CRISM MULTISPECTRAL SURVEY CAMPAIGN – STATUS AND INITIAL MOSAICS. F. P. Seelos[1], S. L. Murchie[1], S. M. Pelkey[2], K. D. Seelos[1], and the CRISM Team, [1] JHU/Applied Physics Laboratory, MP3-E104, 11100 Johns Hopkins Road, Laurel, MD 20723 (Frank.Seelos@jhuapl.edu), [2] Dept. of Geological Sciences, Box 1846, Brown University, Providence, RI 02912.

Introduction: The Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) is a visible and near infrared hyperspectral imaging spectrometer (0.36 to 3.9 μm) on board the Mars Reconnaissance Orbiter (MRO) [1]. CRISM has two primary data acquisition modes: a gimbaled or targeted hyperspectral mode that acquires 544 channel high spatial resolution data (20 or 40 m/pxl; 10 km cross track; 10 or 20 km down track), and a multispectral push broom mode that acquires 72 channel data at 100 or 200 m/pxl (10 km cross track). The CRISM multispectral survey campaign is a systematic observation strategy designed to acquire a near-global map in 72 channels at 200 m/pxl in the first year of MRO Primary Science Phase (PSP) operations.

Multispectral Survey Campaign Observations: Early in the MRO primary mission the spacecraft is restricted to a nadir observing geometry on 50% of the available science orbits to facilitate systematic campaign observations. CRISM survey observations typically take the form three minute segments scheduled in series from terminator to terminator on the dedicated campaign orbits. Multispectral survey data are also acquired on unrestricted orbits on a non-interference basis subject to operational and schedule constraints. The 72 wavelengths in a CRISM multispectral observation consist of a subset of the hyperspectral wavelengths carefully selected to maintain sufficient spectral sampling of key surface and atmospheric absorptions. This allows a robust set of spectral summary parameters to be calculated from multispectral data [2].

Multispectral Survey Status: Through eight weeks of PSP CRISM had acquired > 4750 multispectral survey segments. MRO PSP began at ~130° Ls allowing for significant data acquisition at the high northern latitudes in advance of deteriorating illumination and atmospheric conditions. Figure 1 shows the multispectral survey coverage attained over this time period for the north polar region.

Chasma Boreale Multispectral Mosaic: Chasma Boreale is the largest chasma in the north polar cap and reveals much of the polar stratigraphic section. The chasma is located far enough north that near-complete survey coverage has been attained at this early stage of the mission. Figure 2 shows an IR false color composite (R:2.528, G:1.505, B:1.249 μm) of Chasma Boreale and the surrounding polar terrain. In this composite ice-rich regions appear blue, materials with moderate ice absorptions are white, and ice-poor materials appear yellow to brown. The spacecraft and instrument pointing knowledge is excellent, allowing mosaicking with control at the resolution of the data. The 1.5 μm band depth index (BD1500 spectral summary parameter) for the Chasma Boreale survey mosaic is shown in Figure 3.

Hyperspectral Context: The utility of the multispectral survey data as context for CRISM hyperspectral observations is demonstrated by two targeted observations acquired near the head of Chasma Boreale (Figure 4). Stratigraphic variations in ice content are discernable in the IR false color composite and the 1.5 μm band depth index map in both the survey mosaic and the targeted images. In terms of ice content, the three-layer polar layered deposit (PLD) structure observed in the high resolution data is traceable along the canyon wall in the survey mosaic.

Continuing Work: Multispectral survey VNIR (0.36 to 1.0 μm), IR (1.0 to 3.9 μm), and associated summary parameter mosaics highlighting the diversity of key regions are under development and will be maintained as the CRISM survey campaign progresses.

References: [1] Murchie S. L. et al. (2006) *JGR*, in press. [2] Pelkey, S. M., et al. (2007) *JGR*, in press.

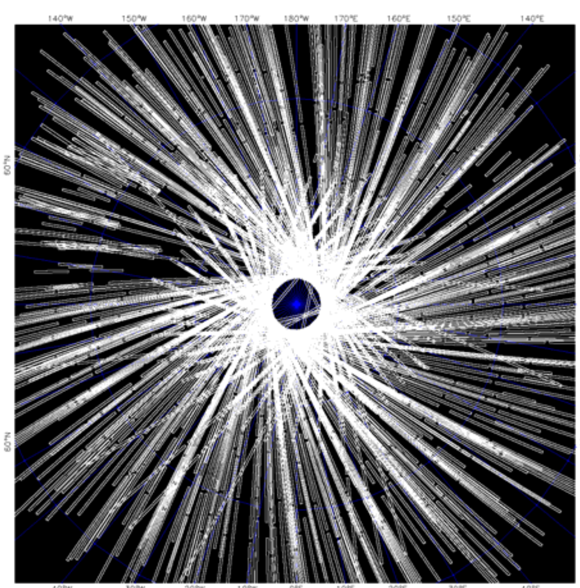

Figure 1. CRISM multispectral survey coverage of Mars Chart MC-01 (>65° N) through eight weeks of science operations. Vector outlines of ~1500 MSP strips are shown.

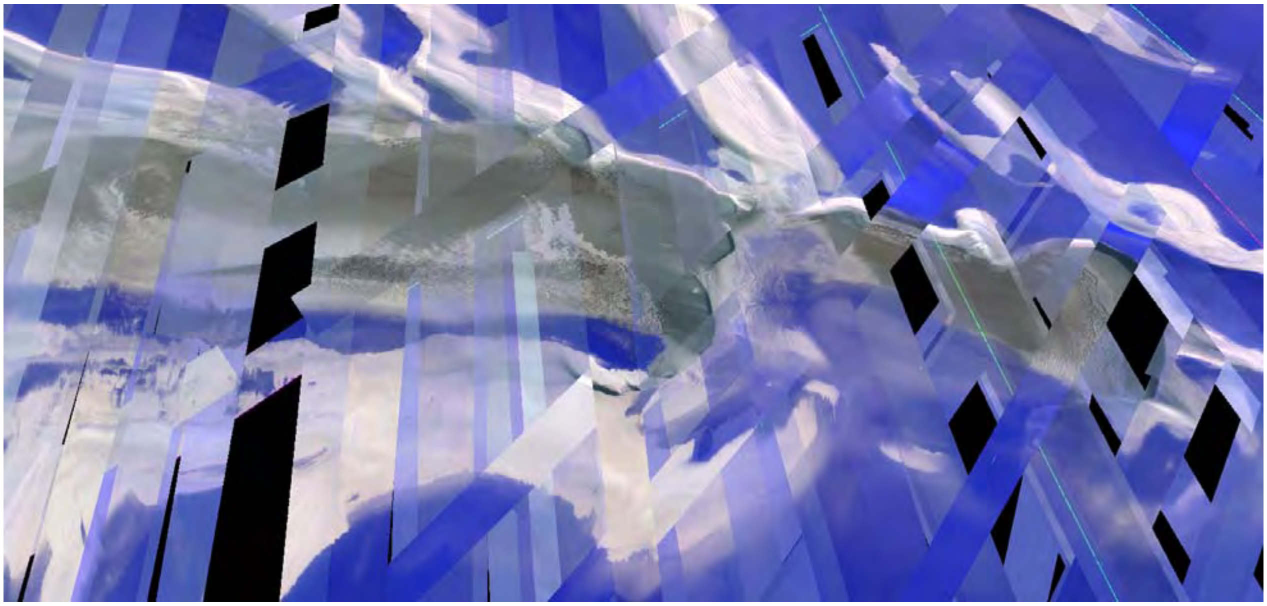

Figure 2. IR multispectral survey false color mosaic of Chasma Boreale (R:2.528, G:1.505, B:1.249 μm). A cos(i) photometric correction has been applied to the constituent survey images which are ordered by incidence angle. No atmospheric correction has been applied.

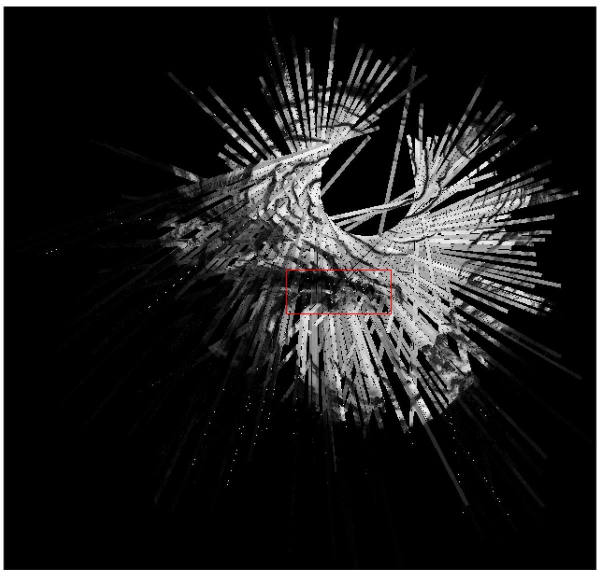

Figure 3. 1.5 μm band depth (BD1500) index map derived from the multispectral mosaic presented in Figure 2. The constituent image edge effects are a data processing artifact. The mosaic consists of 415 individual multispectral survey segments.

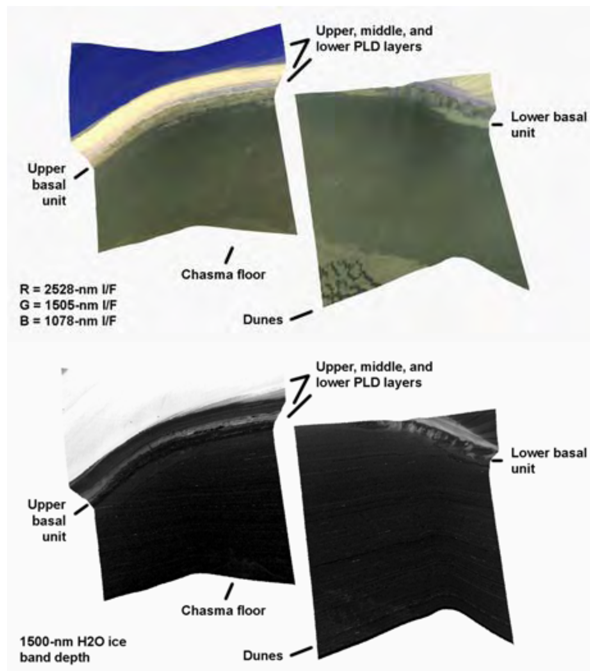

Figure 4. Atmospherically corrected, map projected CRISM targeted observations (2FA6; 3074) acquired near the head of Chasma Boreale. (top) IR false color composite (R:2.528, G:1.505, B:1.078 μm); (bottom) 1.5 μm band depth (BD1500) spectral index. The three layer structure of the PLD is evident (ice rich upper surface; ice poor middle layer; ice-rich lower layer). The upper and lower basal units are dissimilar, but both are depleted in ice as compared to the PLD.