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P43B-2126: Mars Science Laboratory at the Base of Aeolis Mons: New Insights into Early Mars from the Geology, Geochemistry, and Atmosphere

Insights Into the Mineralogic Diversity of Lower Mount Sharp Units from Mars Science Laboratory Mastcam Multispectral Observations

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The Mars Science Laboratory Curiosity Rover has been exploring the environment of Gale Crater since it landed in August 2012. By September 2014 the rover had reached the basal units of the Mt. Sharp (Aeolis Mons) stratigraphy. The ongoing scientific investigation of these strata includes multispectral imaging acquired by the Mast Cameras (Mastcams), Bayer-patterned CCD cameras each equipped with a rotating filter wheel whose filter band centers span twelve unique wavelengths in the visible to near-infrared. This wavelength range (445-1013 nm) covers the locations of many broad spectral absorptions exhibited by a variety of iron-bearing minerals, including both primary igneous minerals such as pyroxenes and olivines as well as minerals such as oxides and sulfates that can form via water-rock interactions. Mastcam spectra acquired to date over the traverse have shown a great variety of spectra in outcrops, float rocks, drill tailings, and other material imaged by the camera. Comparisons with the results of other instruments, such as ChemCam or in the case of drill samples, CheMin, aid in the interpretation of spectral features.

Recent results from the Mastcam multispectral investigation have shown that since reaching the Murray Formation at the base of Mt. Sharp, the spectral diversity observed by Mastcam has increased, including the appearance of distinct absorption features not previously observed in the mission. Much of this new diversity is seen to be variable over small spatial scales within an outcrop, sometimes in association with light-toned veins, suggesting alteration by fluids percolating through fractures in the rock. Follow-up analyses by other instruments further constrain the mineralogy that gives rise to these spectral features. The results are consistent with the interpretation that the alteration environment has shifted from that observed in Yellowknife Bay and the surrounding plains.