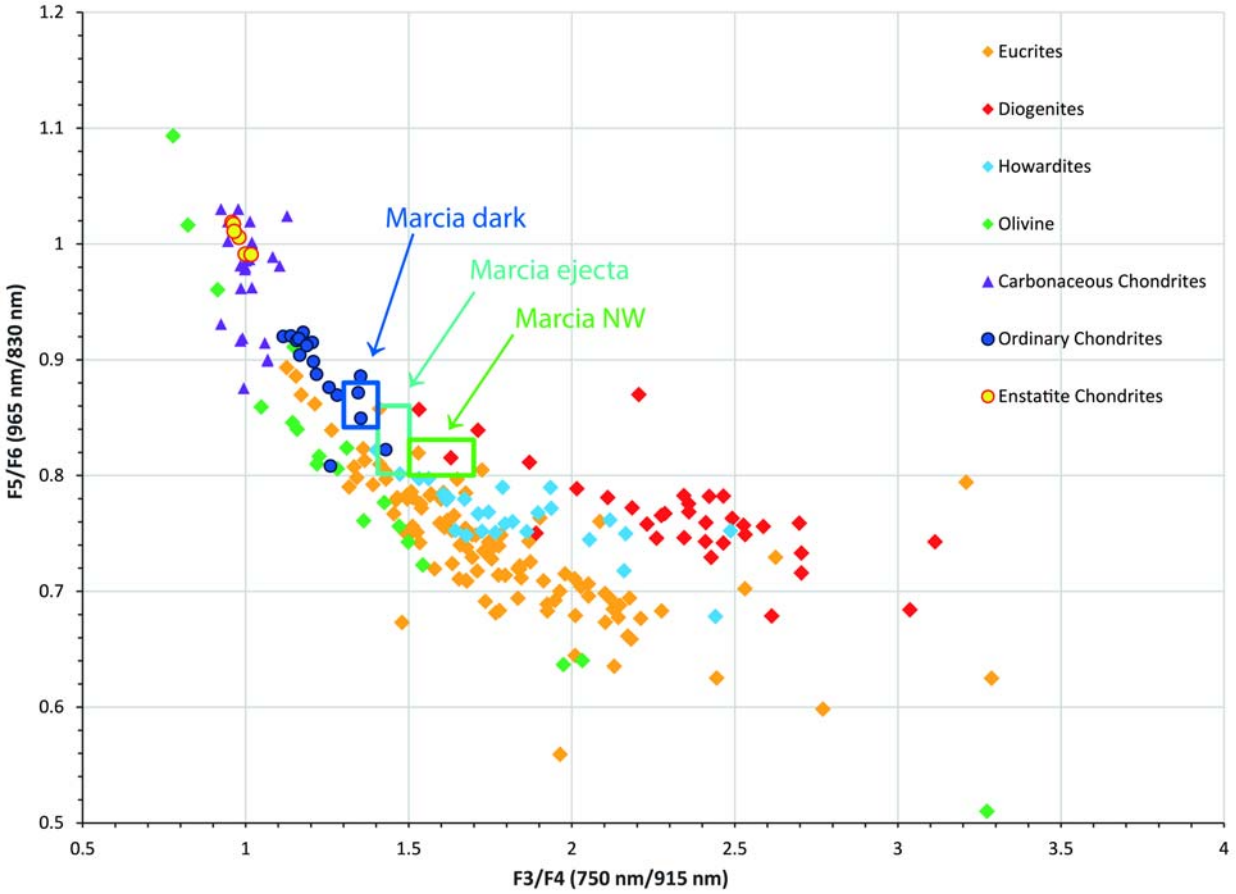
AGU FALL MEETING
San Francisco | 12–16 December 2016

P43C-2130: Anomalous crater Marcia on asteroid 4 Vesta: Spectral signatures and their geological relationship

Thursday, 15 December 2016
13:40 - 18:00
Moscone South - Poster Hall

DAWN Framing Camera (FC) images are used in this study to analyze the diverse spectral signatures of crater Marcia. As the FC offers high spatial resolution as well as several color filters it is well suited to resolve geological correlations on Vestas surface. Our approach comprises the analysis of images from four FC filters (F3, F4, F5 and F6) that cover the pyroxene absorption band at 0.9 um and the comparison of Vesta data with HED meteorite spectra. We use the ratios R 750/915 (F3/F4) and R 965/830 (F5/F6) [nm] to separate HED lithologies spectrally and depict corresponding areas on HAMO mosaics (~ 60 m/px). Additionally, higher resolution LAMO images (~ 20 m/px) are analyzed to reveal the geologic setting. In this work, Marcia is broadly classified into three spectral regions. The first region is located in the northwestern part of the crater as well as in the central peak area and shows the most HED-like signature within the Marcia region. The other two regions, with one of them also describing Marcia ejecta, are spectrally further away from HED lithologies and likely display a mixing with more howarditic-rich material associated with carbonaceous chondrite clasts and relatively higher OH and H concentrations (e.g., [1], [2], [3]). In general, these other two regions are also associated with thick flow features within the crater, while the HED-like area does not show such prominent flows. Hence, these darker regions seem to display post-impact material inflow of the weathered howarditic surface regolith. We conclude that the Marcia impactor likely struck through the howarditic regolith and hit the eucritic crust underneath. Depicting this HED-like signature globally, it resides mostly in the Rheasilvia basin and ejecta blanket, as well as in very young crater ejecta in the equatorial region, consistent with it being a signature of fresh basaltic crust.

[1] M. C. De Sanctis et al. (2012b) The Astrophysical Journal Letters, 758:L36 (5pp)
[2] T. McCord et al. (2012) Nature 491, 83-86
[3] T. H. Prettyman et al. (2012) Science 338, 242-246



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