Geophysical Research Abstracts
Vol. 14, EGU2012-9611, 2012
EGU General Assembly 2012

Geologic Mapping of the Av-14 Urbinia Quadrangle of Asteroid 4 Vesta

S. C. Mest (1), R. A. Yingst (1), D. A. Williams (2), W. B. Garry (1), C. M. Pieters (3), R. Jaumann (4), D. L. Buczkowski (5), M. V. Sykes (1), D. Y. Wyrick (6), P. M. Schenk (7), C. T. Russell (8), C. A. Raymond (9), G. Neukum (10), N. Schmedemann (10), T. Roatsch (4), F. Preusker (4), and E. Ammannito (11)

(1) Planetary Science Institute, Tucson, AZ, United States (mest@psi.edu), (2) Arizona State Unviersity, Tempe, AZ, United States, (3) Brown University, Providence, RI, United States, (4) DLR, Berlin, Germany, (5) JHU-APL, Laurel, MD, United States, (6) SWRI, San Antonio, TX, United States, (7) LPI, Houston, TX, United States, (8) UCLA, Institute of Geophysics, Los Angeles, CA, United States, (9) Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, United States, (10) Freie Universitat Berlin, Institute of Geosciences, Planetology and Remote Sensing, Berlin, Germany, (11) INAF-IFSI Via Fosso del Cavaliere, Rome, Italy

NASA's Dawn spacecraft is providing unprecedented views of the surface of 4 Vesta since it went into orbit in July 2011. Dawn is actively gathering an abundance of image, spectral and topographic data to characterize the geology, composition, shape and internal structure of the ∼560-km-diameter asteroid. Geologic mapping of Vesta's surface is being undertaken at the global and regional scales by subdividing Vesta into 15 quadrangles. Here, we report the mapping results for quadrangle Av-14, the Urbinia quadrangle of Vesta, derived from data acquired during the High Altitude Mapping Orbit (HAMO) and Survey orbit.

Base materials for mapping include HAMO-derived monochrome (clear filter) Framing Camera (FC) mosaic (∼70 m/pixel and a Digital Terrain Model (DTM) derived from Survey orbit FC data (450 m/pixel). We also use FC color ratio images (∼250 m/pixel) from Survey orbit and Visible and InfraRed (VIR) hyperspectral images from Survey (700 m/pixel) and HAMO (200 m/pixel) orbits to provide information on surface composition and refine unit boundaries.

The Av-14 Quadrangle covers the region between 21°-66°S latitude and 270°-360°E longitude. The quadrangle is named after crater Urbinia (D=24 km; 30°S, 276°E), which displays an ejecta blanket with moderate albedo and a smooth, lightly cratered surface. The map area is dominated by moderately cratered equatorial terrains and lightly cratered, but highly deformed, southern terrains. The topographic gradient of the map area is declined toward the south from the more elevated equatorial terrain to the relatively lower interior of the Rheasilivia impact basin.

Av-14 contains two dominant terrains – (1) intermediately-cratered equatorial terrain bearing flat-floored, E-W-trending troughs, and (2) relatively lightly-cratered south polar terrain, which contains the Rheasilvia impact basin and related terrains. The northern part of the quadrangle is covered by the moderately cratered equatorial ridge-and-trough terrain and equatorial cratered terrain. The ridge-and-trough terrain forms a thin exposure along the northeastern edge of the map area that displays a handful of troughs. The equatorial cratered terrain extends the width of the quadrangle in a narrow band near the northern part of the map area; this unit contains a few short troughs and is more heavily cratered than the ridge-and-trough terrain. The south polar region contains materials that comprise the Rheasilvia formation, which includes the Rheasilvia ridge-and-groove terrain and the Rheasilvia central mound terrain. The ridge-and-groove terrain is characterized by lineations exhibiting two main orientations: One set is oriented radial to the central mound (N-S) and includes broad ridges and narrow grooves, as well as low-relief scarps. The second set is more arcuate and is oriented circumferential to the central mound (E-W), and consists of ridges and grooves generally a few tens of kilometers in length.

Av-14 contains numerous "large" (D>5 km) impact craters, many of which are surrounded by distinct ejecta deposits. Most ejecta deposits display albedos similar to the underlying material and are recognizable by identification of lobate terminations. However, several craters display ejecta with moderate albedo and rays with higher albedo than the underlying surface. In general, these craters appear morphologically fresh.