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Visible to Near-IR Spectral Units Along the MSL Gale Crater Traverse: Comparison of In Situ Mastcam and Orbital CRISM Observations

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Abstract:
The Mastcam instruments, comprised of left (M-34) and right (M-100) 1600 x 1200 Bayer pattern CCD cameras, are each equipped with a rotating filter wheel containing six narrow-band science filters to augment RGB color imaging and allow multispectral imaging with band centers spanning the wavelength range 445 – 1013 nm. Several hundred Mastcam multispectral observations have been acquired to date, documenting a diversity of visible to near-infrared spectral behavior observed along Curiosity's traverse toward the base of Mt. Sharp. These observations include both near-field images of materials in or near the rover workspace and also observations targeted towards the more distant central mound. Near-field observations document both outcrop and float rocks, the latter of which may include both local material as well as material transported from nearer the crater rim. Far-field observations of the central mound include the lower and upper layers of the mound as well as the encircling dune field, both of which have been noted in published studies to exhibit spectral variability in the visible to near-infrared from orbital spectral data. Float rocks with spectra distinct from local outcrops may have spectral matches at locations observed only from orbit, suggesting potential source regions. Furthermore, ground-based Mastcam observations may help "ground-truth" orbital data and in turn benefit from orbital predictions of spectral diversity along the future rover traverse. We present comparisons of CRISM and Mastcam multispectral observations of Gale Crater materials to better interpret observed spectral diversity and anticipate areas of likely opportunities for observations of spectral diversity.

Back to: Mars Science Laboratory's Prime Mission: An Exploration of Fluvial and Lacustrine Environments on Gale Crater's Plains

<< Previous Abstract | Next Abstract >>