SULFATE IDENTIFICATIONS IN EAST CANDOR, VALLES MARINERIS WITH CRISM VISIBLE-INFRARED SPECTRA. L.H. Roach[1], J.F. Mustard[1], S. Murchie[2], C.M. Weitz[3], B.L. Ehlmann[1], S. Pelkey[1], F.P. Seelos[2], K. Seelos[2], J.-P. Bibring[4], and the CRISM team, [1]Dept. of Geological Sciences, Box 1846, Brown University, Providence, RI 02912 Leah_Roach@brown.edu, [2]JHU/Applied Physics Laboratory, Laurel, MD 20723, [3]Planetary Science Institute, Tucson, AZ 85719, [4]Institute d'Astrophysique Spatial (IAS), Orsay, France.

Introduction: The groundbreaking Mars Express OMEGA discovery of mono- and poly-hydrated sulfates on many light-toned deposits within Valles Marineris [1,2] has provoked increased interest in Valles Marineris formation and its implications for past Martian climate [3]. A number of sulfate-rich deposits discovered by OMEGA have been targeted by CRISM, the visible-infrared spectrometer aboard Mars Reconnaissance Orbiter. CRISM's high spatial resolution, when combined with HiRISE, allows pinpointed sulfate detections that can be correlated with local geology, enabling us to assess the geologic processes that formed and preserved these mineralogic signatures. This work, which presents sulfate detections within East Candor, is part of the CRISM team presentation of first result sulfate detections within Valles Marineris (Fig 1) [4,5,6].

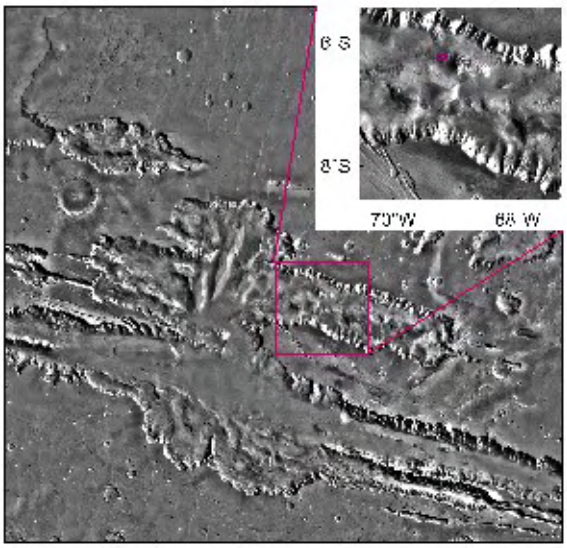

Fig 1. Context map of East Candor, Valles Marineris with outline of overlapping CRISM obs HRS00002FAF_07 and HiRISE obs PSP_001390_1735.

Datasets: CRISM (Compact Reconnaissance Imaging Spectrometer for Mars) is a visible to infrared imaging spectrometer on the Mars Reconnaissance Orbiter mission capable of multiple mapping modes [7]. It can acquire high-resolution targeted observations at 544 wavelengths from 0.362-3.92 µm and 15-19 m/pixel, global mapping strips at ~70 wavelengths and 100-200 m/pixel, and emission phase functions of sites for atmospheric study. We present results from one targeted observation over East Candor, HRS00002FAF_07. Observations are photometrically corrected and provisionally atmospherically corrected, by a ratio with a CRISM scene of Olympus Mons, scaled to the same column density of CO_2. A similar atmospheric correction is used for OMEGA data. Ratioing to a CRISM scene, rather than just a spectrum, is necessary to account for the spectral smile present in 2D spectrometers.

The HiRISE (High Resolution Imaging Science Experiment) camera aboard MRO is capable of acquiring co-aligned imagery with CRISM and can resolve details down to ~30 cm/pixel [8]. HiRISE false color and stereo imagery of Valles Marineris will allow classification and stratigraphic mapping of its Interior Layered Deposits [9].

Results: Kieserite and polyhydrated sulfates have been previously identified in Valles Marineris by the OMEGA team [1,2]. CRISM confirms the identification of kieserite and polyhydrated sulfate in East Candor (Figs 2, 3) and presents new details about geologic relationships.

OMEGA has shown that spectral indices are useful for highlighting spectral features indicative of martian mineralogy [10]. CRISM infrared spectral indices of observation HRS00002FAF_07 show variations in the light-toned deposits of the 1.9 µm band depth, which indicates hydration, and the 2.1 µm band depth, which is sensitive to monohydrated sulfates (Fig 3). The rest of the scene, which consists of dust-covered slopes, does not have unique spectral indices.

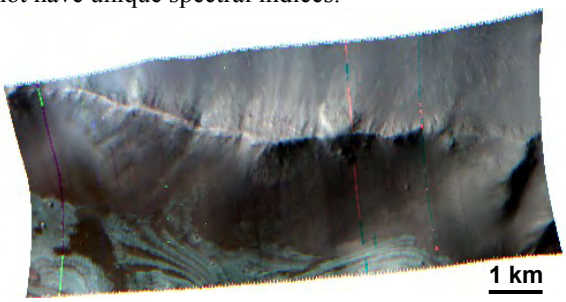

Fig 2. CRISM false color RGB (2.528, 1564, and 1.078 µm) showing ridge with talus slope overlying light-toned deposits.