INVESTIGATING THE CHEMISTRY OF MARTIAN CARBONATES USING CRISM DATA. J. L. Bishop[1], S. J. King[1], A. J. Brown[1], and J. J. Wray[2], [1]Carl Sagan Center, SETI Institute (Mountain View, CA, jbishop@seti.org), [2]School of Earth and Atmospheric Sciences, Georgia Institute of Technology (Atlanta, GA).

This study is re-evaluating carbonate outcrops on Mars using CRISM spectra acquired from images calibrated with the latest processing. We seek to provide constraints on the carbonate chemistry through CRISM analyses using new lab spectra of a broad range of carbonates. Our preliminary results indicate that Mg-carbonates are observed near Nili Fossae and McLaughlin crater, Fe-carbonates at Huygens crater, and mixed cation carbonates are found at Libya Montes and Leighton crater.

Previous Carbonate Detections: Recent studies have identified carbonates at Nili Fossae [1,2], Libya Montes [3], the Phoenix landing site [4-5], and several craters: Gusev [6-7], Leighton [8], Huygens [9], and McLaughlin [10]. At the Nili Fossae and Libya Montes sites bordering Isidis Basin the carbonate spectra include features due to phyllosilicates and olivine [1,3] and new algorithms are refining detections of carbonates and related clays [2,11].

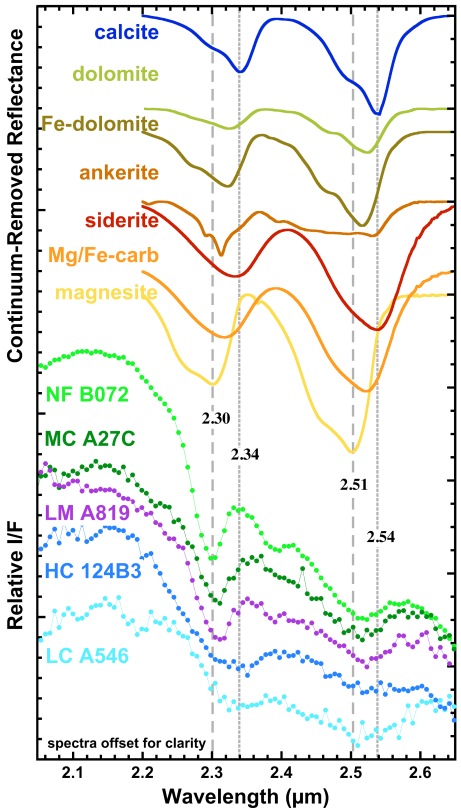

Figure 1. Relative CRISM I/F spectra of carbonate-bearing regions on Mars as compared with continuum-removed lab spectra of natural and synthetic carbonate samples from [12,13]. The dashed lines at 2.30 and 2.51 μm refer to the magnesite bands, while the dotted lines at 2.34 and 2.54 μm refer to the calcite bands.

Carbonates are identified in CRISM spectra by paired bands near 2.3 and 2.5 μm. Detection of an additional band at ~3.4-3.5 μm provides confirmation of the carbonate assignment, although this band is frequently weak and difficult to observe in CRISM spectra. New lab spectra of several carbonates have been measured [12,13] and provide additional data for constraining the chemistry of carbonates on Mars.

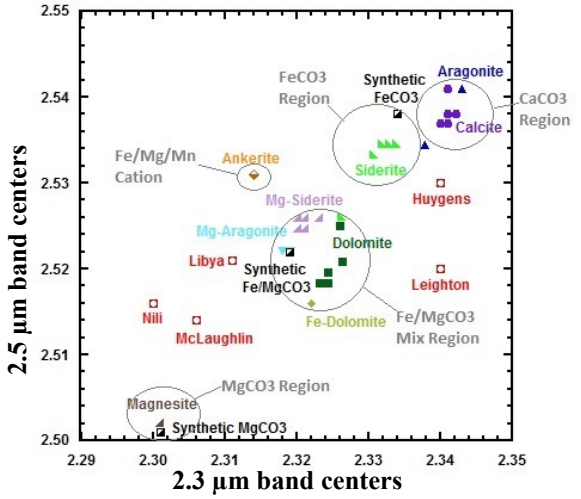

Figure 2. Carbonate band center comparison for the 2.3 and 2.5 μm bands. Values determined from the continuum-removed spectra.

IMPLICATIONS FOR ASTROBIOLOGY: Carbonates tend to form in pH neutral, warm waters that are consistent with habitable conditions. Variations in carbonate chemistry across the planet indicate different geochemical environments and processes on early Mars. We are investigating the chemistry of carbonates in multiple locations in order to provide constraints on former aqueous environments on Mars and help identify regions that could have been important for astrobiology.

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