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Geologic Mapping of the Av-3 Caparronia Quadrangle of Asteroid 4 Vesta

D.T. Blewett (1), B.L. Young (1,2), D.A. Williams (3), D.P. O'Brien (4), R. Gaskell (4), R.A. Yingst (4), W.B. Garry (4), D.L. Buczkowski (1), H. Hiesinger (5), T.B. McCord (6), J-Ph Combe (6), P.M. Schenk (7), R. Jaumann (8), C.M. Pieters (9), A. Nathues (10), L. Le Corre (10), V. Reddy (10), M. De Sanctis (11), T. Roatsch (8), F. Preusker (8), and the Dawn Science Team

(1) Johns Hopkins University Applied Physics Laboratory, United States (david.blewett@jhuapl.edu), (2) University of Maryland-Baltimore County, United States, (3) Arizona State University, United States, (4) Planetary Science Institute, United States, (5) Westfälische Wilhelms-Universität, Germany, (6) Bear Fight Institute, United States, (7) Lunar & Planetary Institute, United States, (8) DLR, Berlin, Germany, (9) Brown University, United States, (10) Max Planck Inst., Katlenburg-Lindau, Germany, (11) National Institute of Astrophysics, Rome, Italy

NASA's Dawn spacecraft is spending one year in orbit around asteroid (4) Vesta 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 Caparronia quadrangle Av-3. Mapping is based on a Framing Camera (FC) mosaic produced from High Altitude Mapping Orbit (HAMO) data with a spatial resolution of ∼70 m/pixel, supplemented by a Digital Terrain Model (DTM: lateral spacing of 450 m/pixel and vertical accuracy of ∼30 meters), FC color images, and Visible and InfraRed (VIR) hyperspectral images. The Caparronia Quadrangle extends from 90° to 180° E longitude and 21° to 66° N latitude. Vesta's rotation axis is tilted ∼29° with respect to its orbital plane. Dawn arrived during northern winter, hence portions of Vesta north of ∼45° N are in shadow and have not yet been imaged. Vesta has three dominant terrains: 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 Northern Cratered Trough terrain dominates the Caparronia quadrangle. Part of a NW-SE-trending trough enters the center of the sunlit part of the quad. Caparronia crater is centered at ∼36° N, 167° E and is located near the eastern edge of the quad. The crater's elongation in the north-south direction is caused by slumping, likely as a result of the steep topography on which the crater formed. Smooth ejecta from Caparronia and two other relatively fresh craters can be mapped to a distance of roughly one crater radius from the crater rims, and to greater distances in places. In addition to morphology derived from FC clear filter images, we plan to take advantage of compositional information derived from FC color ratio images and VIR hyperspectral data.
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