Geological Investigation of Northern Rim of Argyre Planitia, Mars using High-Resolution Datasets

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Argyre Planitia, a Noachian aged multiring basin is located (51°S and 43°E) in the southern highlands region of the Mars. It is one of the largest and best preserved impact structures on Mars having a diameter of ~1800 km. Since its formation it has been resurfaced continuously by various erosional and depositional processes. Earlier studies have indicated its complex geologic history with presence of various tectonic, magmatic, aeolian, fluvial, lacustrine, alluvial, glacial and periglacial features e.g, [1-5]. The geologic units associated with this basin spans from Noachian to the Hesperian, thus making Argyre Planitia a potential area to study the compositional layering of ancient highland rocks [6,7]. The present study is undertaken to investigate in detail the exposed mafic/altered phase signatures in the northern rim of Argyre Planitia and their spatial relationships using mainly MRO (Mars Reconnaissance Orbiter) data to reconstruct its geological history. The study is supporting and expanding OMEGA (Observatoire pour la Mine´ralogie l'Eau, les Glaces et l'Activite´ in Mars Express) detected findings [8] by using Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) [9] which is a hyperspectral sensor on board MRO and records observations at 18meters/pixel to 36meters/pixels in targeted mode. It has a spectral resolution of 6.55 μm/channel in the range 362-3920 μm. For these studies 'Targeted Reduced Data Record' (TRDR) observation mode was used and after preprocessing spectral analysis for these regions was performed with the help of derived summary parameters. NIR spectra are selected for identification of olivine and phyllosilicates and compared with CRISM spectral library to confirm the obtained results. Various new regions of olivine exposure in addition to earlier detected, have been recorded and further analyzed. Olivine was detected in almost all observational datasets and found associated with low-calcium pyroxene and Fe-Mg Phyllosilicates. Further analysis will be performed in this region with the help of MRO's CTX (ConTeXT Camera), HiRISE (High Resolution Imaging Science Experiment), MOLA (Mars Orbiter Laser Altimeter) and Mars Odyssey's THEMIS (Thermal Emission Imaging System) data to analyze the extensive exposures of olivine-rich bedrock and their stratigraphic relationship.

References

[1] Parker T.J. and Gorsline D.S. (1991) *LPS XXII*, 1033-1034.
[2] Kargel J.S. and Strom R.G. (1992) *Geology*, 20, 3-7.
[3] El Maarry M.R. et al. (2013) *Icarus*, 226, 905-922.
[4] Dohm J.M. et al. (2015) *Icarus*, 253, 66-98.
[5] Soare R.J. et al. (2014) *EPSL*, 398, 25-36.
[6] Scott D.H. and Tanaka K.L. (1986) *USGS* I-1802-A
[7] Buczkowski D.L.S. et al. (2010) *JGR*, 115, E12011.
[8] Ody A. et al. (2013) *JGR*, 118, 2, E004149.
[9] Mustard J.F., et al. (2008) *Nature*, 454,305-309.