Geophysical Research Abstracts
Vol. 14, EGU2012-5686, 2012
EGU General Assembly 2012

Geologic Mapping of the Av-8 Marcia Quadrangle of Asteroid 4 Vesta

D.A. Williams (1), H Hiesinger (2), P.M. Schenk (3), R. Jaumann (4), D.L. Buczkowski (5), T.B. McCord (6), R.A. Yingst (7), W.B. Garry (7), J.-Ph. Combe (6), C.M. Pieters (8), A. Nathues (9), L. Le Corre (9), V. Reddy (9), T. Roatsch (4), F. Preusker (4), N. Schmedemann (10), G. Neukum (10), C.A. Raymond (11), E. Ammannito (12), and M.C. De Sanctis (12)

(1) Arizona State University, School of Earth & Space Exploration, Tempe, United States (david.williams@asu.edu, 480-965-8102), (2) Westfälische Wilhelms-Universität, Münster, Germany, (3) LPI, Houston, Texas, USA, (4) DLR, Berlin, Germany, (5) JHU-APL, Laurel, Maryland, USA, (6) Bearfight Center, Winthrope, Washington, USA, (7) PSI, Tucson, Arizona, USA, (8) Brown University, Providence, Rhode Island, USA, (9) MPI for Solar System Research, Katlenburg-Lindau, Germany, (10) Free University, Berlin, Germany, (11) NASA JPL, Cal Tech, Pasadena, California, USA, (12) National Institute of Astrophysics, Rome, Italy

NASA's Dawn spacecraft is spending one year in orbit of asteroid 4Vesta to characterize its geology, chemical and mineralogical composition, topography, shape, and internal structure. The Dawn Team is conducting geological mapping of the surface in the form of 15 quadrangle maps, and here we report results from the mapping of Marcia quadrangle Av-8. Mapping is based on a Framing Camera (FC) mosaic produced from High Altitude Mapping Orbit (HAMO) data with a spatial resolution of $\sim$70 m/pixel, supplemented by a Digital Terrain Model (DTM: lateral spacing of 450 m/pixel and vertical accuracy of $\sim$30 meters), FC color images, and Visible and InfraRed (VIR) hyperspectral images. Av-8 Marcia Quadrangle covers 144°-216°E longitude and $\pm$21° latitude in the equatorial region of Vesta. This quadrangle is dominated by the 'Snowman' crater region, which is a low-albedo ejecta field containing impact craters Marcia, (68 km by 58 km), Calpurnia (54 km by 52 km), and Minucia (26 km by 23 km). A hill with a dark-rayed crater, named Aricia Tholus, is 42.5 km by 28 km. This quadrangle has all three of the dominant terrains found on Vesta: A heavily-cratered northern terrain with ancient troughs and grooves, an intermediately-cratered equatorial terrain bearing prominent flat-floored, E-W-trending troughs, and the relatively lightly-cratered south polar region, containing the Rheasilvia impact basin and related terrains. The low albedo ejecta field derived from the 'Snowman' craters, which we call Dark Crater Ejecta Material, mantles underlying older terrains. It has an obvious lower abundance of impact craters, indicative of a relatively younger age. A dark-rayed crater, occurring at $\sim$14°N, 180°, excavates a darker unit from underneath the brighter ejecta. Images from the Low Altitude Mapping Orbit (LAMO) show dark materials exposed in the rim of crater Marcia, suggesting basaltic flows or intrusions underlie the ejecta. Bright and Dark Lobate Materials also occur in this quad, and appear to be associated with impact or gradational processes (rotational slumps and landslides). Aricia Tholus was initially suggested as a potential volcano. It has been sculpted by impact craters, and there is no unequivocal evidence of extrusive volcanic materials, which suggests that it may represent a dike or intrusion that is being exposed by impact cratering. Both FC color ratio images and VIR images show compositional variations within the Marcia quadrangle. VIR data show strong 1 mm and 2 mm absorptions exposed within the walls and floor of impact crater Marcia, suggesting excavation of pyroxene-rich material and/or variations in particle sizes. FC color ratio images using approximations of Clementine ratios [Red (750/430 nm); Green (750/920 nm); Blue (430/750 nm)] show color differences in the floors of Marcia and Calpurnia, the distinctiveness of the eastern side of the 'Snowman' ejecta field from its western side, the dark-rayed craters at $\sim$14°N, 180° and on Aricia Tholus, and an unusual orange diffuse deposit surrounding an unnamed crater on the western side of the quadrangle. Further study is underway to investigate the significance of these color variations.