

Extensive Phyllosilicate Layer in North- Western Noachis Terra: Relationship to Phyllosilicates in Holden and Eberswalde?



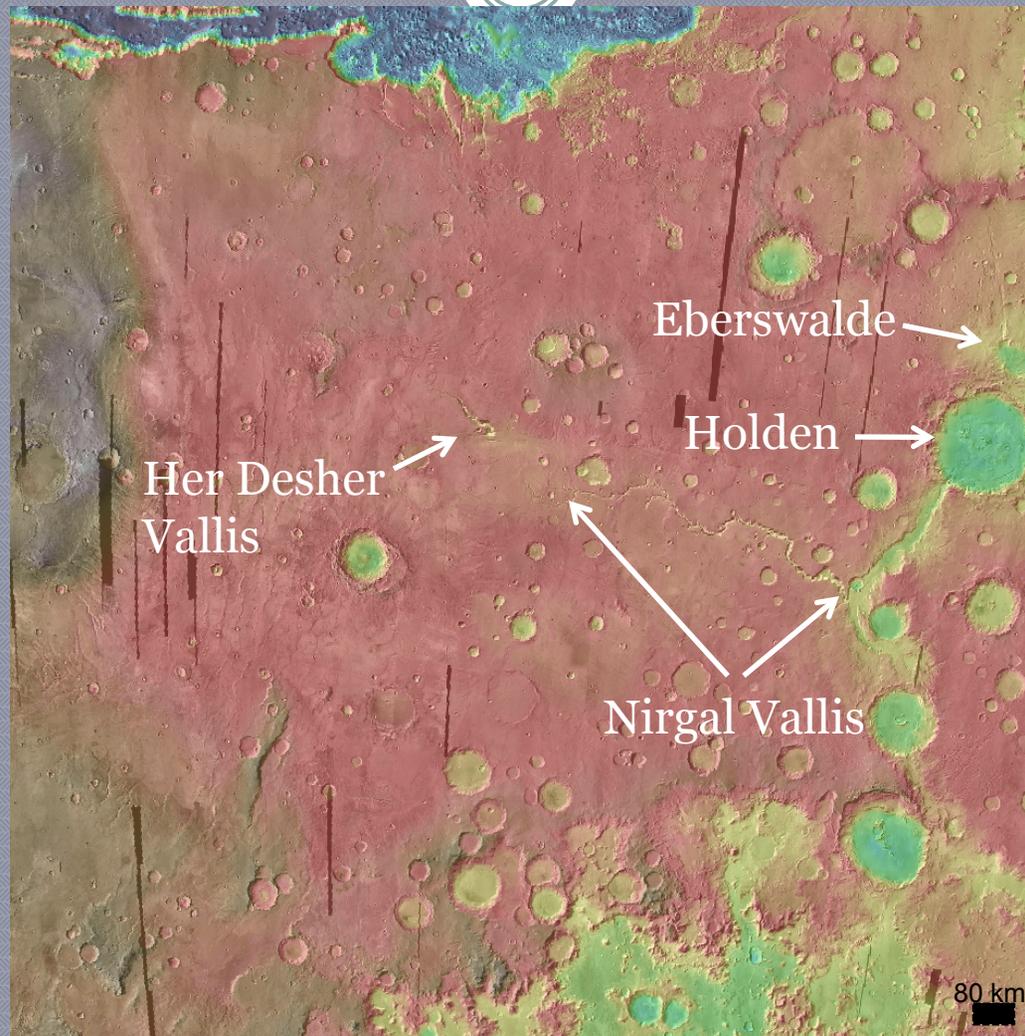
DEBRA BUCZKOWSKI
AND

KIM SEELOS

JOHNS HOPKINS UNIVERSITY APPLIED PHYSICS LAB

MSL LANDING SITE WORKSHOP
SEPTEMBER 28, 2010

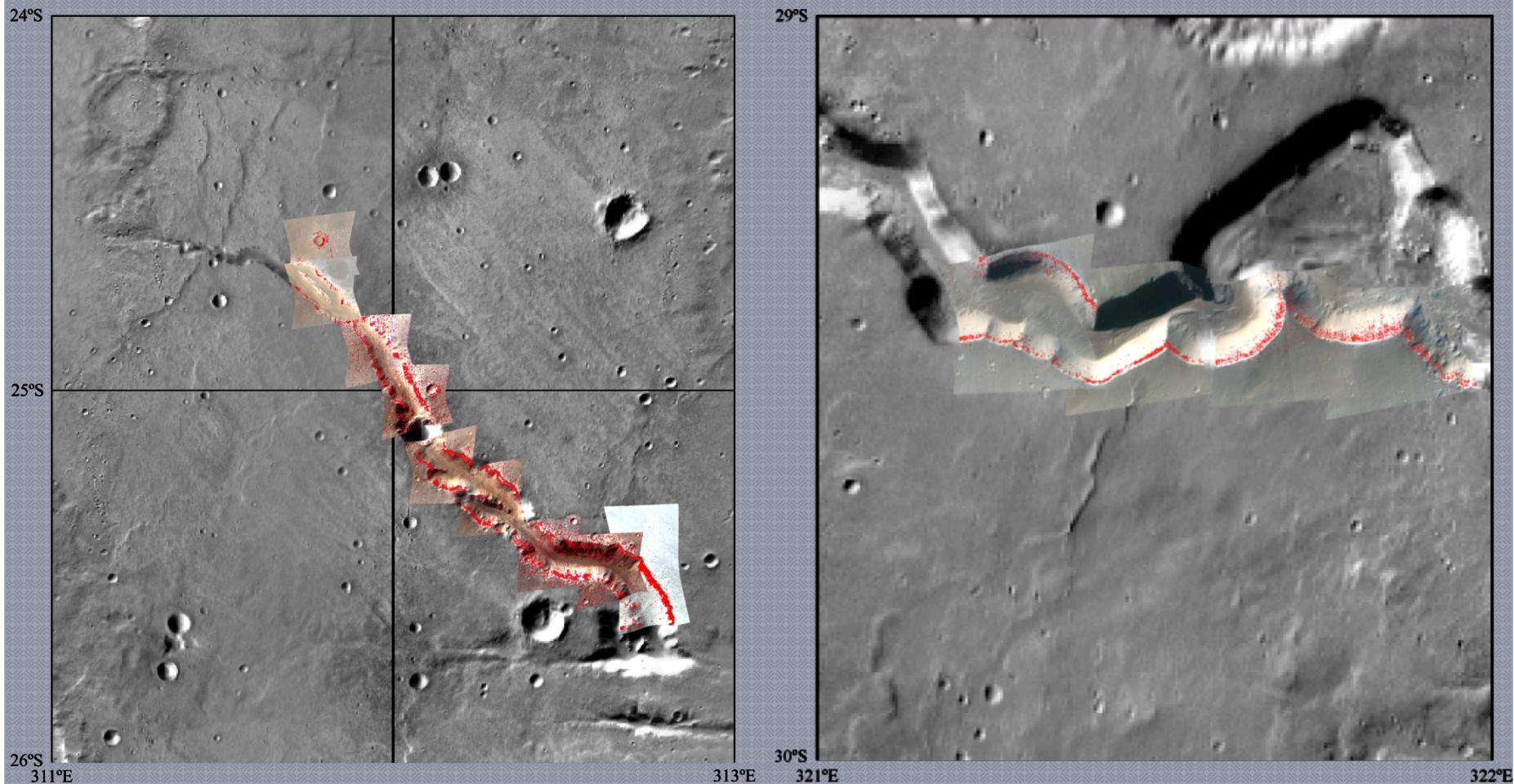
Northwest Noachis Terra



Her Desher and Nirgal Valles



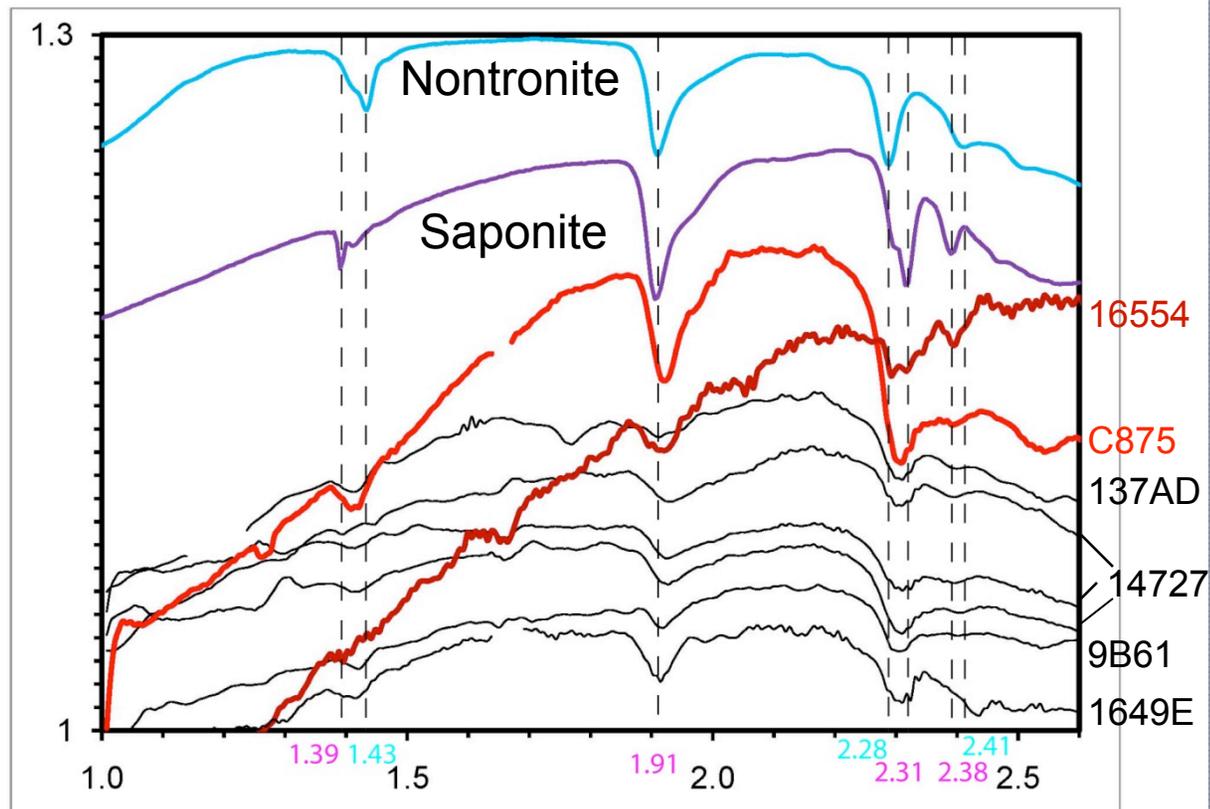
CRISM Observations of Valleys



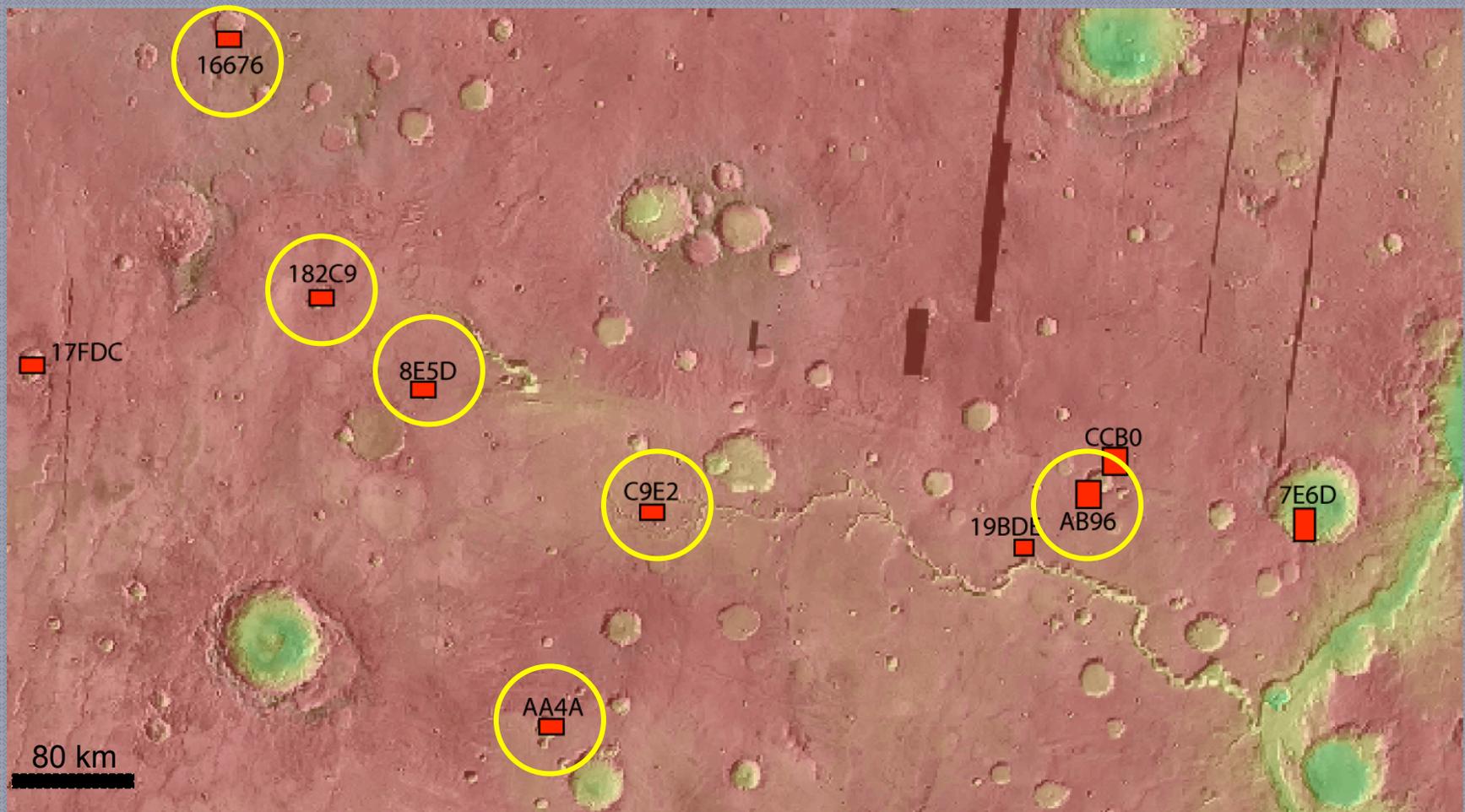
Spectral Analysis



Her Desher Spectra+ Nirgal Spectra



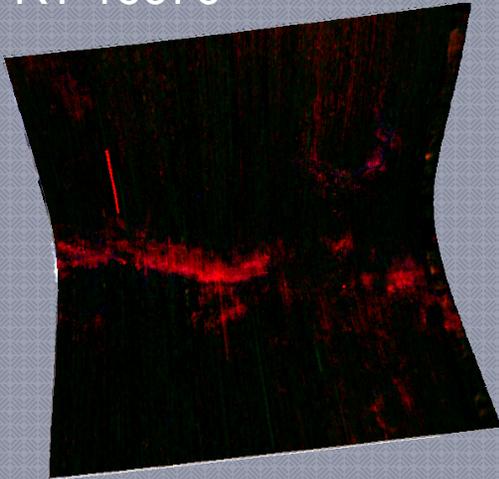
Nearby Crater Observations



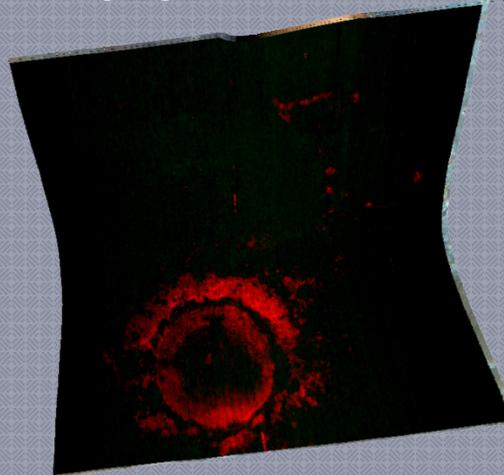
Nearby Craters



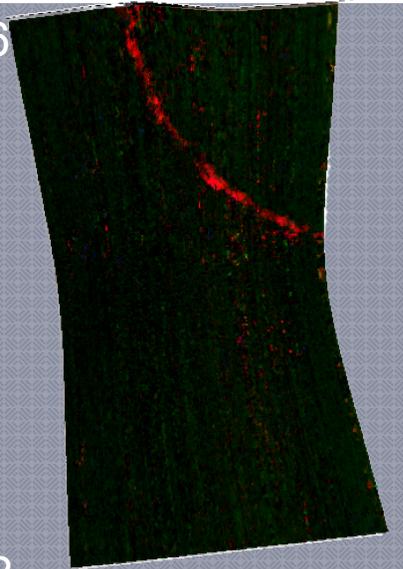
FRT 16676



FRT 8E5D



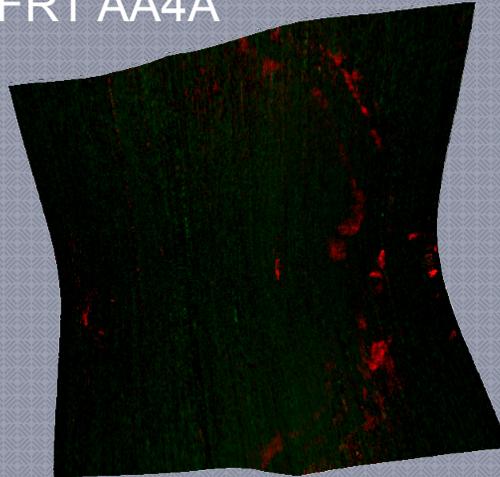
HRL AB96



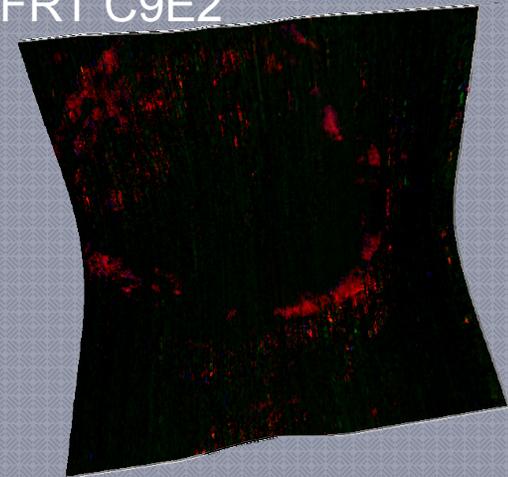
FRT 182C9



FRT AA4A



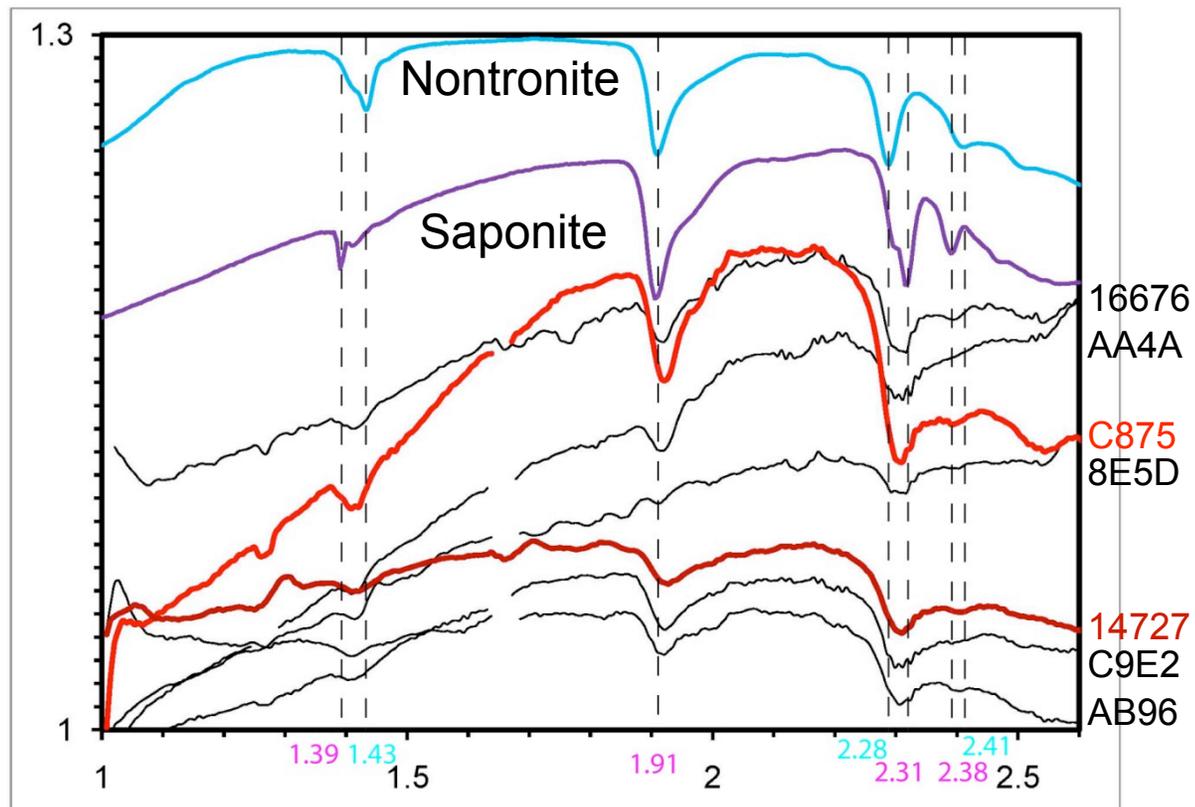
FRT C9E2



Spectral Analysis



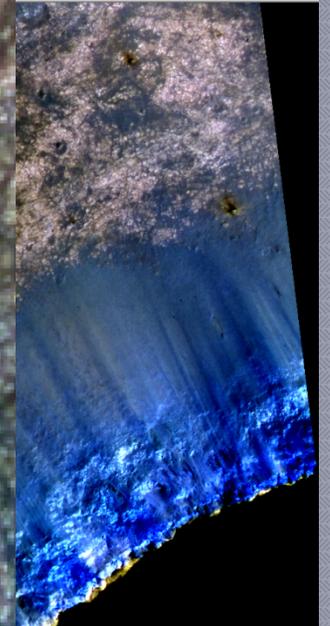
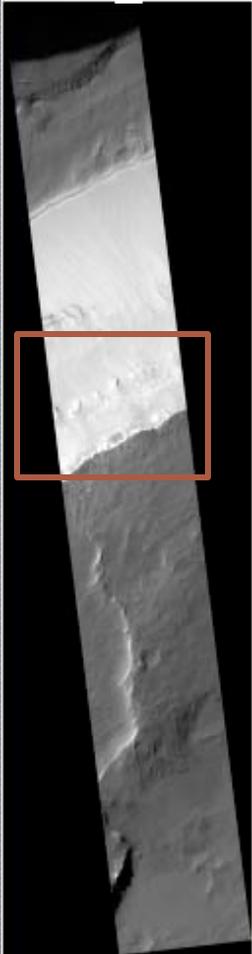
Crater Spectra



Geomorphology

Silicates

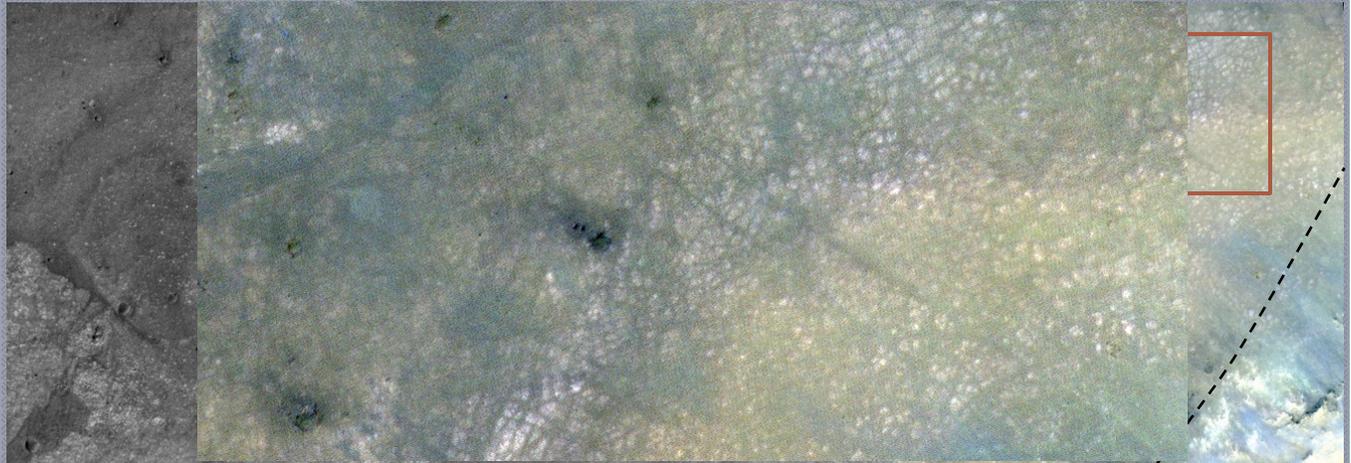
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Geomorphic Analysis of Crater Phyllosilicates



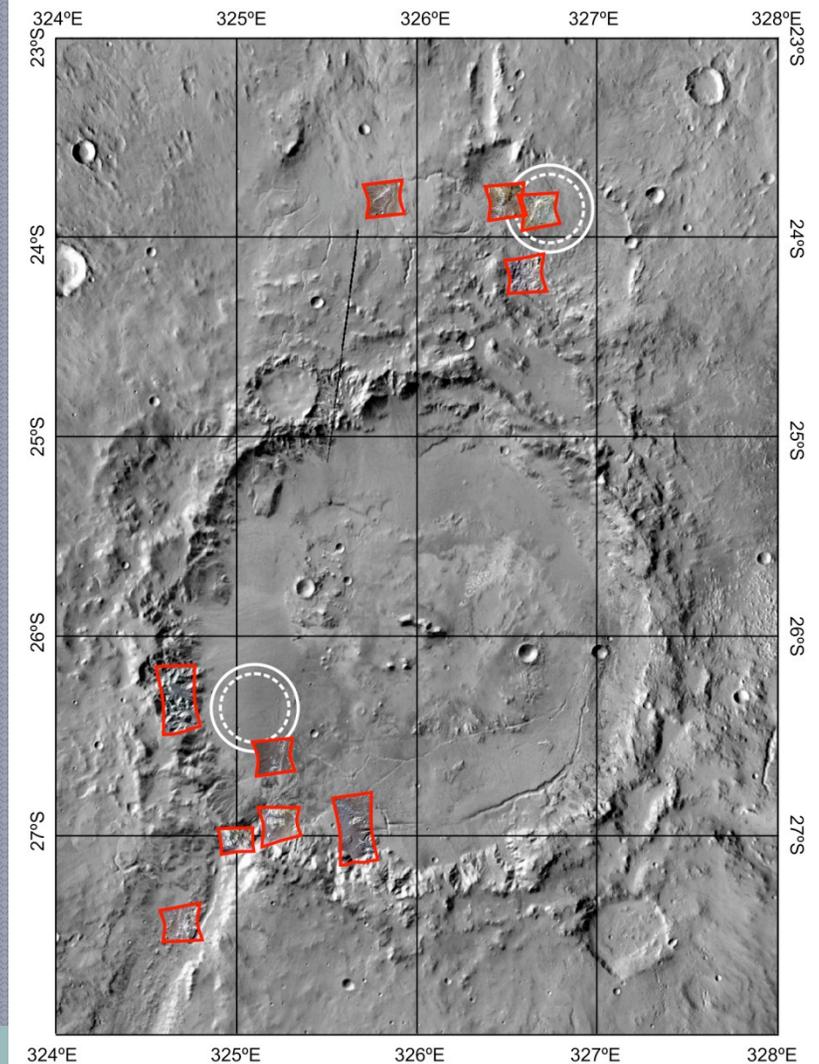
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Selected CRISM Observations: Holden & Eberswalde

Selected a variety of terrain types near landing sites with potential phyllosilicate signatures

Are these phyllosilicate materials spectrally consistent with the regional phyllosilicate - bearing layer in Noachis Terra?



Selected Holden Crater Observations

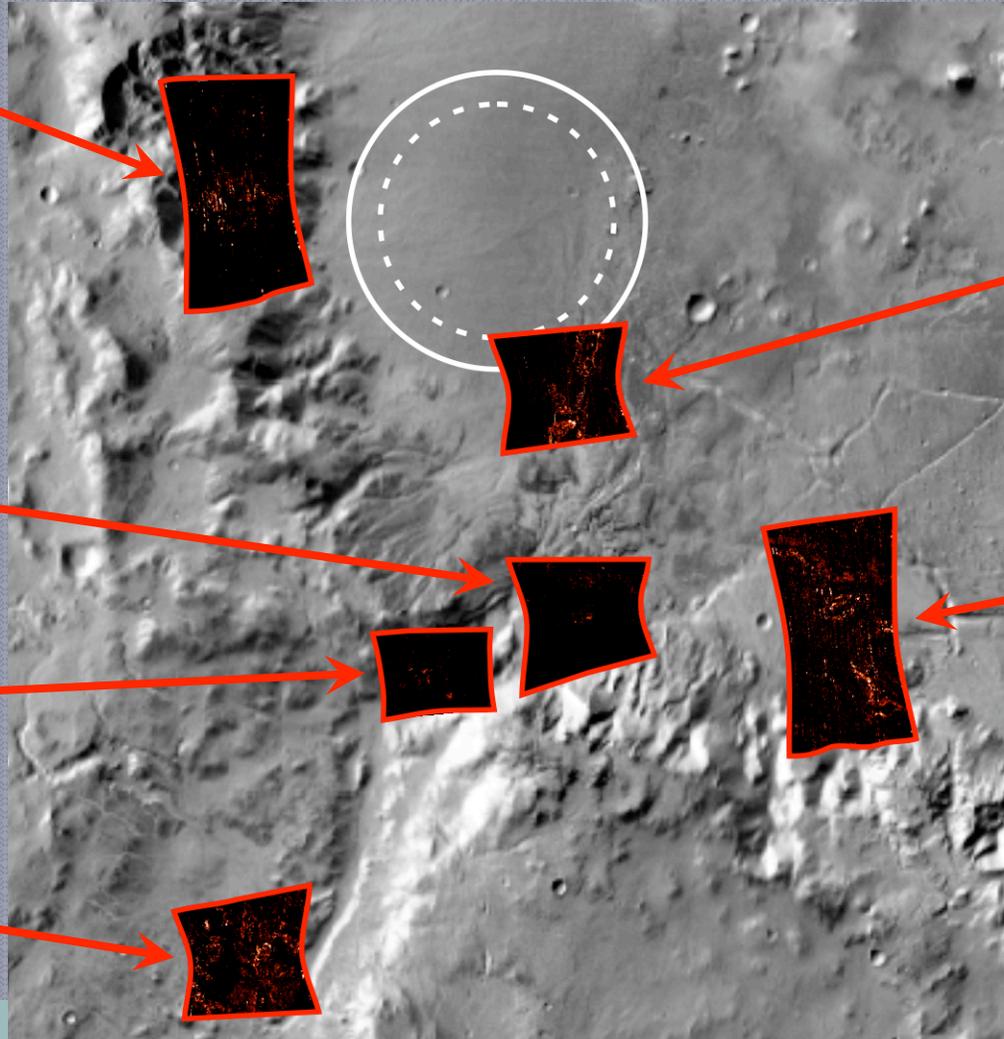


West crater wall:
HRL00018BA4

Megabreccia near breach:
FRT00009172

Rim breach:
HRS0001266E

Channel:
FRT0000ABB5



SE ellipse fan deposit:
FRT0000C1D1

Fan deposit:
HRL0000BE9D

D2300

0.03

IR RGB

R: 2.529 μm

G: 1.506 μm

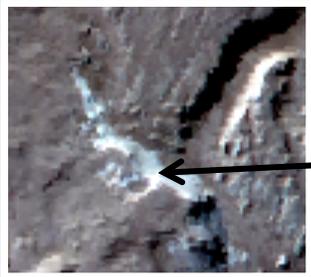
B: 1.080 μm

Ratio Spectra from Selected Holden Scenes

Transported Materials

“In-Place” Materials

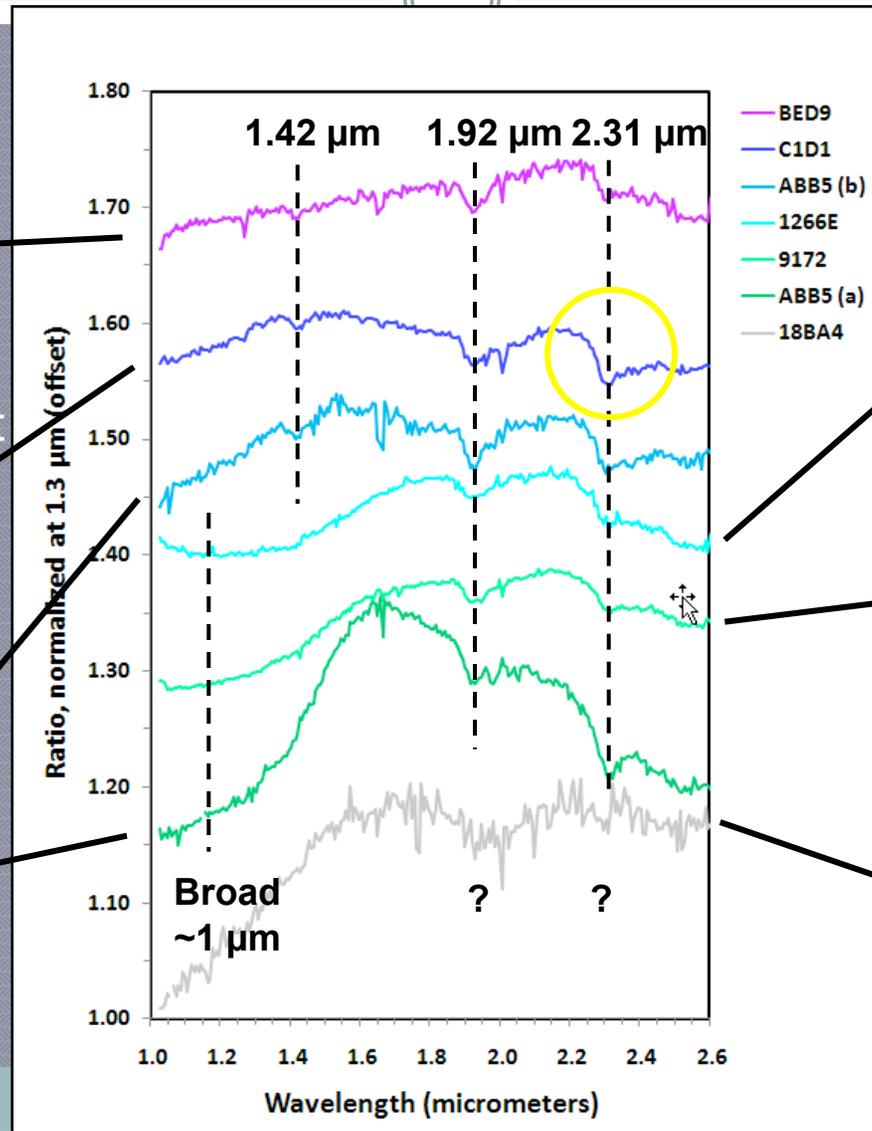
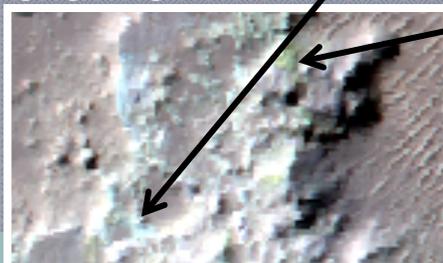
Fan deposit



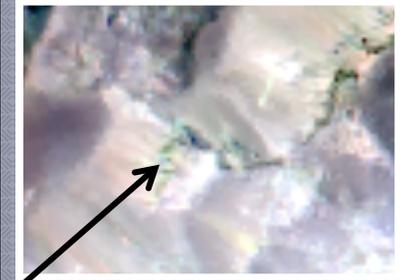
SE ellipse fan deposit



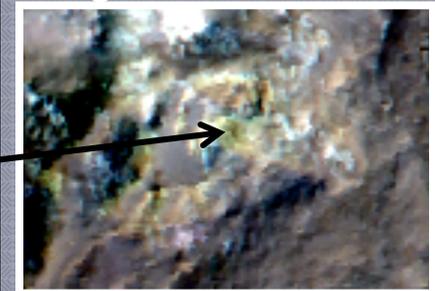
Knobs/deposits in channel



Rim breach outcrop



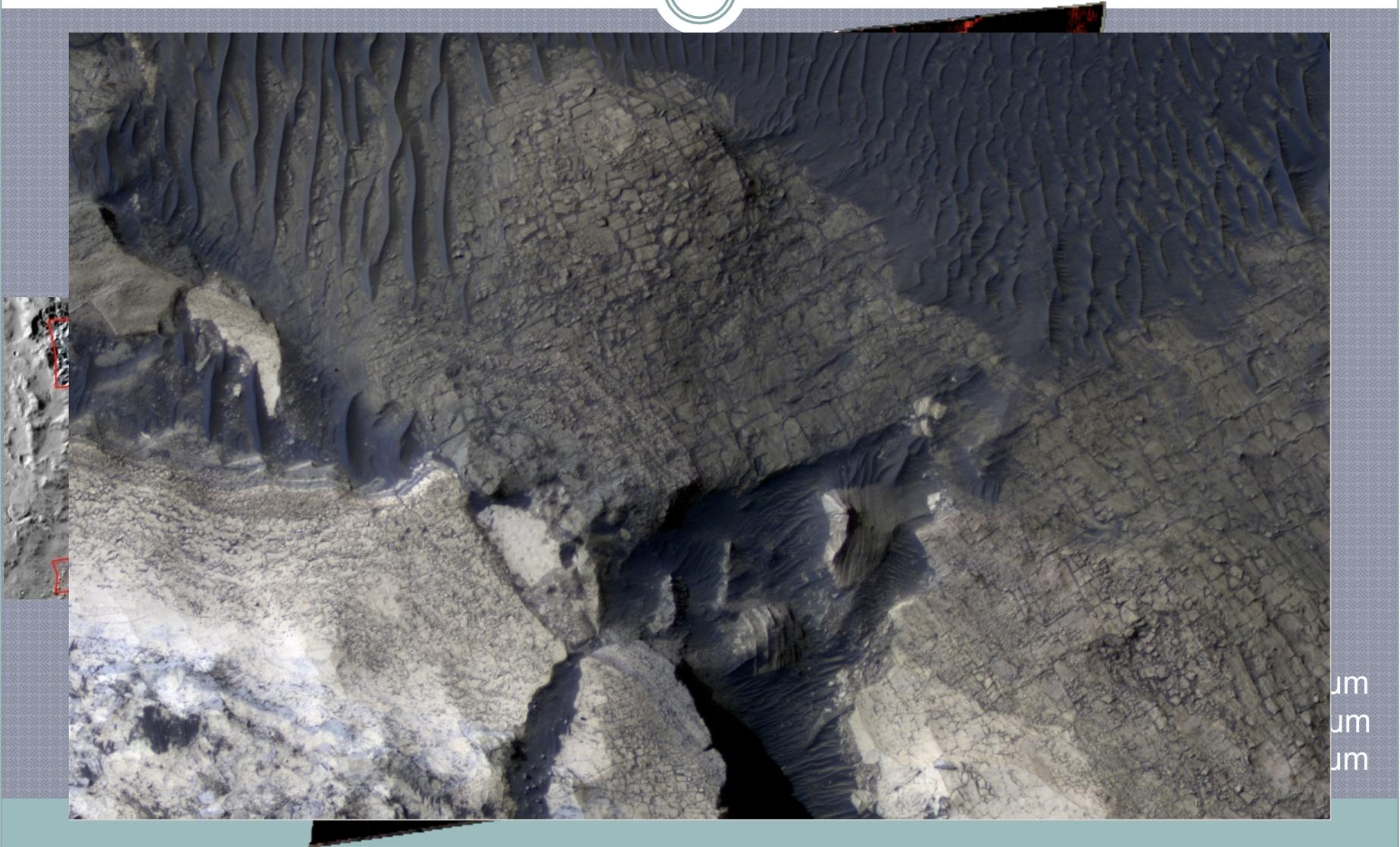
Megabreccia



Eroded western rim



FRT0000C1D1: Phyllosilicate Morphology



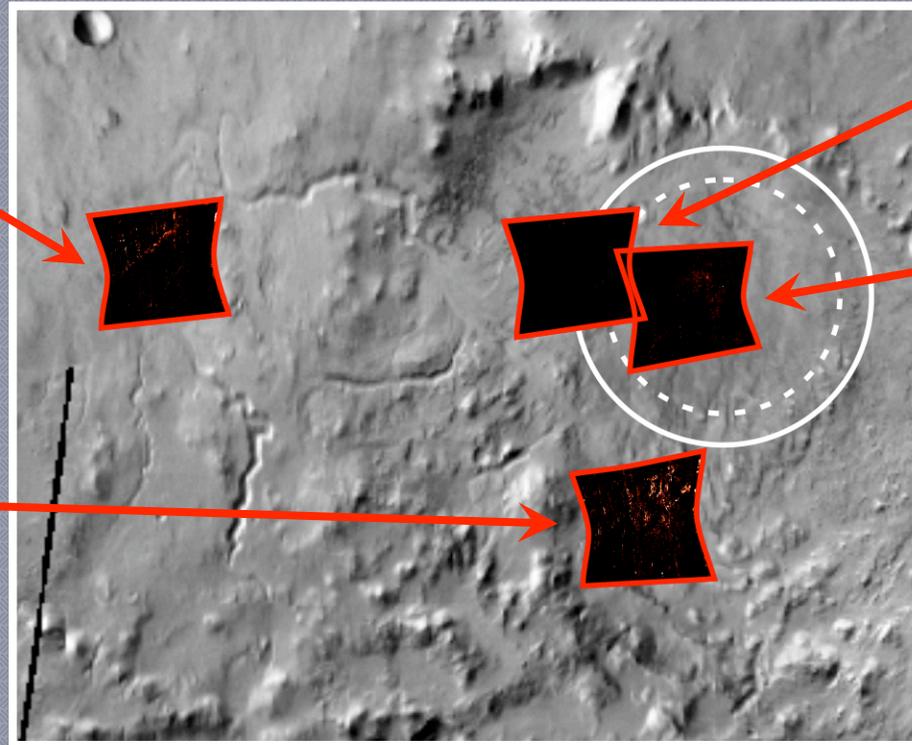
um
um
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Selected Eberswalde Observations



Valley west of
crater:
FRT0000B2D4

South of
ellipse:
FRT000019D76



Fan deposit:
FRT000060DD

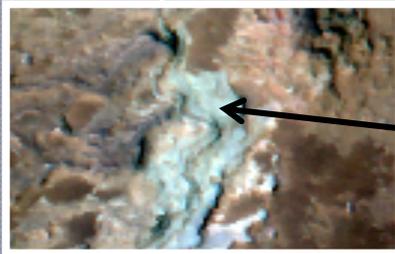
Ellipse center:
FRT0000A30C

D2300

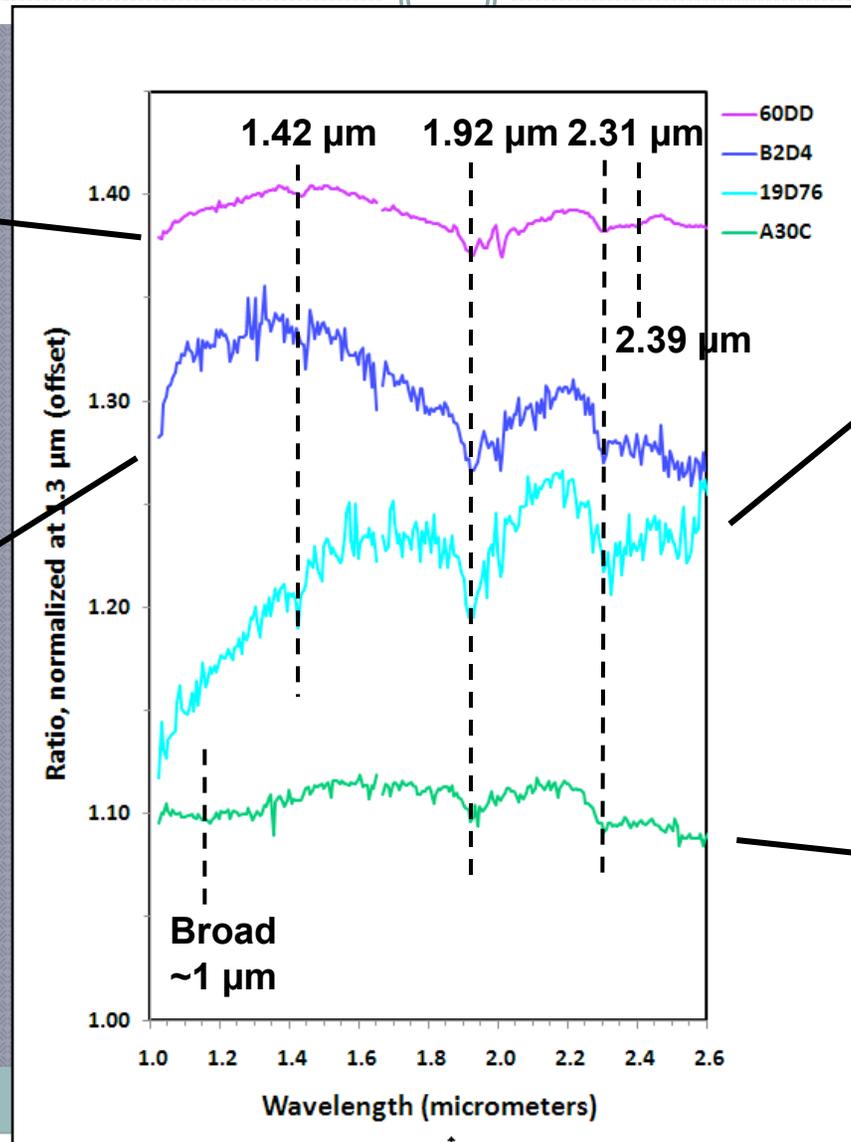


Ratio Spectra from Selected Eberswalde Scenes

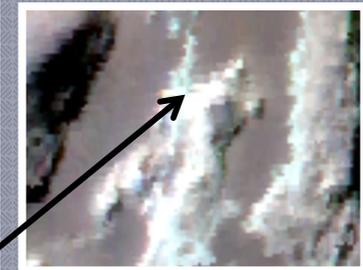
Fan deposit



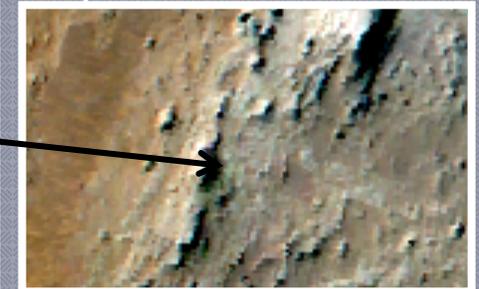
Western channel



Deposits south of ellipse



Knobs/deposits in ellipse



Compare Bedrock in Holden to Noachis Terra



- In-place materials in Noachis Terra
 - Regionally extensive layer is cohesive but polygonally fractured
 - Hydrated, with distinct 1.4 and 1.9 micron absorptions
 - Broadness of bands at 2.3 and 2.4 microns are consistent with:
 - Mixture of nontronite (Fe smectite) and saponite (Mg smectite)
 - Intermediate phase smectite
 - Mixed layer smectite/chlorite
- In-place materials in Holden crater
 - Crater rim materials and megabreccia
 - 1.9 micron absorption indicates hydration, but no 1.4
 - Broad 1 micron absorption, consistent with olivine
 - Narrower absorption at 2.31 microns, but no 2.4 micron band

Compare Fan Deposits to Noachis Terra



- Transported materials in Holden crater
 - Hydrated, with distinct 1.4 and 1.9 micron absorptions
 - 2.3 micron band is consistent with Fe/Mg smectite
 - Most have narrower absorption at 2.31 but no 2.4 micron absorption
 - Lower bed of fan has a broad absorption from 2.28-2.31 and is polygonally fractured, comparable to the Noachis phyllosilicate-bearing layer
- Transported materials in Eberswalde crater
 - Hydrated, with distinct 1.4 and 1.9 micron absorptions
 - 2.3 micron absorption is consistent with Fe/Mg smectite
 - Narrower absorptions at 2.31 microns
 - 2.39 micron absorption

Conclusions



- In-place phyllosilicate-bearing materials in Holden appear spectrally different from phyllosilicate-bearing layer in Noachis Terra
 - However, lower bed of fan could be eroded from the regionally extensive layer, outcropping locally
- Transported materials in Holden and Eberswalde are consistent with materials in Noachis Terra
 - Could be eroded and transported Noachis Terra phyllosilicates
 - However, can not rule out that these materials were eroded and further altered from the local bedrock
 - Also possible that the phyllosilicates formed in-situ in the fans