GEOLOGIC MAPPING OF THE AV-3 CAPARRONIA QUADRANGLE OF ASTEROID 4 VESTA. B.L. Young[1,2], D.T. Blewett[1], 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], M. Hoffmann[10], V. Reddy[10], T. Roatsch[8], F. Preusker[8], S. Marchi[11], J. Scully[12], C.T. Russell[12], C.A. Raymond[13], M. DeSanctis[14], [1]Johns Hopkins University Applied Physics Lab, 11100 Johns Hopkins Rd, Laurel, Maryland, USA (brittany.young@jhuapl.edu); [2]University of Maryland-Baltimore County, Baltimore, Maryland, USA; [3]School of Earth & Space Exploration, Arizona State University, Tempe, Arizona USA; [5]Westfälische Wilhelms-Universität, Münster, Germany; [4]PSI, Tucson, Arizona, USA; [6]Bear Fight Center, Winthrop, Washington, USA; [7]LPI, Houston, Texas, USA; [8]DLR, Berlin, Germany; [9]Brown University, Providence, Rhode Island, USA; [10]Max Planck Inst., Katlenburg-Lindau, Germany; [11]Observatoire de la Cote d'Azur, CNRS, Nice Cedex, France; [12]UCLA, Los Angeles, California, USA; [13]NASA JPL, California Institute of Technology, Pasadena, California, USA; [14]National Institute of Astrophysics, Rome, Italy.

Introduction: NASA's *Dawn* spacecraft began orbiting the inner main belt asteroid 4 Vesta on July 16, 2011, and will characterize the geology, elemental and mineralogical composition, topography, and internal structure of Vesta before departing for asteroid 1 Ceres in late 2012. As part of the *Dawn* data analysis, the science team is constructing geological mapping of the surface, in the form of 15 quadrangle maps. This abstract reports preliminary results from mapping of quadrangle Av-3, named for Caparronia crater.

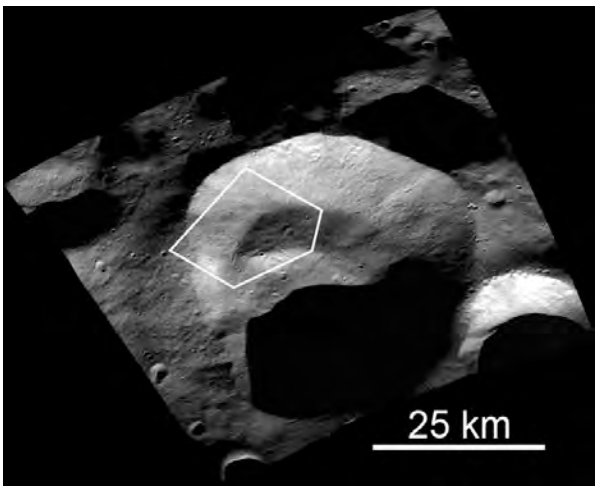

Figure 1. Caparronia crater, ~44 × 56 km. *Dawn* FC image obtained during HAMO. Equirectangular projection of image FC21B0010637_11291091801F1A. The white box outlines the approximate area of Fig. 3.

Data: The base for mapping this quadrangle is a monochrome Framing Camera (FC) mosaic produced from the High Altitude Mapping Orbit (HAMO) data with a spatial resolution of ~70 m/pixel. Fig. 1 shows an individual frame used in the construction of this mosaic. Higher-resolution images (~20 m/pixel) from the Low Altitude Mapping Orbit (LAMO) are available for selected portions of the quad to aid in interpretation. The base mosaic is supplemented by a digital terrain model (DTM) derived from HAMO data (Fig. 2). Also used to support the mapping are FC color ratio images from the Survey orbit with a spatial resolution of ~250 m/pixel, slope and contour maps derived from the DTM, and Visible and InfraRed (VIR) hyperspectral images from the Survey and HAMO orbits with spatial resolutions of 700 and 200 m/pixel, respectively.

Geologic Setting: 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. At the global scale [1, 2] 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.

Geologic Units & Features: The Caparronia quadrangle is dominated by the Northern Cratered Trough terrain. Caparronia crater (Figs. 1 and 2) 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. The higher-resolution view in Fig. 3, from the Low Altitude Mapping Orbit (LAMO), reveals the fine texture on the northern wall and slump, including mass-wasting features and accumulations of smoother, presumably finer-grained material at the base of slopes. 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.

More detailed interpretation of features in the quad requires additional higher-spatial-resolution FC and VIR data from LAMO, which is being acquired during the first quarter of 2012.

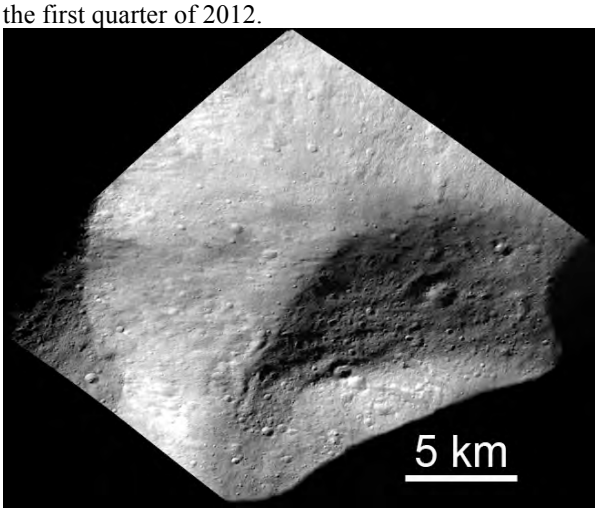

Figure 3. LAMO view of Caparronia crater's northern wall and interior slump (cf. Fig. 1). Equirectangular projection, image FC21A0015167_11359120117F1A.

Compositional Information: Calibrated, photometrically corrected FC albedo and color products [3] show Vesta's hemispherical dichotomy, first revealed in ground-based and *Hubble* telescopic observations [4-7]. Stronger pyroxene bands (near a wavelength of 1 μm) are observed in the southern hemisphere. This is consistent with exposure of material like that of diogenite meteorites in the southern hemisphere and more eucritic material in the northern hemisphere. Little FC color or VIR hyperspectral [8] data is available as yet for quad Av-3, but the area likely consists of lower-albedo material with a more eucrite-like composition.

References: [1] A. Yingst et al. (2011) AGU, P43B-0248. [2] R. Jaumann, et al. (2012) *LPS 43rd,* this mtg. [3] A. Nathues et al. *LPS 43rd,* this mtg. [4] T. McCord et al. (1970) *Science 168*. [5] M. Gaffey (1997) *Icarus 127*. [6] P. Thomas et al. (1997) *Science 277*. [7] R. Binzel et al. (1997), *Icarus 128*. [8] M. DeSanctis et al., *LPS 43rd,* this mtg.

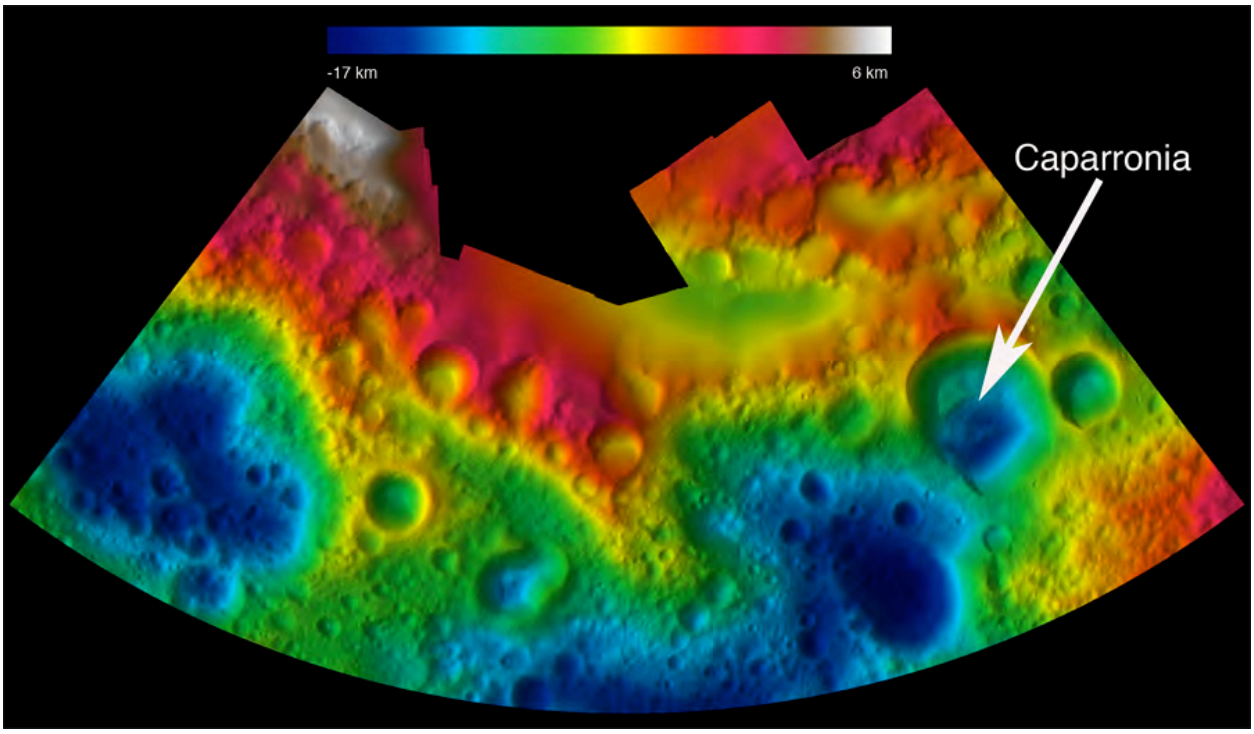

Figure 2. Color-coded digital terrain model of quad Av-3, derived from *Dawn* FC HAMO monochrome imaging. Lambert conformal conic projection centered at 135˚ E with standard parallels of 30˚ and 58˚ N. Elevations are relative to a 285 × 229 km reference ellipse.