Aqueous alteration detection in Tikhonravov crater

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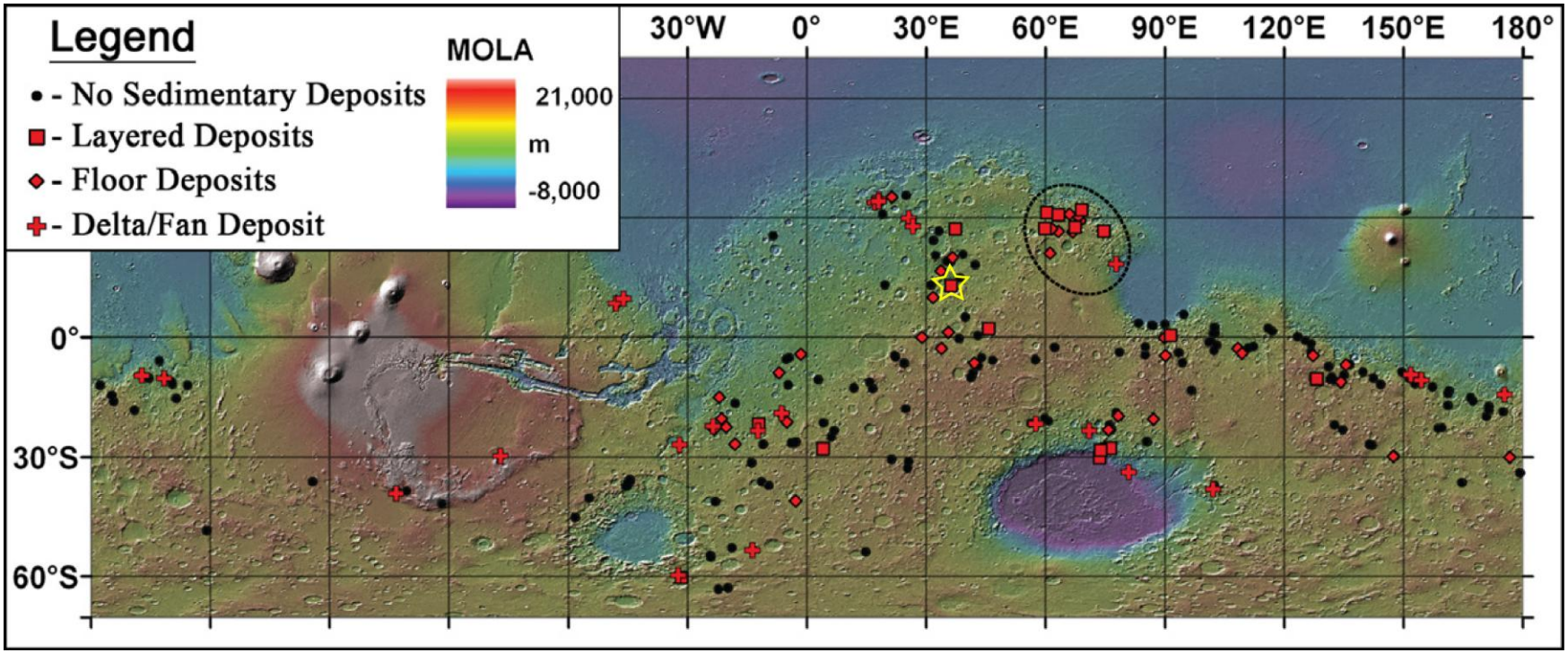
TIKHONRAVOV

- Over 226 open-basin lakes have been mapped in the ancient Noachian and Hesperian highlands across much of the planet.



Global distribution of open-basin lakes (Goudge et al. 2012)

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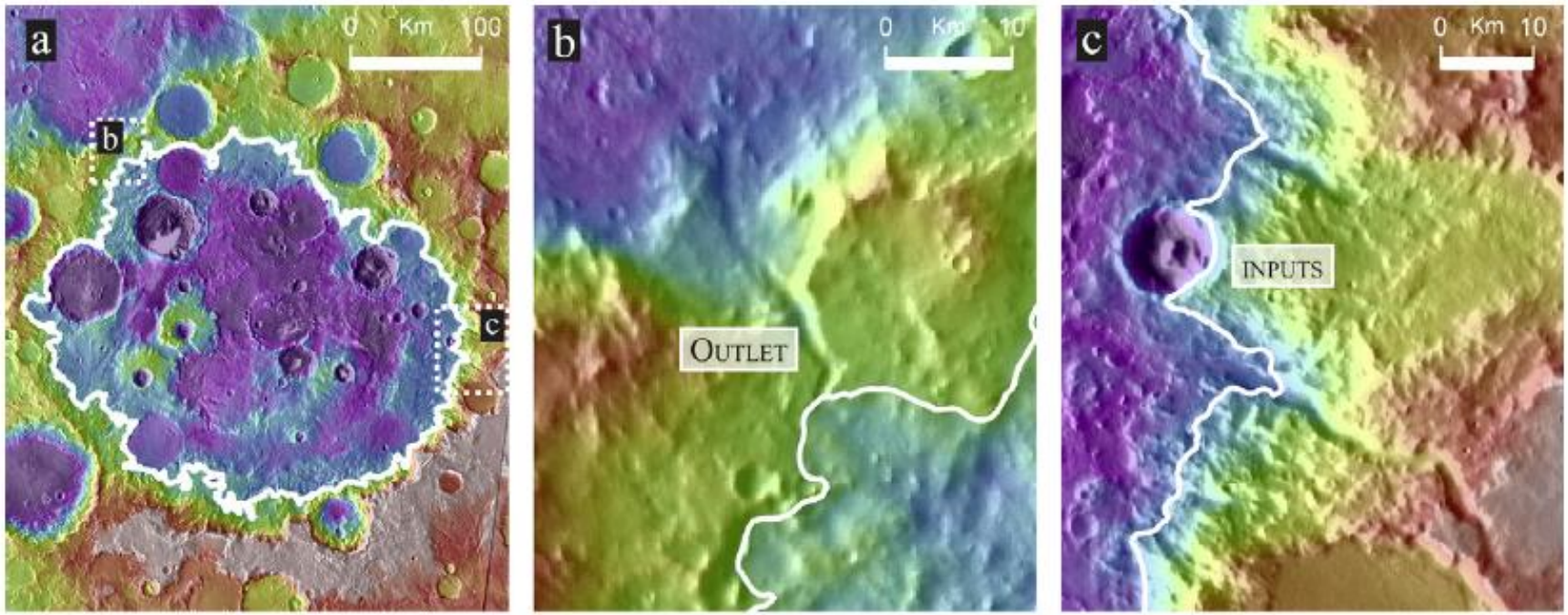
- **Tikhonravov, located in eastern Arabia Terra, is a putative paleolake.**



Tikhonravov crater (Fasset and Head, 2008)

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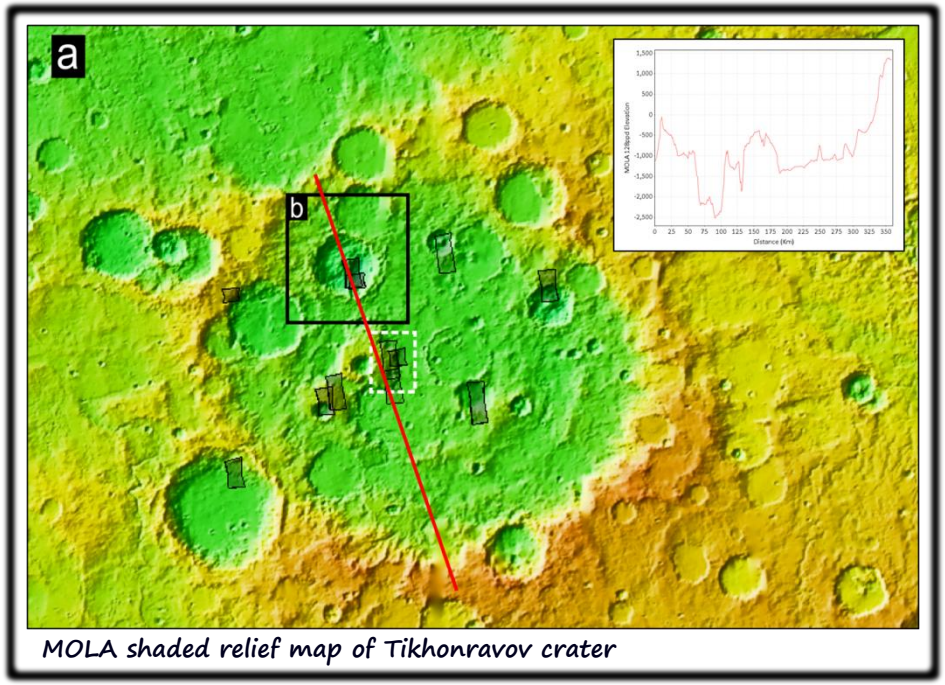
- **Earlier CRISM observation within the crater has shown no evidence for the presence of aqueous alteration minerals (Goudge et al. 2012)**



MOLA shaded relief map of Tikhonravov crater

Francesca Mancarella

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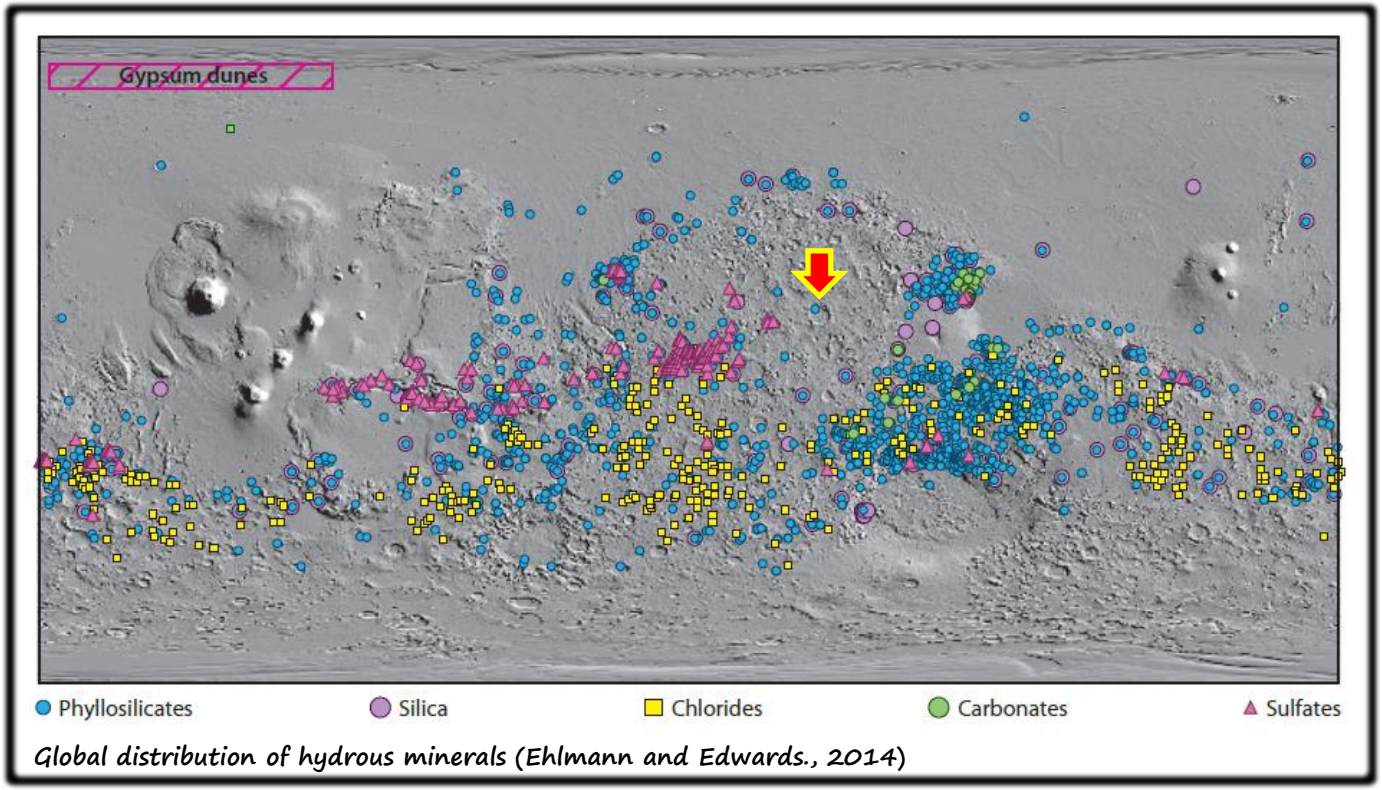
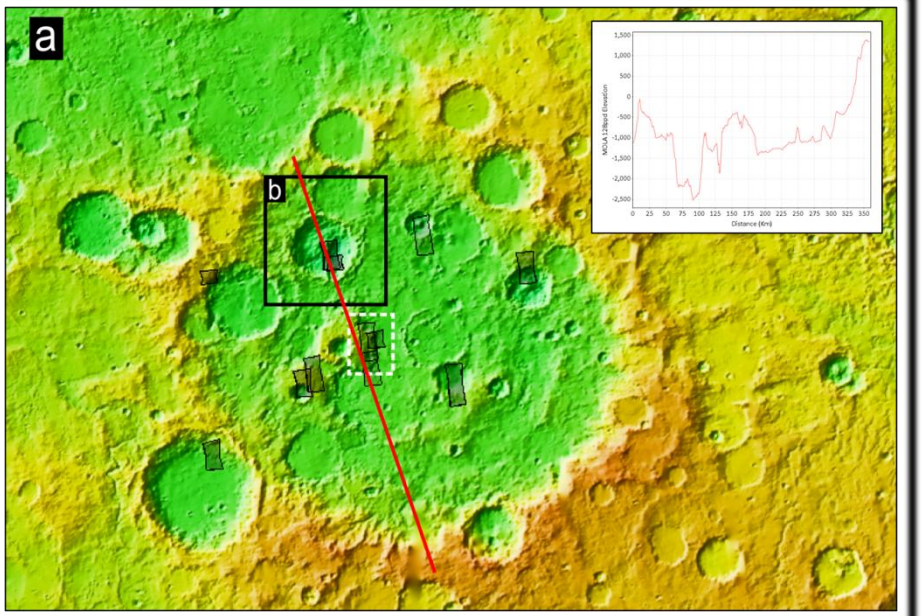
- Tikhonravov, located in eastern Arabia Terra, is a putative paleolake.
- Earlier CRISM observation within the crater has shown no evidence for the presence of aqueous alteration minerals (Goudge et al. 2012)
- **A global-scale survey of hydrous minerals based on a systematic analysis of CRISM and OMEGA data has indicated the presence of phyllosilicates (Carter et al., 2013)**



Global distribution of hydrous minerals (Ehlmann and Edwards., 2014)

CRISM OBSERVATIONS

- Spectral analysis on two CRISM observations partially overlapped.



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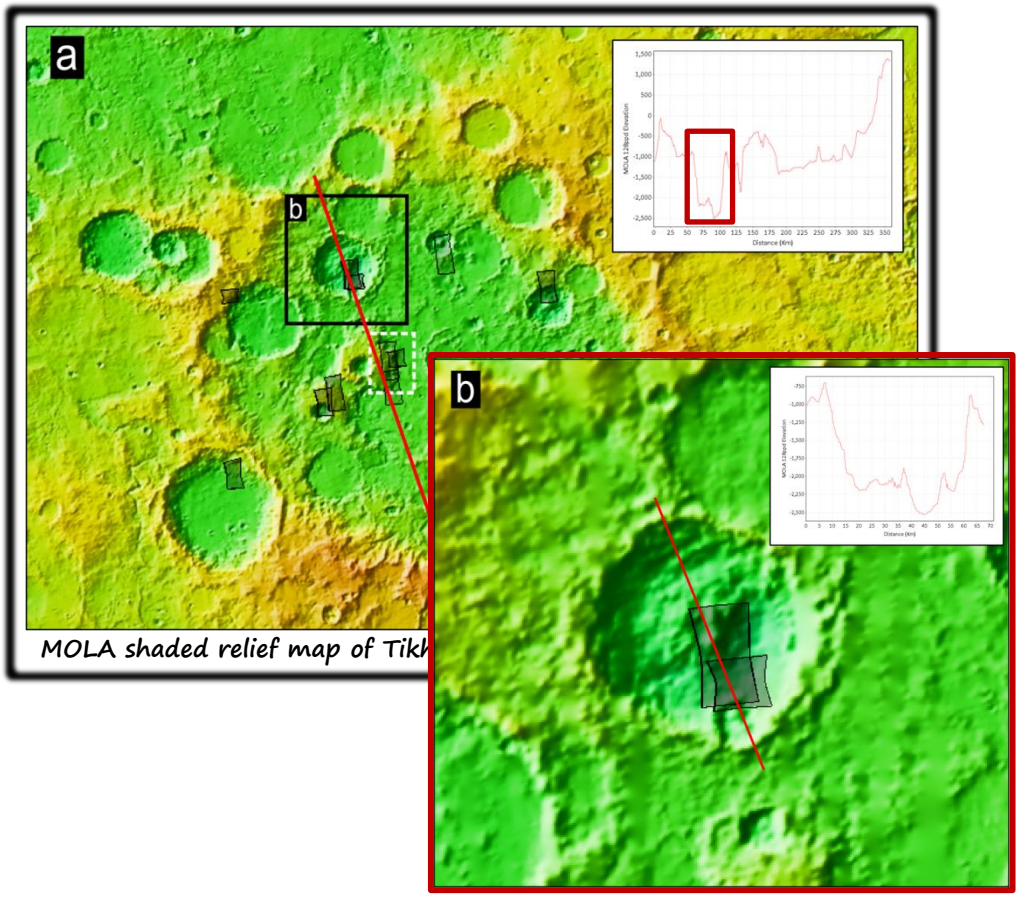

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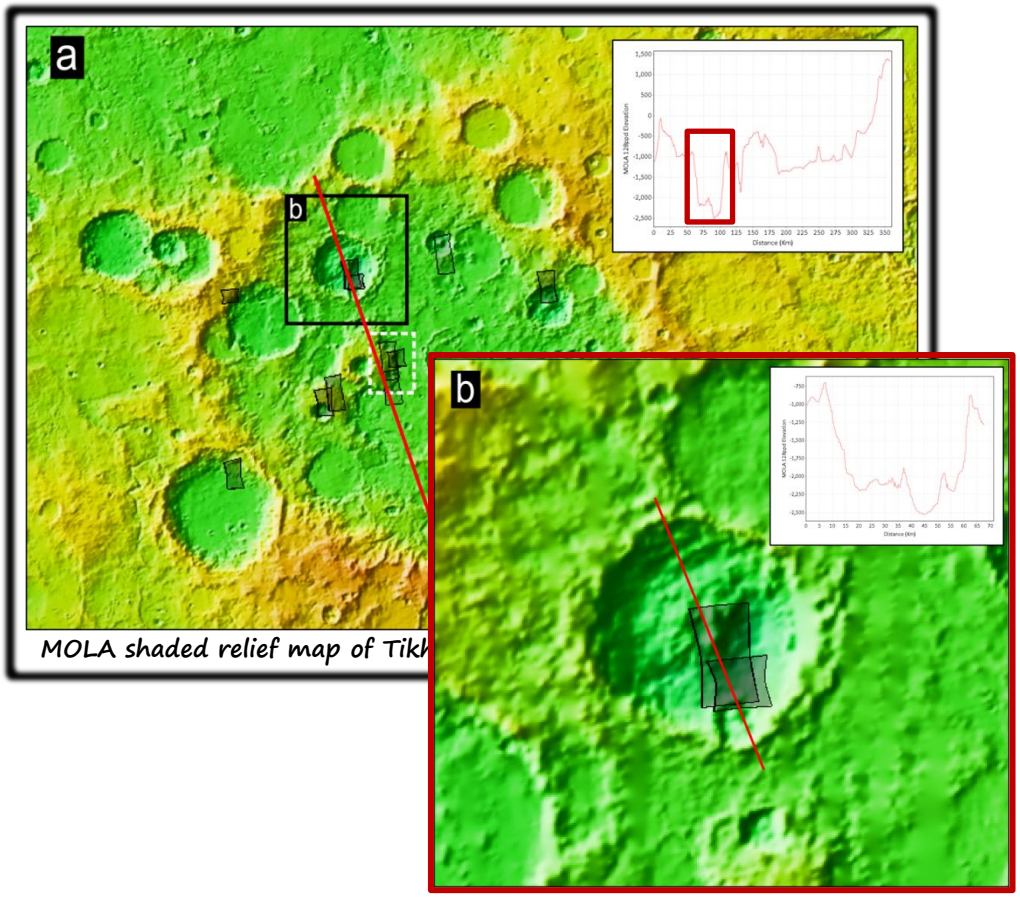

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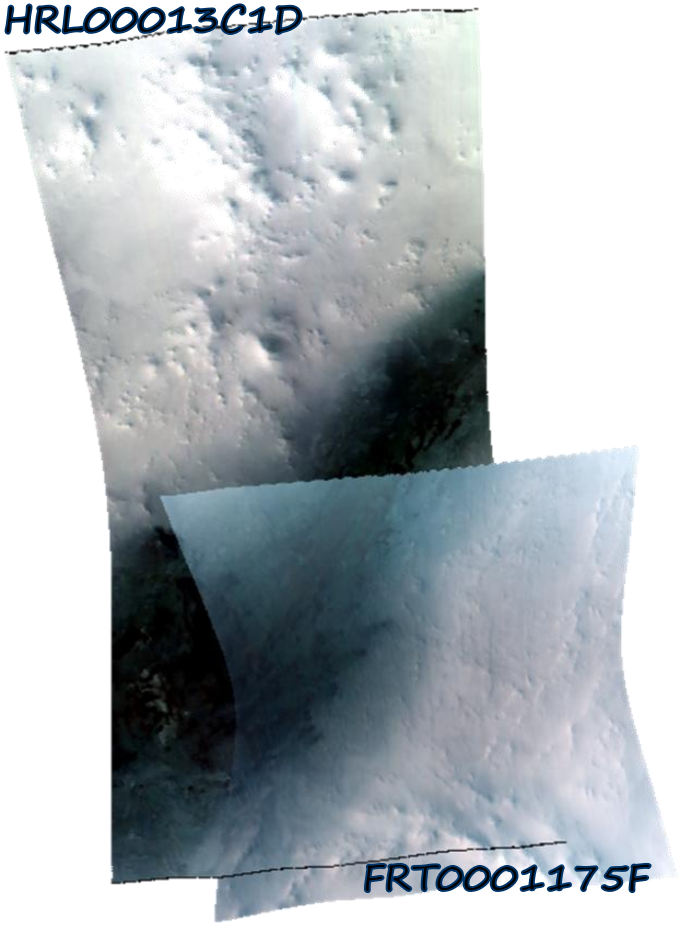

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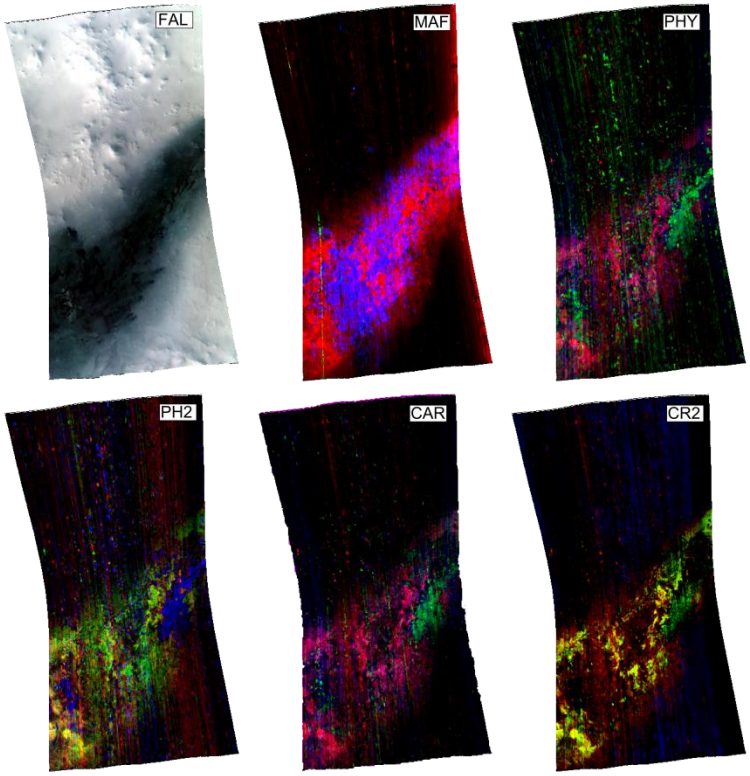
CRISM OBSERVATIONS

- Spectral analysis on two CRISM observations partially overlapped.
- Application of spectral parameters to each image and creation of RGBs (Pelkey et al. 2007, Ehlmann et al. 2009).

HRL00013C1D



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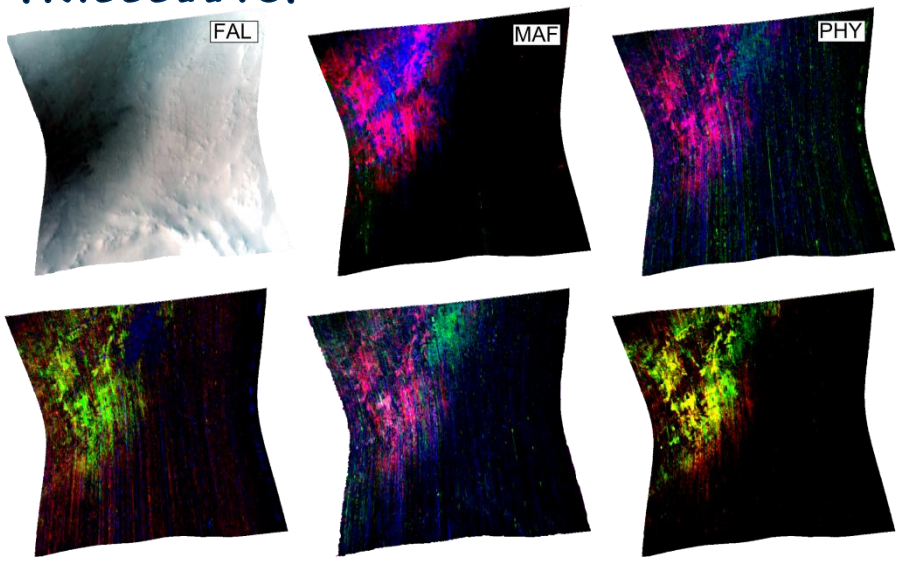

MINERAL IDENTIFICATION

- Both Al- and Mg/Fe phyllosilicates have been identified.
- Here, we present the results of an area where carbonates have been found.

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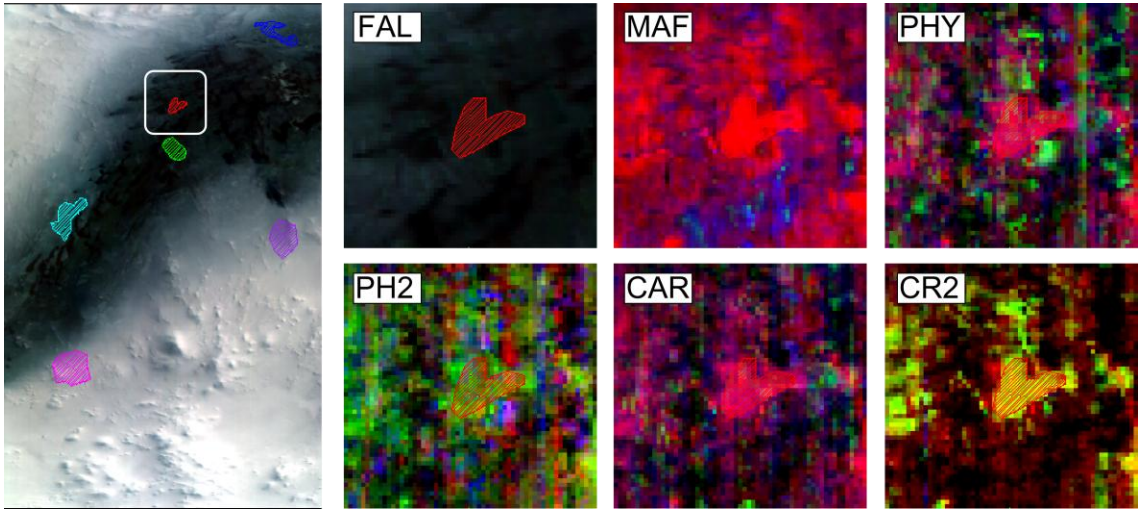

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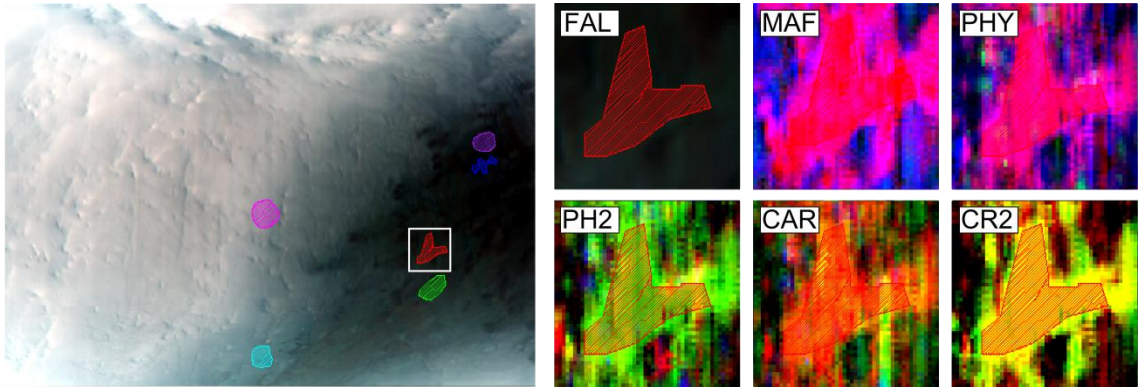

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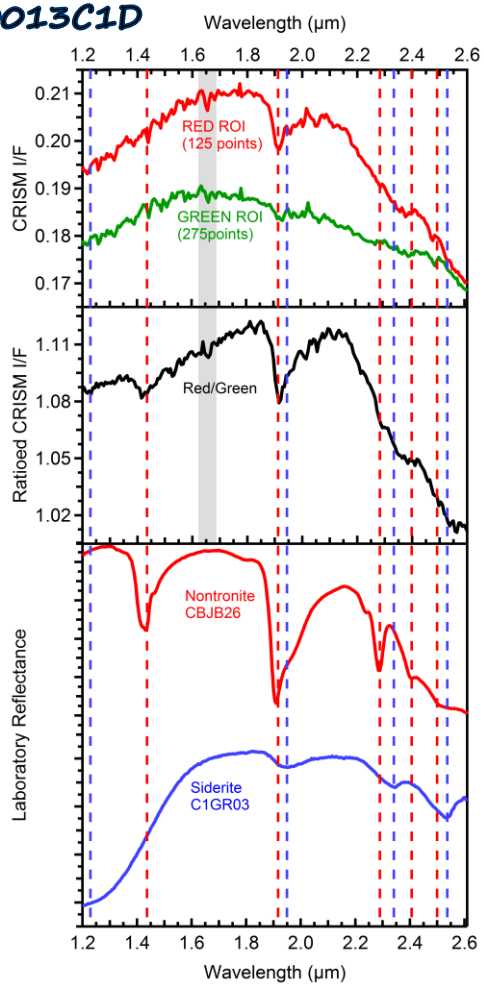

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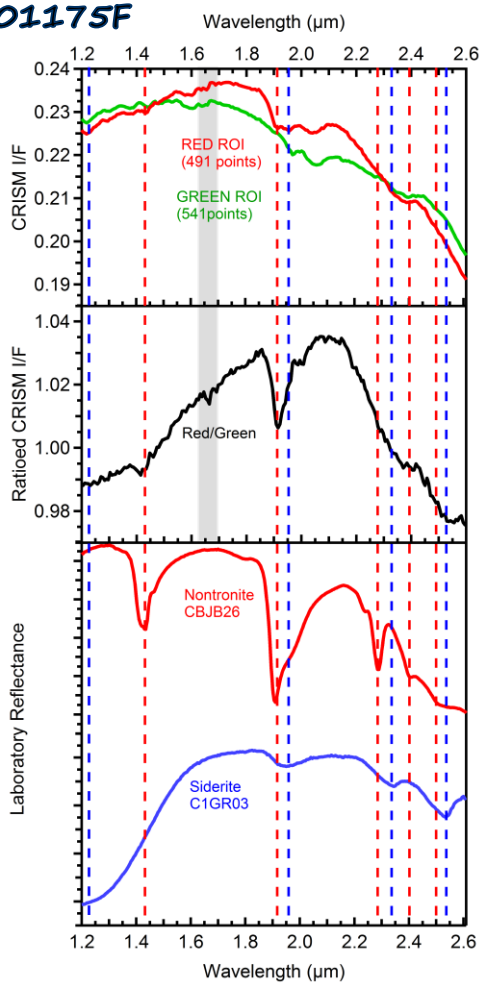

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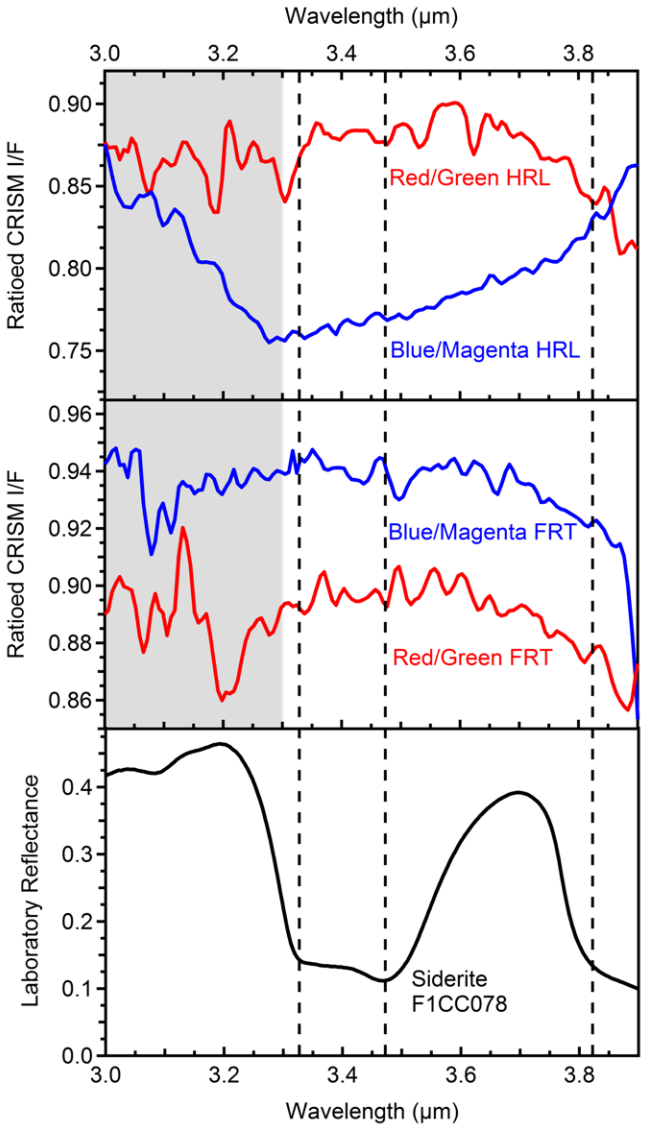
THE 3.0-4.0 μm REGION

- In general, mineral identification is done studying spectral features in 1.2÷2.6 μm.
- Carbonates have diagnostic features at 3.4 and 3.9 μm.
- CRISM data are affected by an instrumental artifact centered at about 3.2 μm.

…HOWEVER…



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CONCLUSIONS and HINTS

• Spectral analysis on Tikhonravov crater have revealed the presence of aqueous alteration products.

• Their identification only in a deep minor crater lead to a possible interpretation of their formation (paleolake Vs ground-water activity)…

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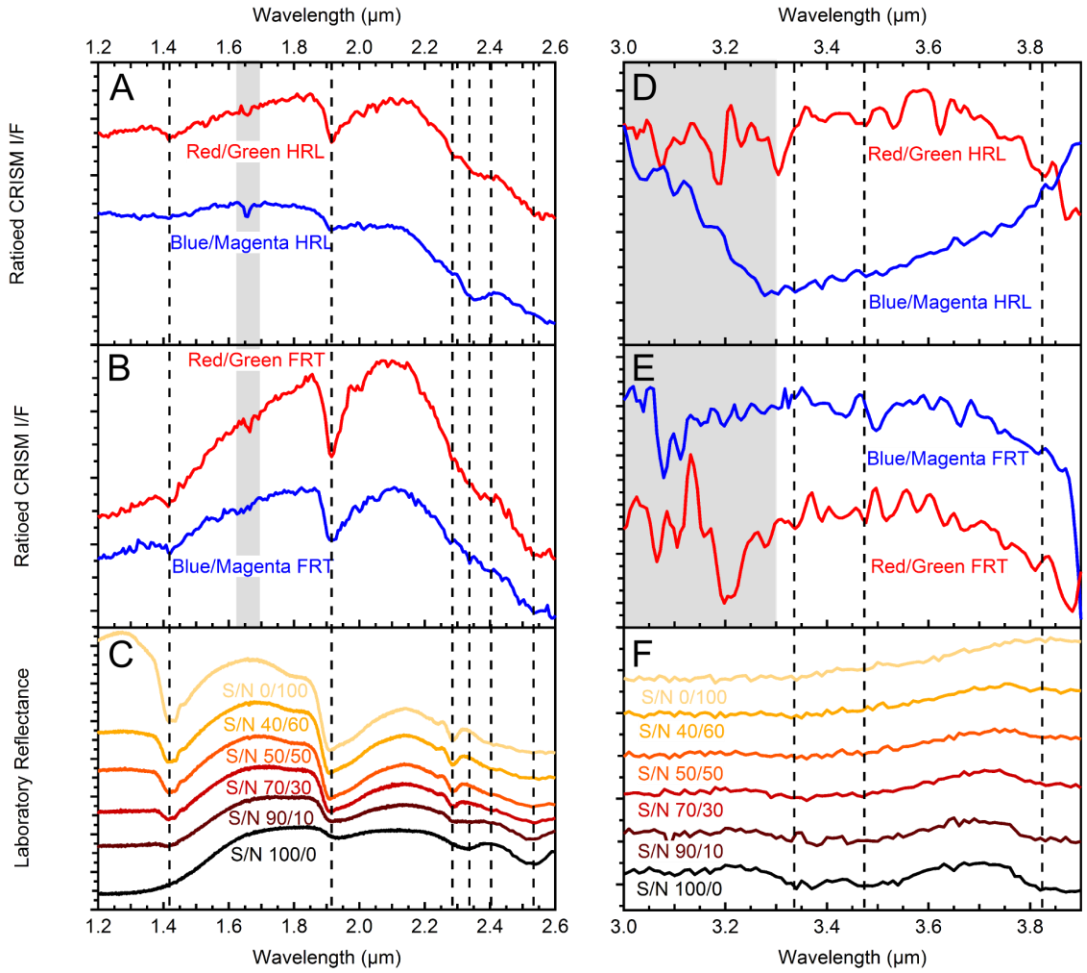
• Their identification only in a deep minor crater lead to a possible interpretation of their formation (paleolake Vs ground-water activity)…

• CRISM spectra behaviour has suggested that sediments within the studied crater are composed mainly by a mixture of nontronite with a carbonate such as siderite.

• The spectrum of a mixture could be affected by several factors (grain size, relative amount of each component,…)

•We have compared CRISM spectra with our laboratory spectra of mixtures composed by coarse nontronite and coarse siderite (Presentation #503, this conference) at several %wt of each component.

CONCLUSIONS and HINTS



The carbonate part of the mixture composing the sediments within the studied crater, is composed by coarse particles of siderite and its weight amount is higher than that of phyllosilicates.

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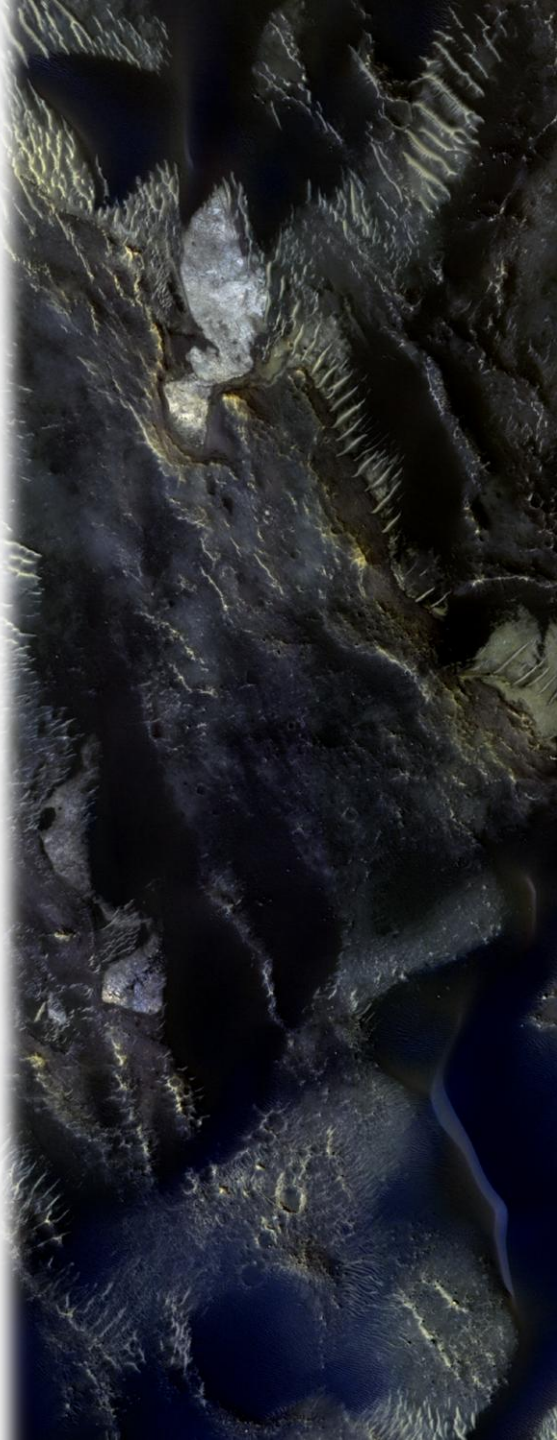
THANKS !!!



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