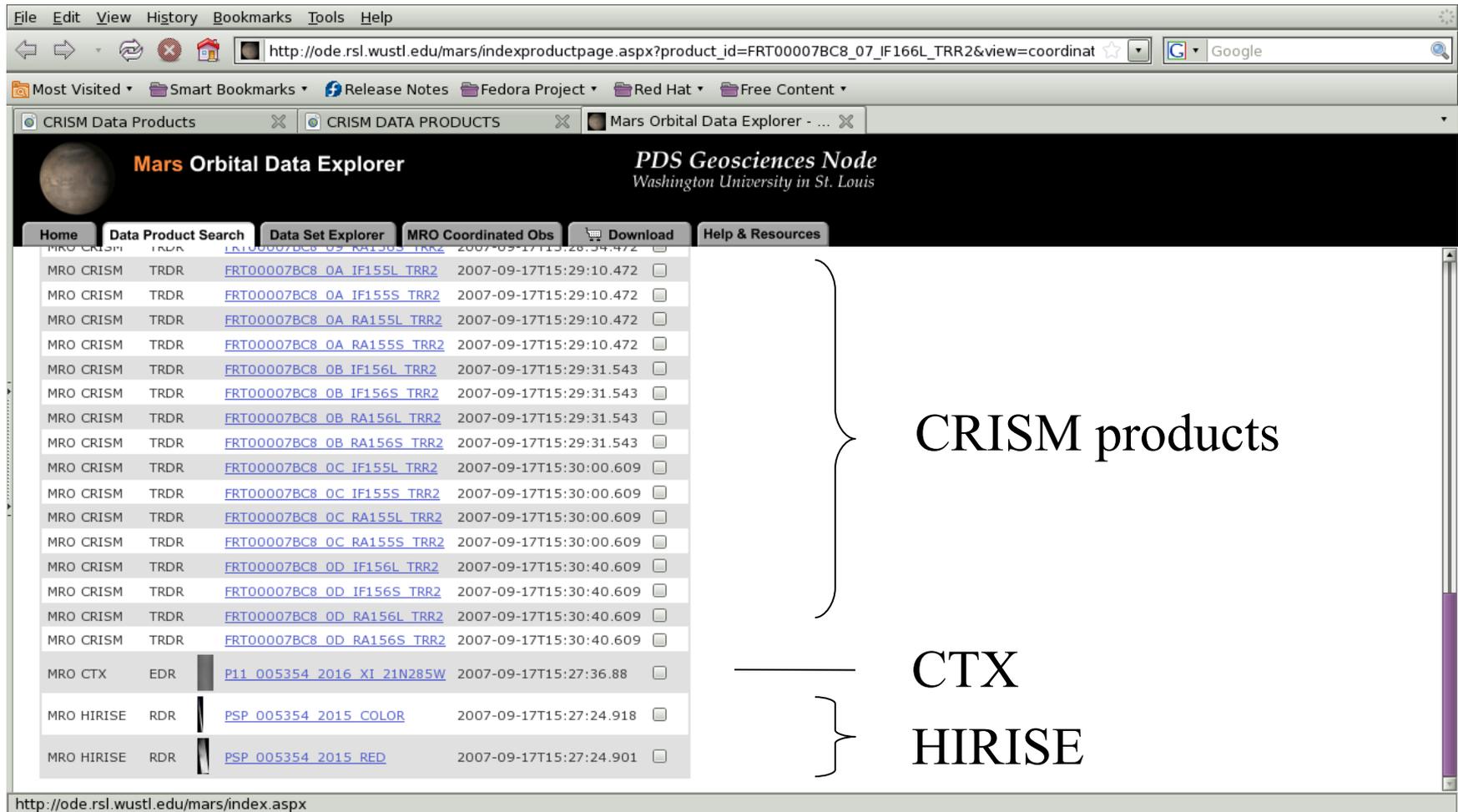
The main content area displays the product ID "FRT00007BC8_07_IF166L_TRR2" and provides links for "More About this Product Type (help page)", "Data Product Software Interface Specification (PDF)", and "Archive Software Interface Specification Document (PDF)". Below these links are buttons for "Browse", "Meta Data", "Label", and "Related Products".

The "Associated Products" section shows a dropdown menu for "Current Product" set to "Coordinated with the listed products". Below this, it indicates "Products Found: 46" and includes an "Update Cart" button.

A table lists the products found, with columns for "Instrument", "Type", "Product ID", and "Obs Time". The table contains 10 rows of data, all for MRO CRISM TRDR products. A large curly bracket on the right side of the table points to the text "CRISM products".

Instrument	Type	Product ID	Obs Time
MRO CRISM	TRDR	FRT00007BC8_01_IF156L_TRR2	2007-09-17T15:24:40.609
MRO CRISM	TRDR	FRT00007BC8_01_IF156S_TRR2	2007-09-17T15:24:40.609
MRO CRISM	TRDR	FRT00007BC8_01_RA156L_TRR2	2007-09-17T15:24:40.609
MRO CRISM	TRDR	FRT00007BC8_01_RA156S_TRR2	2007-09-17T15:24:40.609
MRO CRISM	TRDR	FRT00007BC8_02_IF155L_TRR2	2007-09-17T15:25:17.41
MRO CRISM	TRDR	FRT00007BC8_02_IF155S_TRR2	2007-09-17T15:25:17.41
MRO CRISM	TRDR	FRT00007BC8_02_RA155L_TRR2	2007-09-17T15:25:17.41
MRO CRISM	TRDR	FRT00007BC8_02_RA155S_TRR2	2007-09-17T15:25:17.41
MRO CRISM	TRDR	FRT00007BC8_03_IF156L_TRR2	2007-09-17T15:25:43.543
MRO CRISM	TRDR	FRT00007BC8_03_IF156S_TRR2	2007-09-17T15:25:43.543

The browser's address bar at the bottom shows the URL: `http://ode.rsl.wustl.edu/mars/indexDatasets.aspx`.



Mars Orbital Data Explorer
PDS Geosciences Node
Washington University in St. Louis

Home | Data Product Search | Data Set Explorer | MRO Coordinated Obs | Download | Help & Resources

Instrument	Product ID	Time	Download
MRO CRISM TRDR	FRT00007BC8_0A_IF155L_TRR2	2007-09-17T15:29:10.472	<input type="checkbox"/>
MRO CRISM TRDR	FRT00007BC8_0A_IF155S_TRR2	2007-09-17T15:29:10.472	<input type="checkbox"/>
MRO CRISM TRDR	FRT00007BC8_0A_RA155L_TRR2	2007-09-17T15:29:10.472	<input type="checkbox"/>
MRO CRISM TRDR	FRT00007BC8_0A_RA155S_TRR2	2007-09-17T15:29:10.472	<input type="checkbox"/>
MRO CRISM TRDR	FRT00007BC8_0B_IF156L_TRR2	2007-09-17T15:29:31.543	<input type="checkbox"/>
MRO CRISM TRDR	FRT00007BC8_0B_IF156S_TRR2	2007-09-17T15:29:31.543	<input type="checkbox"/>
MRO CRISM TRDR	FRT00007BC8_0B_RA156L_TRR2	2007-09-17T15:29:31.543	<input type="checkbox"/>
MRO CRISM TRDR	FRT00007BC8_0B_RA156S_TRR2	2007-09-17T15:29:31.543	<input type="checkbox"/>
MRO CRISM TRDR	FRT00007BC8_0C_IF155L_TRR2	2007-09-17T15:30:00.609	<input type="checkbox"/>
MRO CRISM TRDR	FRT00007BC8_0C_IF155S_TRR2	2007-09-17T15:30:00.609	<input type="checkbox"/>
MRO CRISM TRDR	FRT00007BC8_0C_RA155L_TRR2	2007-09-17T15:30:00.609	<input type="checkbox"/>
MRO CRISM TRDR	FRT00007BC8_0C_RA155S_TRR2	2007-09-17T15:30:00.609	<input type="checkbox"/>
MRO CRISM TRDR	FRT00007BC8_0D_IF156L_TRR2	2007-09-17T15:30:40.609	<input type="checkbox"/>
MRO CRISM TRDR	FRT00007BC8_0D_IF156S_TRR2	2007-09-17T15:30:40.609	<input type="checkbox"/>
MRO CRISM TRDR	FRT00007BC8_0D_RA156L_TRR2	2007-09-17T15:30:40.609	<input type="checkbox"/>
MRO CRISM TRDR	FRT00007BC8_0D_RA156S_TRR2	2007-09-17T15:30:40.609	<input type="checkbox"/>
MRO CTX EDR	P11_005354_2016_XI_21N285W	2007-09-17T15:27:36.88	<input type="checkbox"/>
MRO HIRISE RDR	PSP_005354_2015_COLOR	2007-09-17T15:27:24.918	<input type="checkbox"/>
MRO HIRISE RDR	PSP_005354_2015_RED	2007-09-17T15:27:24.901	<input type="checkbox"/>

CRISM products

CTX

HIRISE

http://ode.rsl.wustl.edu/mars/index.aspx

See Scott and Frank's presentations for which CRISM files are required to work the ENVI CRISM CAT.