CRISM Special Products for MSL Landing Site Selection

2nd MSL Landing Site Selection Workshop

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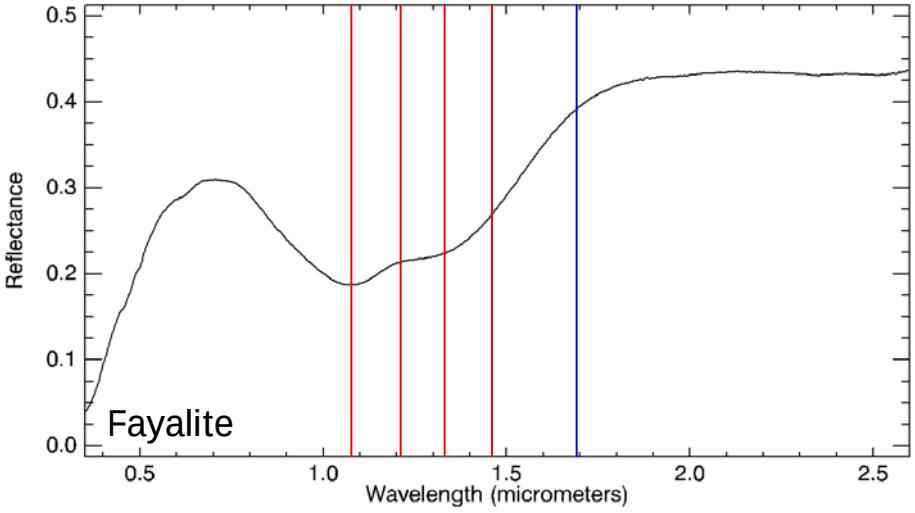
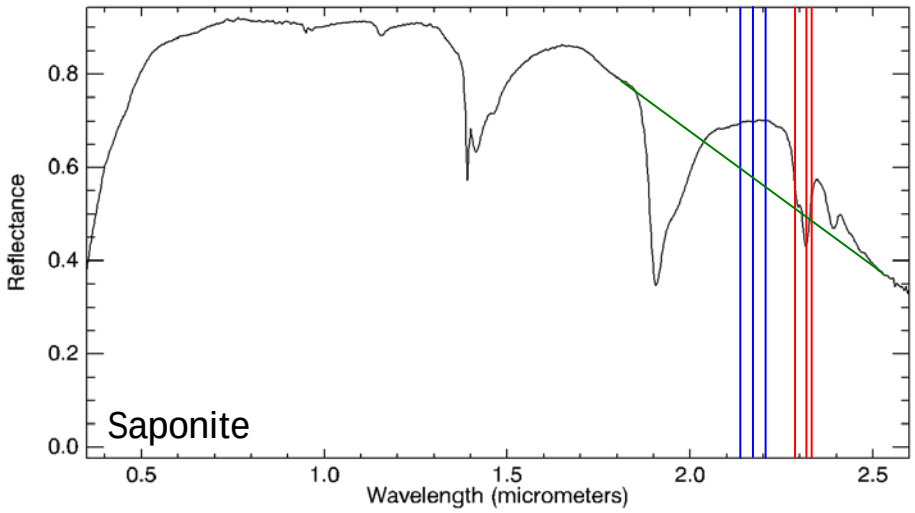
CRISM Spectral Summary Parameters

- Spectral Summary Parameters
  - Band math calculations that codify spectral characteristics indicative of certain mineral types or diagnostic absorptions
  - Strong heritage to the OMEGA investigation
  - Refined for CRISM instrument characteristics

Olivine Index (OLINDEX)



2300 nm Drop-Off (D2300)



CRISM Browse Product Specification

- Browse Products
  - RGB composites of categorized summary parameters
  - Consistent composite band scaling allows for direct product comparison

VNIR IRON MINERALOGY

Channel	Parameter	Scaling	Significance
Red	530-nm band depth, BD530*	0-0.22 to 0-250	Higher values indicate greater content or larger particle size of oxidized iron minerals
Green	600-nm shoulder, SH600*	1.2-1.4 to 0-250	Higher values correlated with coatings or rinds present on rocks
Blue	1-micron band depth, BDI1000*	0-10. to 0-250	Higher values indicate greater content or larger particle size of iron minerals, especially olivine and pyroxene

MAFIC MINERALOGY

Channel	Parameter	Scaling	Significance
Red	Olivine index OLINDEX*	0-0.13 to 0-250	Higher values indicate greater content or larger particle size of olivine
Green	Low calcium-pyroxene index LCPINDEX*	0-0.1 to 0-250	Higher values indicate greater content or larger particle size of low-calcium pyroxene
Blue	High calcium pyroxene index HCPINDEX*	0-0.2 to 0-250	Higher values indicate greater content or larger particle size of high-calcium pyroxene

SULFATE and HYDRATED MINERALOGY

Channel	Parameter	Scaling	Significance
Red	Sulfate index, SINDEX*	0-0.03 to 0-250	Higher values indicate greater content or larger particle size of minerals or glasses with bound or dissolved molecular water
Green	2100 nm band depth, BD2100*	0.01-0.04 to 0-250	Higher values indicate greater content or larger particle size of monohydrated sulfates
Blue	1900 nm band depth, BD1900*	0.01-0.04 to 0-250	Higher values indicate greater content or larger particle size of hydrated minerals such as sulfates

PHYLLOSILICATE MINERALOGY

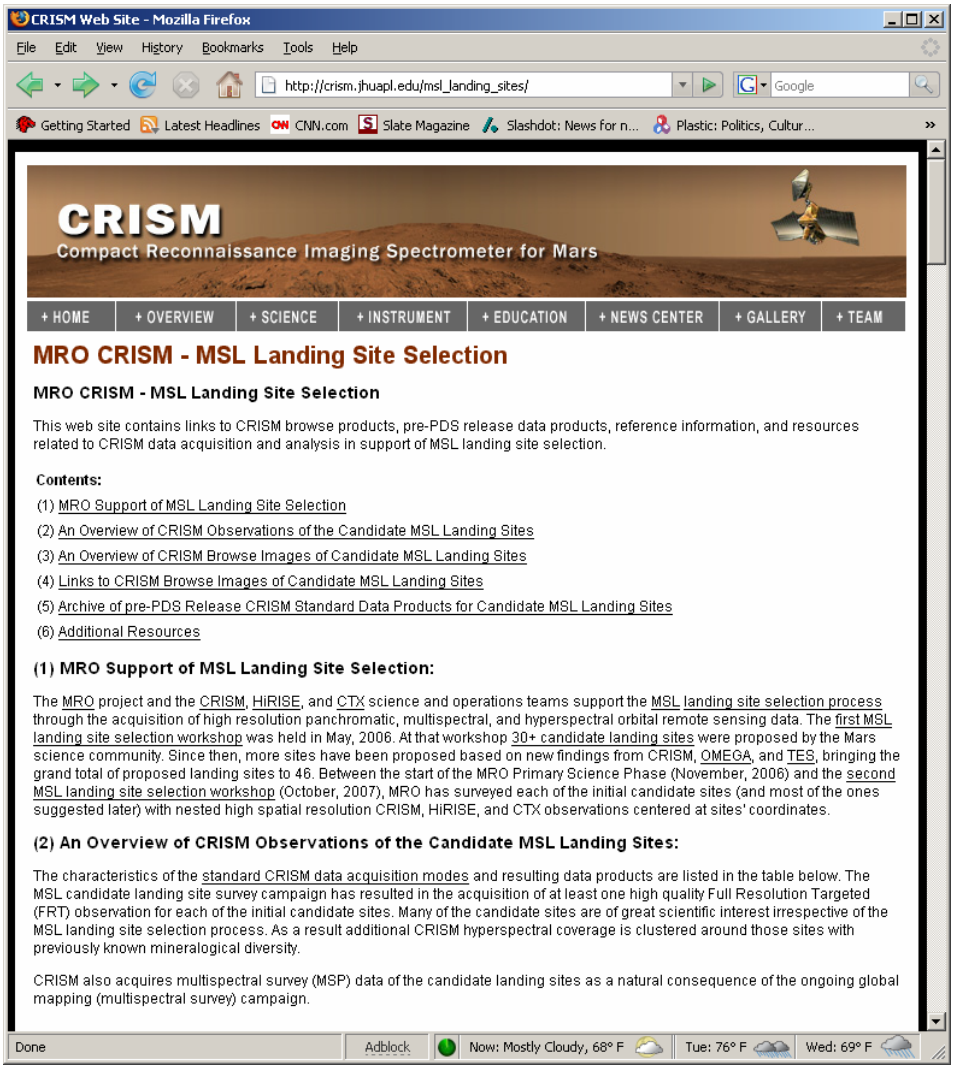
Channel	Parameter	Scaling	Significance
Red	2300 nm dropoff, D2300*	0.005-0.02 to 0-250	Higher values indicate greater content or larger particle size of iron/magnesium phyllosilicates
Green	2210 nm band depth, BD2210*	0.005-0.02 to 0-250	Higher values indicate greater content or larger particle size of aluminum phyllosilicates or hydrated silica
Blue	1900 nm band depth, BD1900*	0.01-0.04 to 0-250	Higher values indicate greater content or larger particle size of hydrated minerals

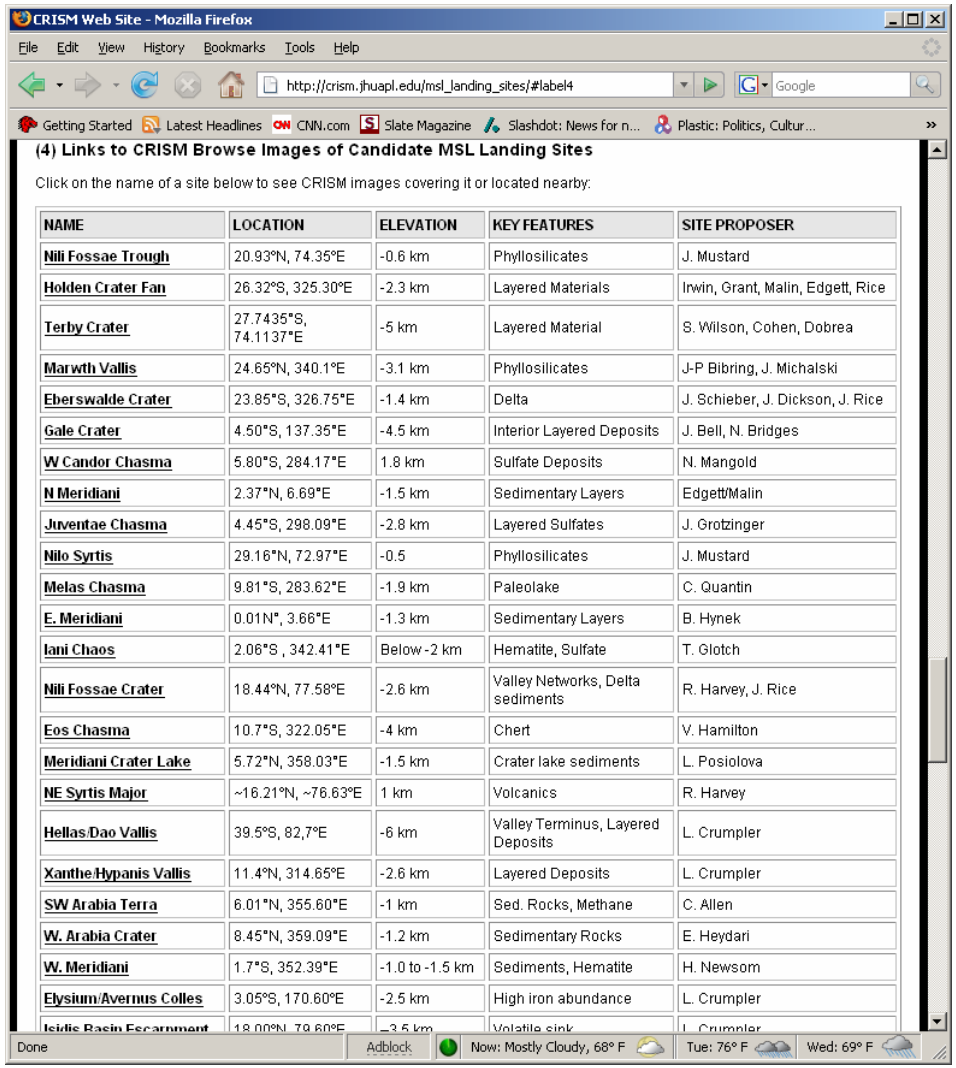
MSL Special Products – FRT Browse Products

- 3x3 degree study area delineated for each MSL candidate landing site
- Batch processing of Full Resolution Targeted (FRT) hyperspectral observations within each site study area
  - ~125 FRT observations identified
  - Photometric correction (cos[incidence])
  - Atmospheric correction (empirical gas-band)
  - Summary parameter calculation
  - Browse product rendering
  - Map projection

- MSL candidate landing site CRISM FRT browse product collection available online
  - http://crism.jhuapl.edu/msl_landing_sites/

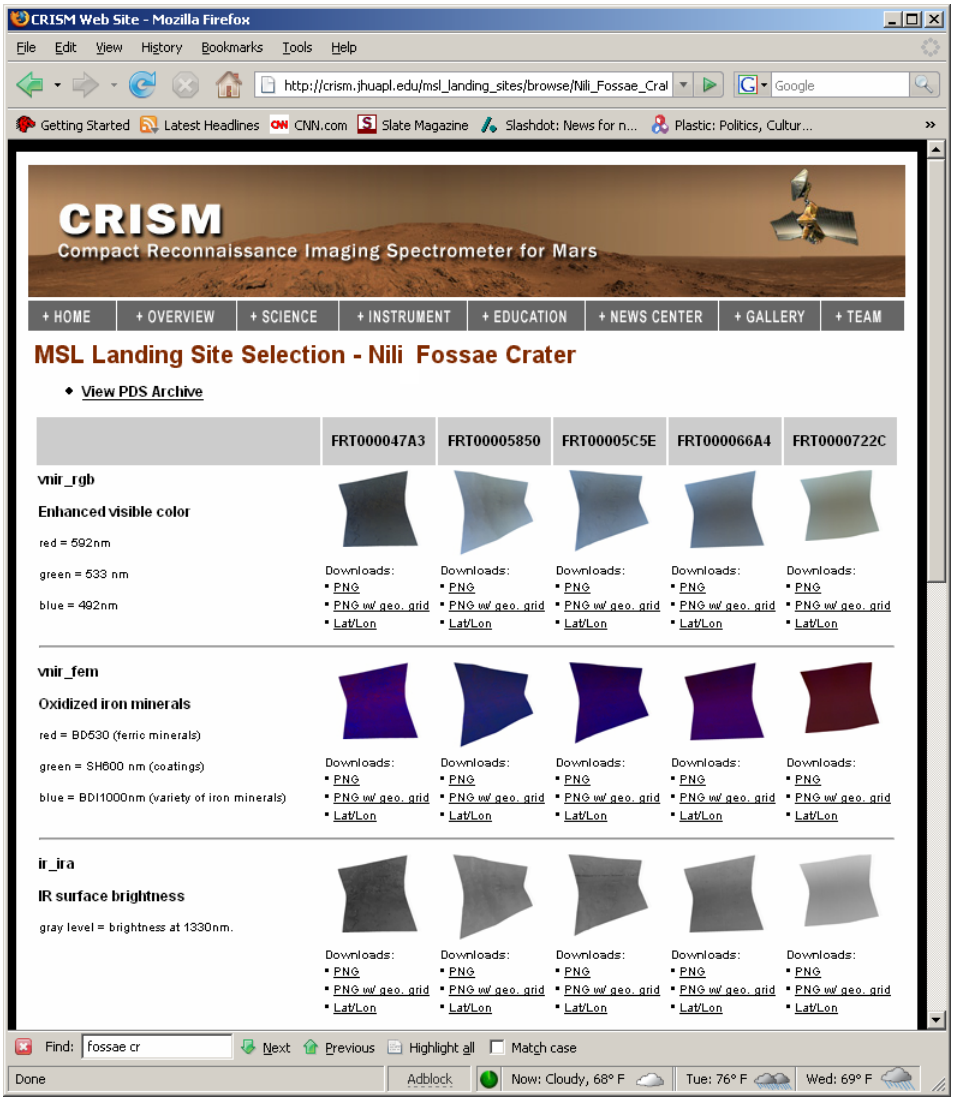
CRISM MSL Landing Site Selection Website

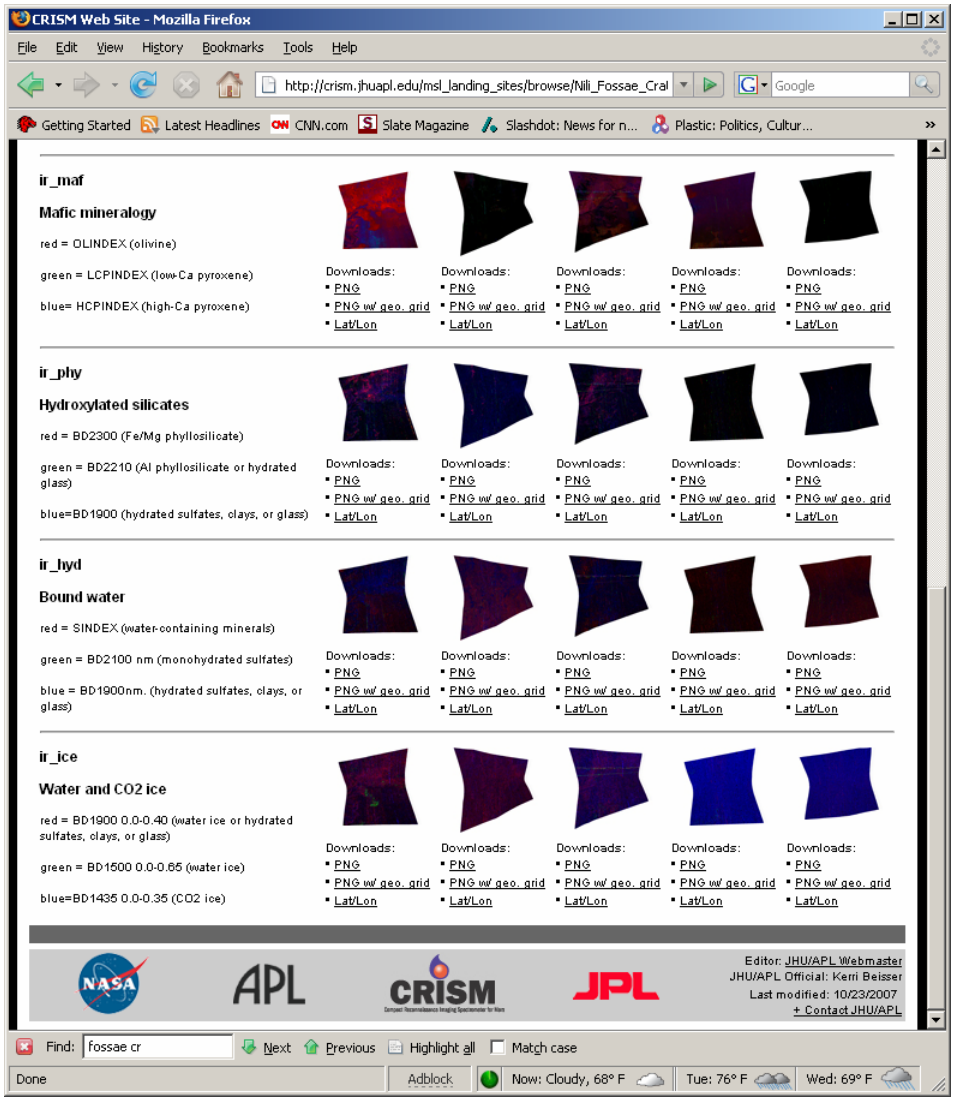




http://crism.jhuapl.edu/msl_landing_sites/

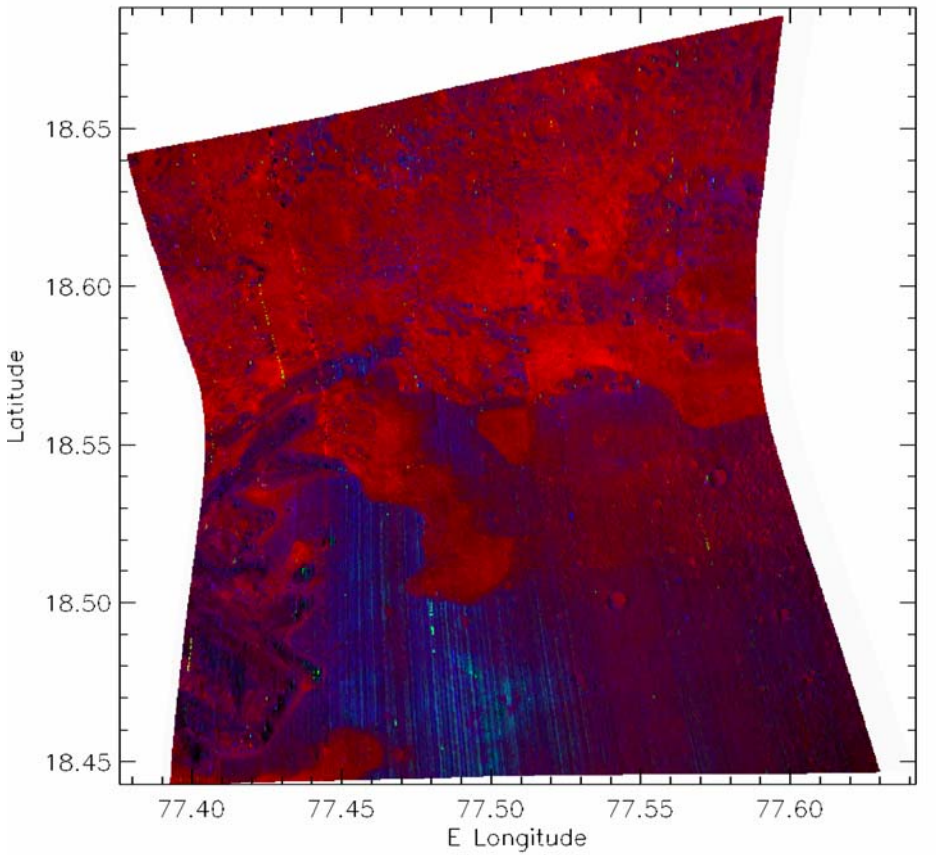
CRISM FRT Browse Product Image Sets

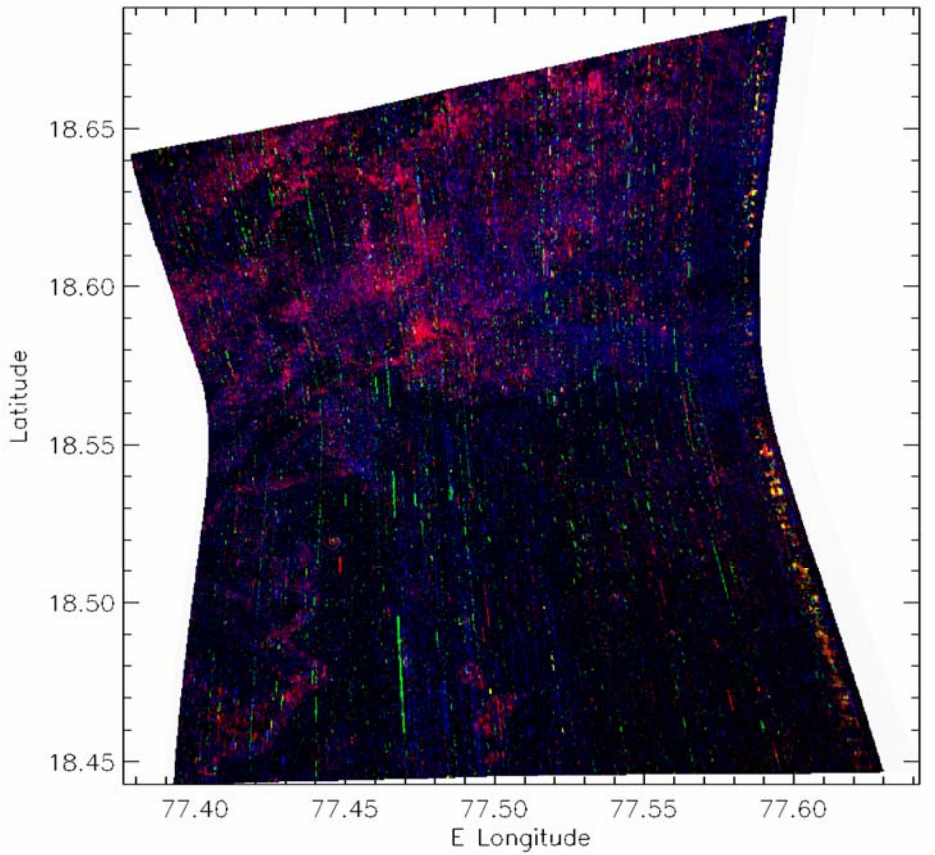




http://crism.jhuapl.edu/msl_landing_sites/

FRT000047A3 MAF and PHY Browse Products





MSL Special Products – MSP/MSW Mosaics

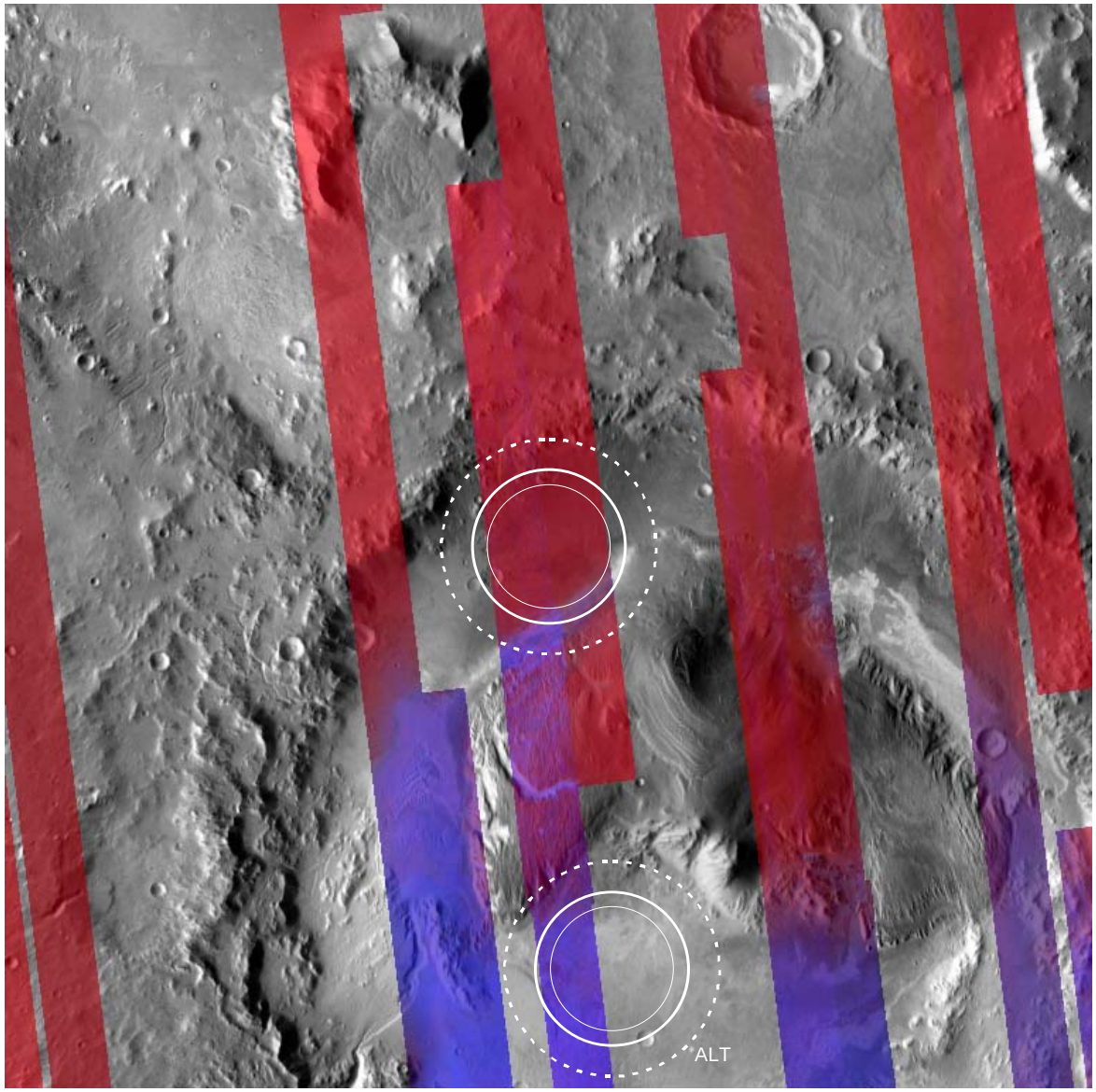
- Batch processing of CRISM multispectal data that intersect each candidate landing site study area
  - Photometric correction (cos[incidence])
  - Atmospheric correction (empirical gas-band)
  - Summary parameter calculation
  - Map projection and layer stacking (MRO standard; entropy ordering)
  - Browse product rendering (THEMIS day IR overlay @ 256 ppd)
- Four CRISM multispectral browse product mosaics have been generated for each site
  - FEM (iron mineralogy)
  - MAF (mafic mineralogy)
  - HYD (sulfate and hydrated mineralogy)
  - PHY (phyllosilicate mineralogy)
- The complete product set is on display on the back wall

FEM (Iron Mineralogy) Example
Gale Crater

R: BD530

G: SH600

B: BDI1000

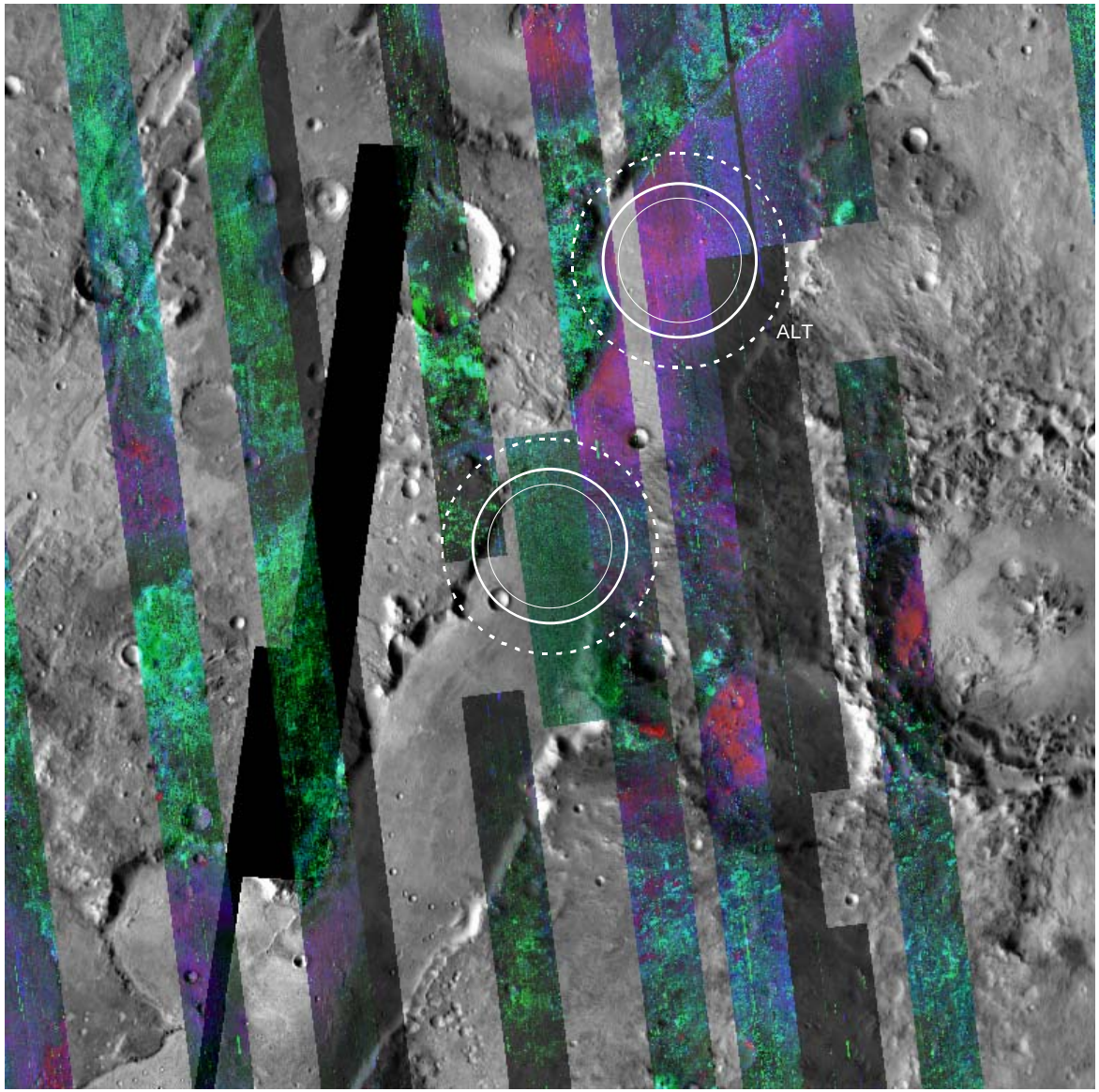


MAF (Mafic Mineralogy) Example
Nili Fossae Trough

R: OLINDEX

G: LCPINDEX

B: HCPINDEX

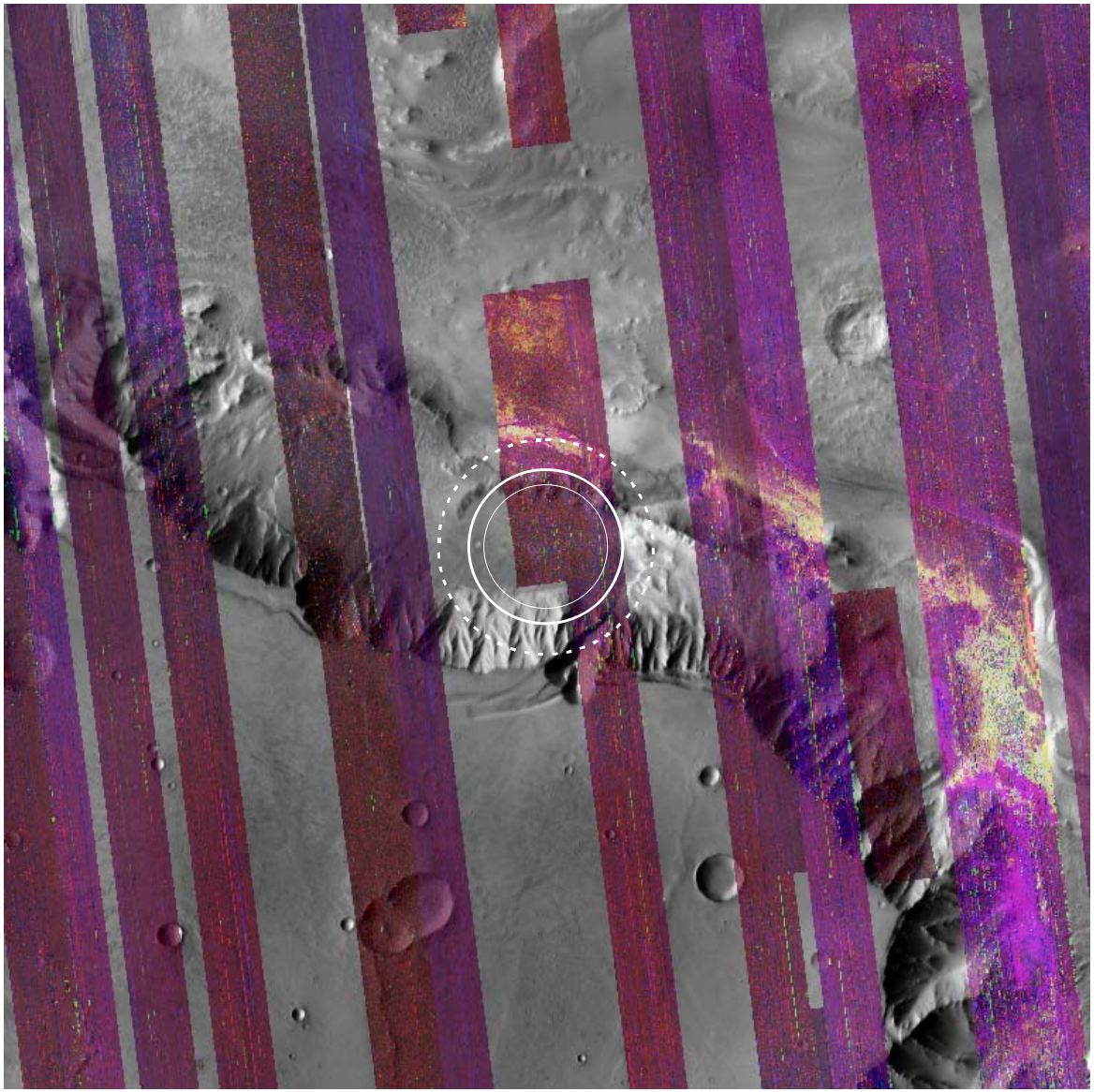


HYD (Sulfate and Hydrated Mineralogy) Example
Melas Chasma

R: SINDEX

G: BD2100

B: BD1900

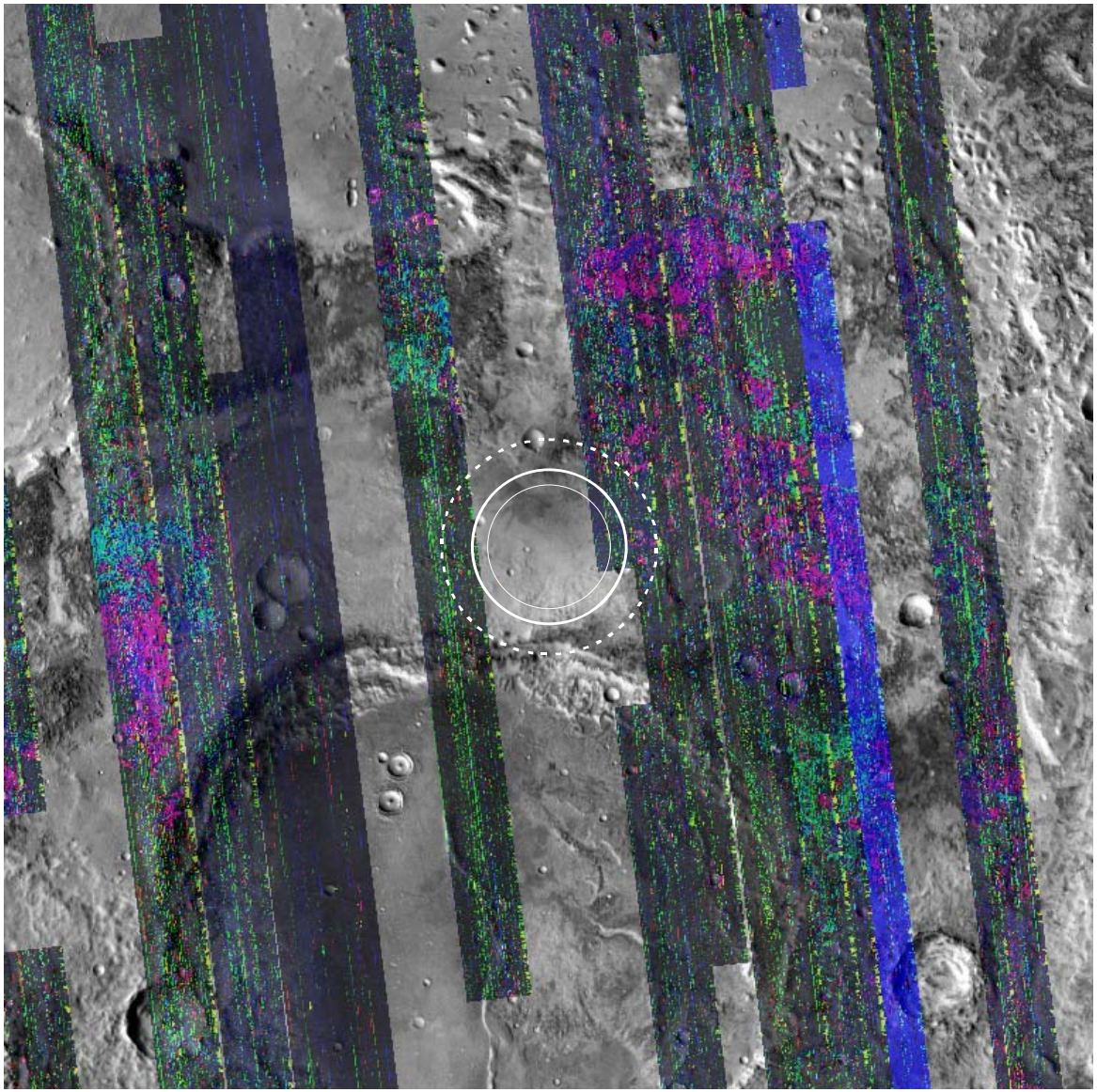


PHY (Phyllosilicate Mineralogy) Example
Mawrth Vallis

R: D2300

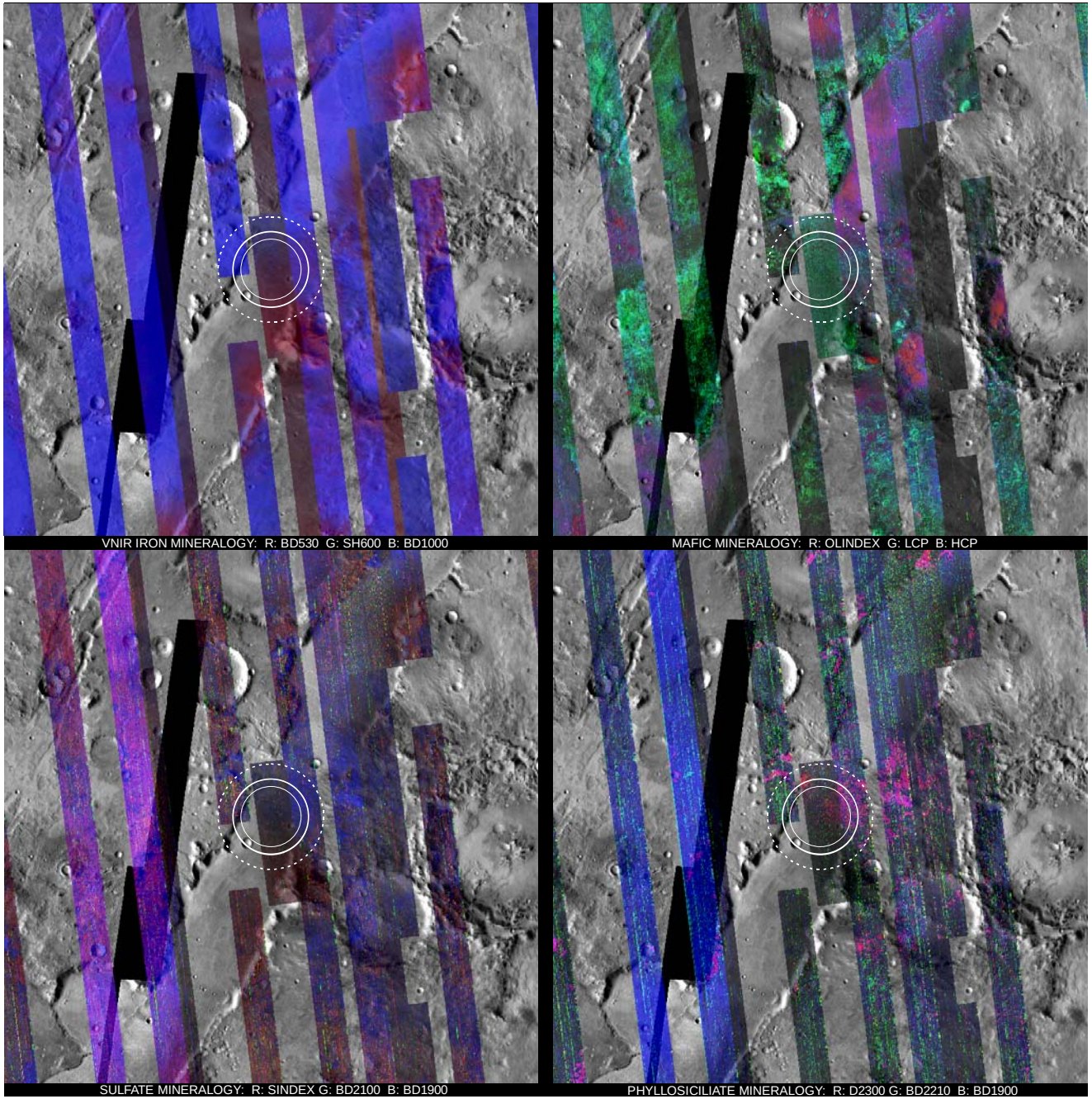
G: BD2210

B: BD1900

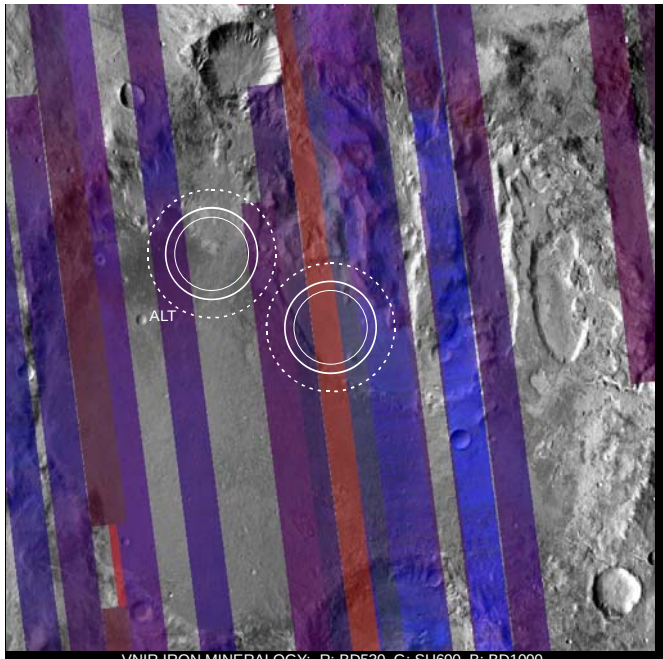


CRISM Multispectral Browse Product Highlights

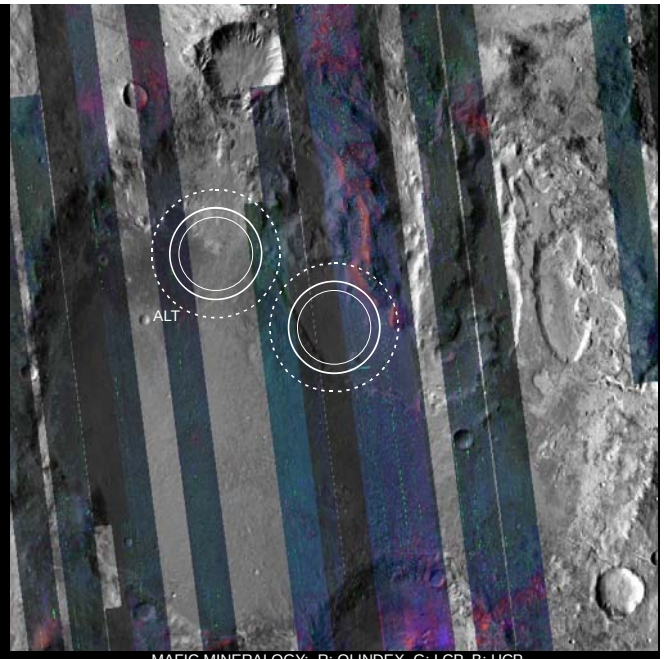
1. Nili Fossae Trough



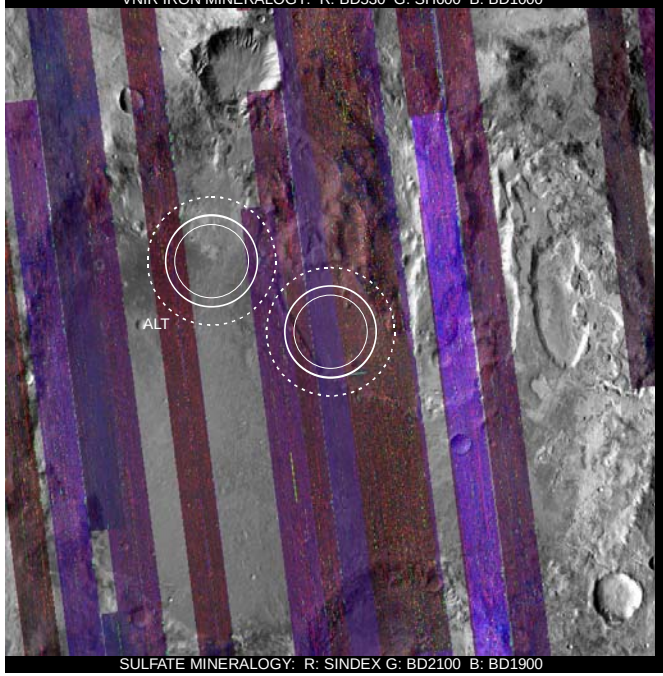
3. Terby Crater & Alternate



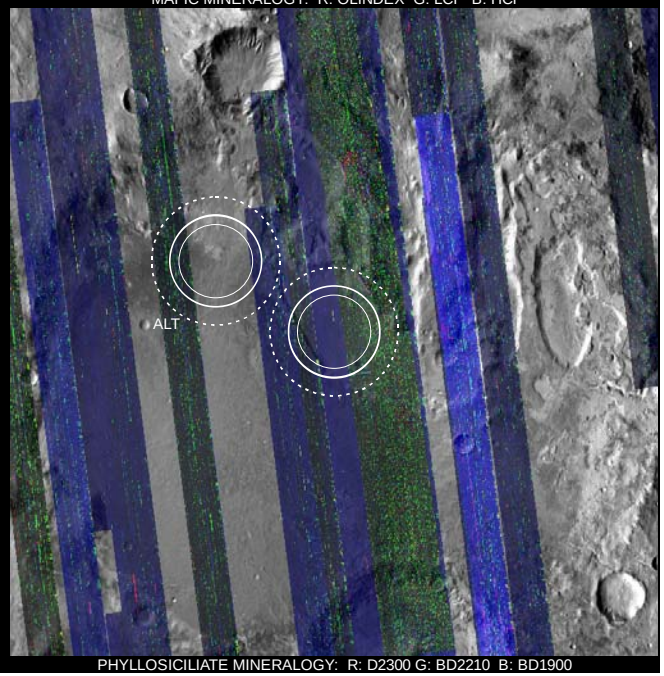
VNIR IRON MINERALOGY: R: BD530 G: SH600 B: BD1000



MAFIC MINERALOGY: R: OLINDEX G: LCP B: HCP

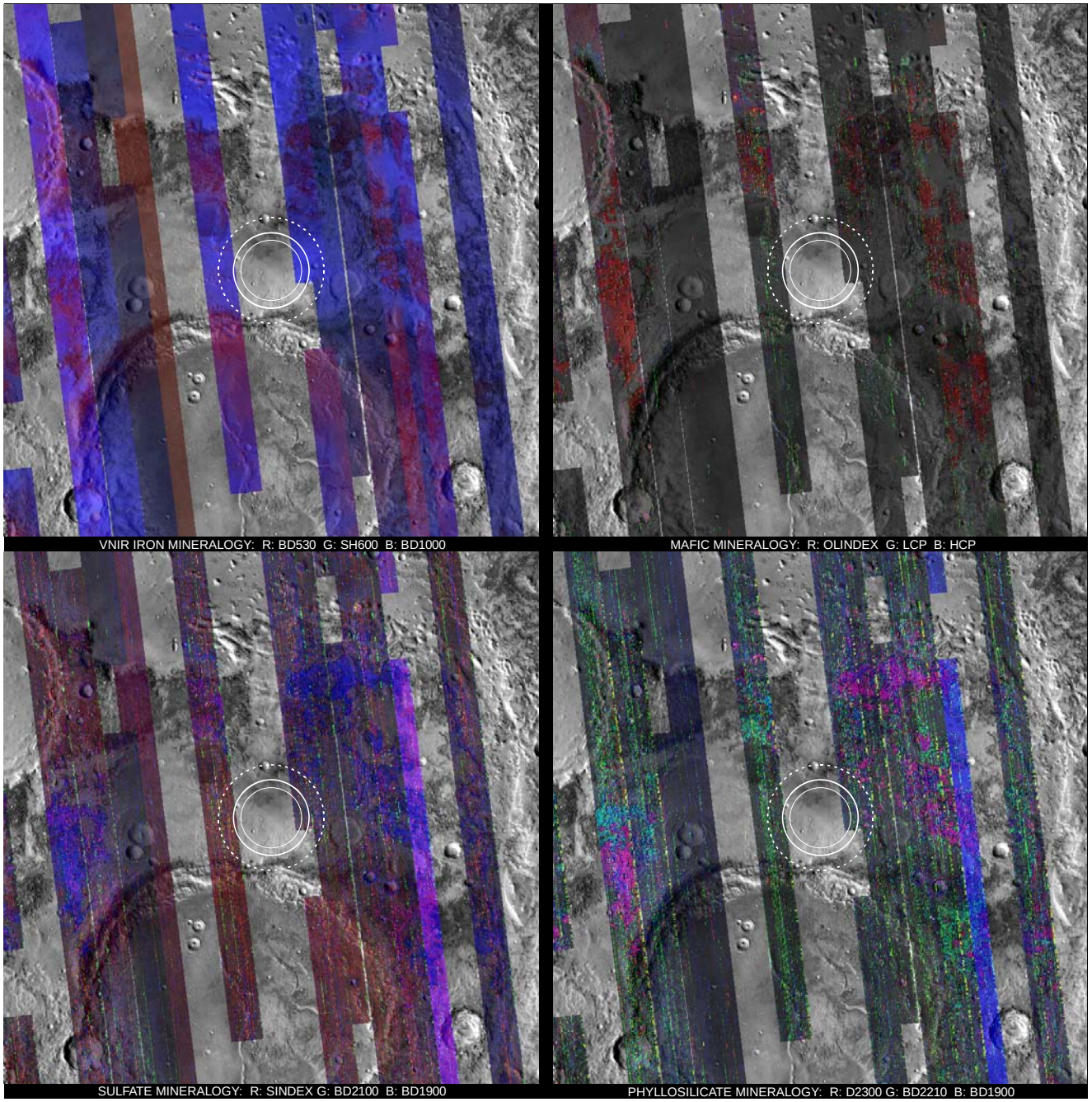


SULFATE MINERALOGY: R: SINDEX G: BD2100 B: BD1900

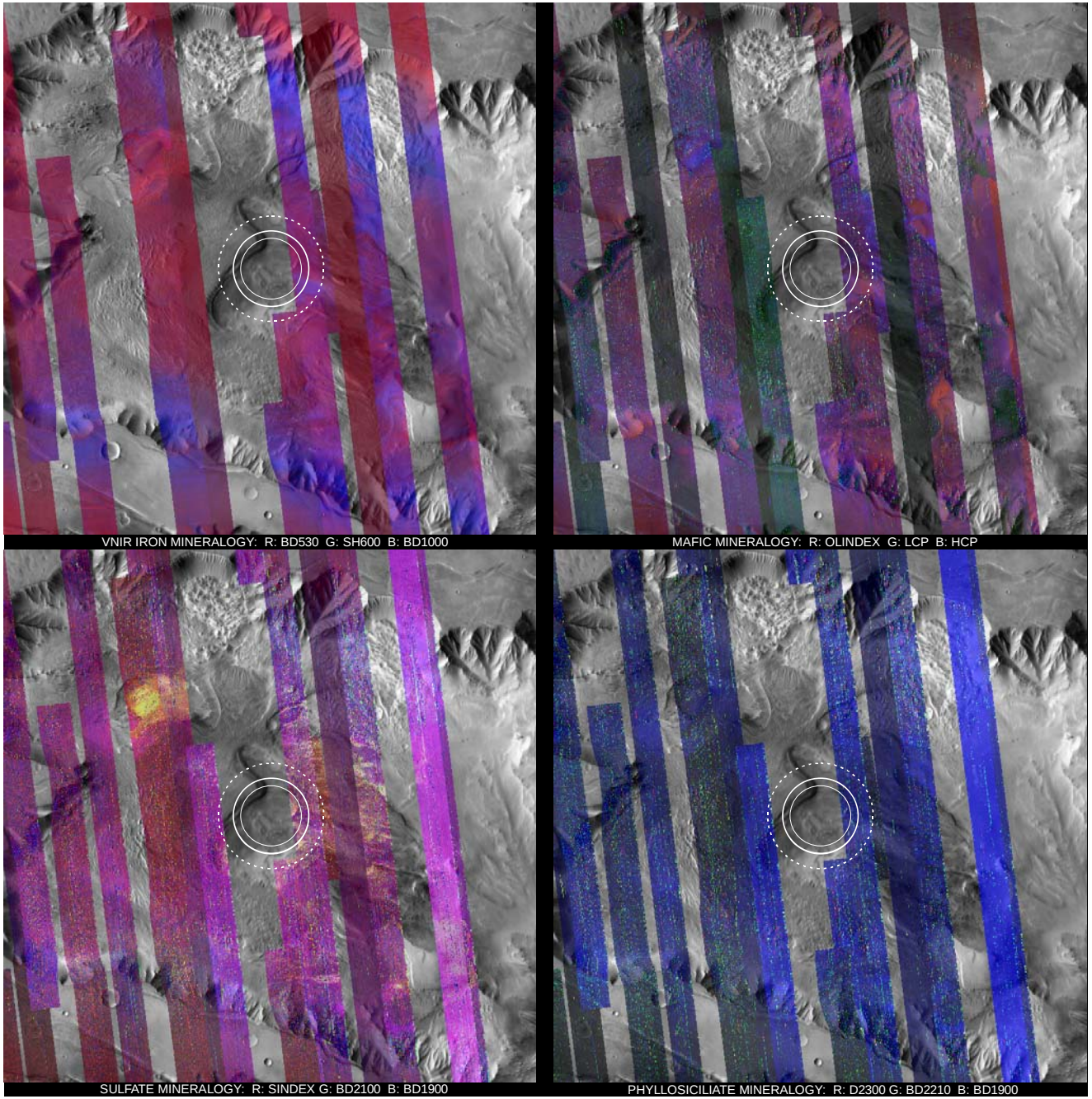


PHYLLOSICILIATE MINERALOGY: R: D2300 G: BD2210 B: BD1900

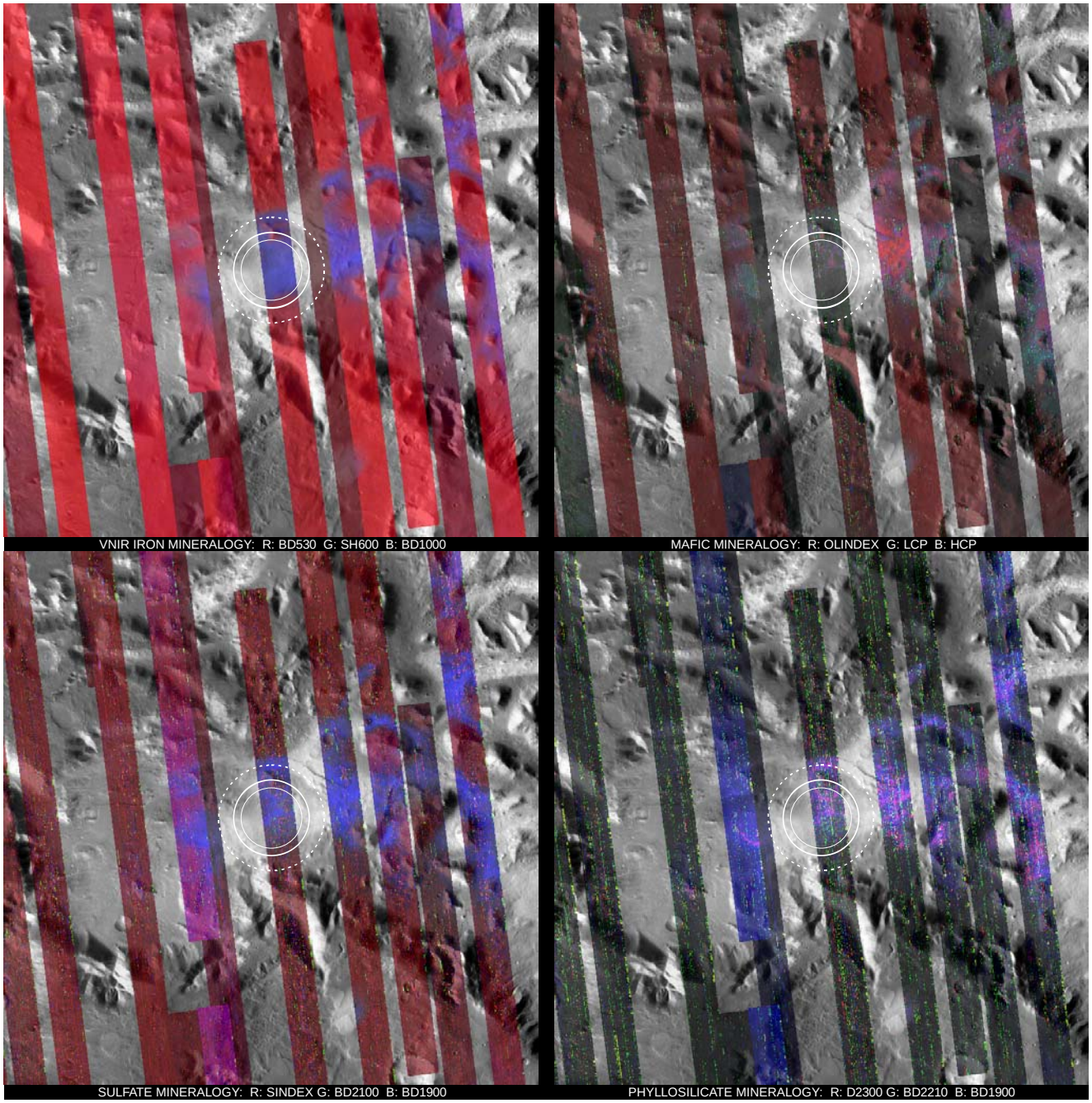
4. Mawrth Vallis



7. West Candor Chasma

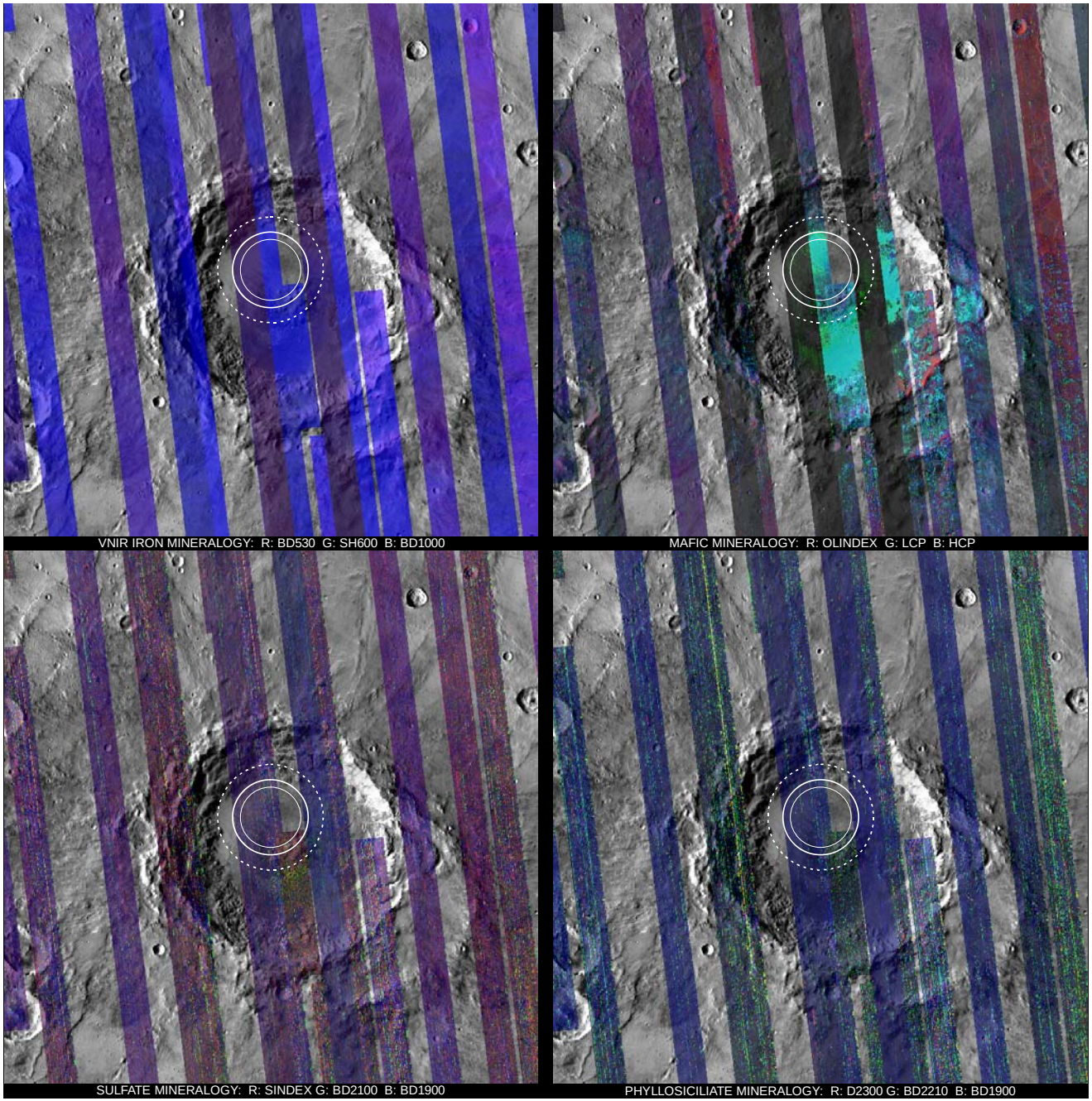


10. Nilo Syrtis

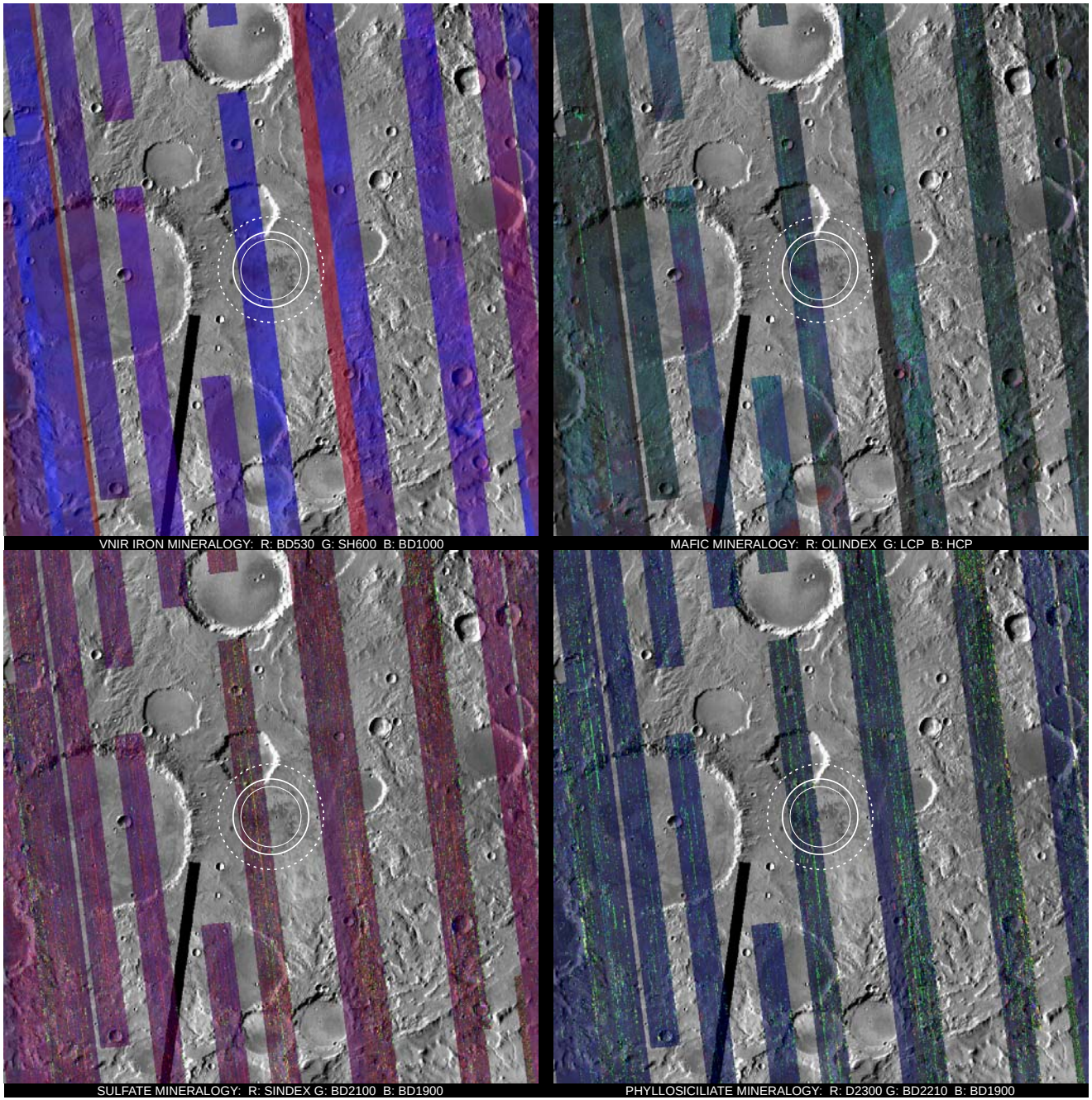


11. Melas Chasma

29. Ritchey Crater



42. Chloride Site 5



23. Elysium/Avernus Colles