GEOLOGIC MAPPING OF THE AV-14 URBINIA QUADRANGLE OF ASTEROID 4 VESTA. S.C. Mest[1,2], R.A. Yingst[1], D.A. Williams[3], W.B. Garry[1], C.M. Pieters[4], R. Jaumann[5], D.L. Buczkowski[6], M.V. Sykes[1], P. Tricarico[1], D.Y. Wyrick[7], P.M. Schenk[8], C.T. Russell[9], C.A. Raymond[10], G. Neukum[11], N. Schmedemann[11], T. Roatsch[5], F. Preusker[5], E. Ammannito[12], and the Dawn Team, [1]Planetary Science Institute, Tucson, AZ (mest@psi.edu); [2]NASA Goddard Space Flight Center, Greenbelt, MD; [3]ASU, Tempe, AZ; [4]Brown University, Providence, RI; [5]DLR, Berlin, Germany; [6]JHU-APL, Laurel, MD; [7]SWRI, San Antonio, TX; [8]LPI, Houston, TX; [9]UCLA, Institute of Geophysics, Los Angeles, CA; [10]Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; [11]Freie Universität Berlin, Inst. of Geosciences, Planetology and Remote Sensing, Berlin, Germany; [12]INAF-IFSI Via Fosso del Cavaliere, 100, 00133, Roma, Italy.

Introduction: NASA's *Dawn* spacecraft has been providing unprecedented views of the surface of 4 Vesta since it went into orbit around the main belt asteroid 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 (equatorial) asteroid. Geologic mapping of Vesta's surface is currently being undertaken at the global [1,2] and regional scales by subdiving Vesta into 15 quadrangles. Here, we report the results from the mapping of quadrangle Av-14, the Urbinia quadrangle of Vesta.

Data: Base materials for mapping the Av-14 Quadrangle include a monochrome (clear filter) Framing Camera (FC) mosaic (Fig. 1) produced from High Altitude Mapping Orbit (HAMO) data, which has a spatial resolution of ~70 m/pixel and a Digital Terrain Model (DTM) derived from Survey orbit FC data [3-5] with a horizontal resolution of 450 m/pixel (Fig. 2). We also use FC color ratio images (~250 m/pixel) from Survey orbit [6] and Visible and InfraRed (VIR) hyperspectral images [7,8] from Survey (700 m/pixel) and HAMO (200 m/pixel) orbits to provide information on surface composition and refine unit boundaries. DTM-derived slope and contour maps are being used to analyze the shape of the surface and assist in evaluating the extent of geologic materials and features.

Geologic Setting: Av-14 Urbinia Quadrangle covers the region between 21°-66°S latitude and 270°-360°E longitude. The quadrangle is named after crater Urbinia, which is ~24 km in diameter and located at 30°S, 276°E. Urbinia displays an ejecta blanket with moderate albedo and a smooth, lightly cratered suface.

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 as one traverses from the more elevated equatorial terrain to the relatively lower interior of the Rheasilivia impact.

Geologic Units & Features: The global surface of Vesta is broadly dominated by three terrains [2,3]: (1) A heavily-cratered northern terrain with ancient troughs and grooves, (2) an intermediately-cratered equatorial terrain bearing prominant flat-floored, E-W-trending troughs, and (3) the relatively lightly-cratered south polar region, which contains the Rheasilvia impact basin and related terrains.

Av-14 contains two of the three dominant terrains displayed on Vesta – the equatorial terrain and the south polar terrain. The northern part of the quadrangle is covered by the moderately cratered equatorial ridge-and-trough terrain and equatorial cratered terrain. In general, the ridge-and-trough terrain displays broad E-W-trending troughs that are tens to hundreds of kilometers in length [9]. Av-14 contains a thin exposure of ridge-and-trough terrain along the northeastern edge of the map 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 in Av-14 includes the Rheasilvia ridge-and-groove terrain, as well as the Rheasilvia central mound terrain [3]. 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 other set is more arcuate and is oriented circumferential to the central mound (E-W), and consists of ridges and grooves that are generally a few tens of kilometers in length in this quadrangle.

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 underlaying 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.

The Urbinia quadrangle also contains several deposits of bright and dark lobate material (blm and dlm, respectively). Only one blm deposit has been identifed thus far from HAMO data and is located on the floor of an ~30-km-diameter crater in the south-central part of the map area. Deposits of dlm are found throughout the map area. The largest deposits are located in the southern part of the map area along the bases of scarps within the Rheasilivia ridge-and-groove terrain and

appear to have been emplaced via mass wasting. Several smaller deposits are found in the northern part of the map area within apparently older cratered highland material and equatorial cratered terrain. These deposits are not associated with topographically high features and may consist of lobate ejecta or suggest the locations of ancient lava flows. Ongoing analysis of high-resolution VIR and color ratio data, as well as Low Altitude Mapping Orbit (LAMO) FC images will en able these lobate deposits to be characterized.

References: [1] Yingst et al. (2011) Fall AGU, #P43B-0248. [2] Yingst et al. (2012) 43rd LPSC, this volume. [3] Preusker et al. (2011) Fall AGU, #U23B-02. [4] Jaumann et al. (2012) *Science,* in review. [5] Preusker et al. (2012) 43rd LPSC, this volume. [6] Reddy et al. (2011) Fall AGU, #U31A-0001. [7] Coradini et al. (2011) Fall AGU, #U22A-02. [8] De Sanctis et al. (2011) Fall AGU, #U31A-0002. [9] Buczkowski et al. (2011) Fall AGU, #U21B-05. [10] Tricarico, P., et al. (2012) 43rd LPSC, this volume.

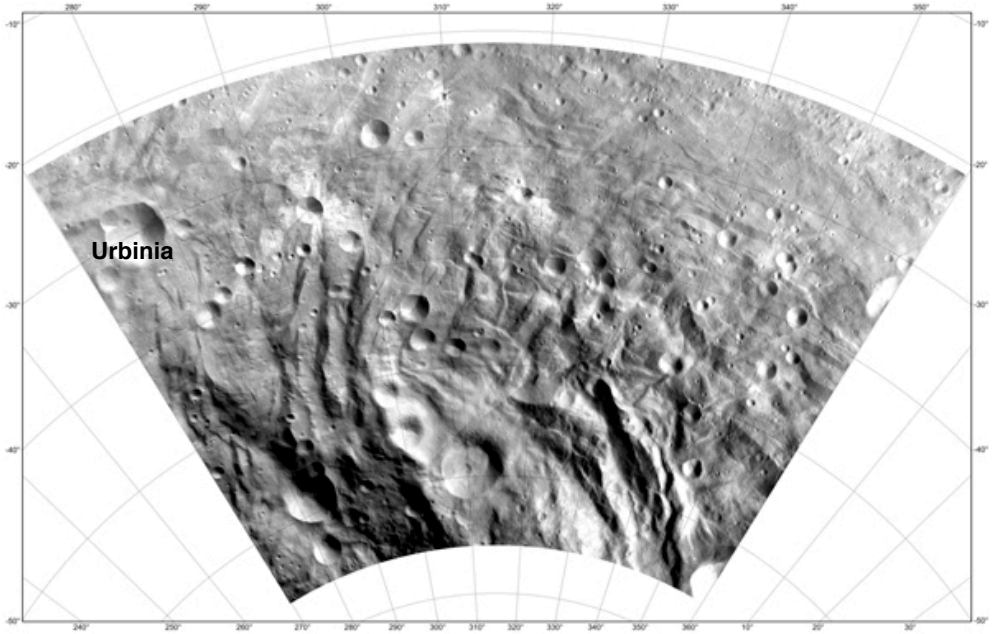

Figure 1. *Dawn* FC monochrome image base mosaic of the Av-14 Urbinia quad compiled from HAMO data. The quad is named for Urbinia crater (D=24 km), located in the northwest corner of the quad. Resolution ~70 m/pixel.

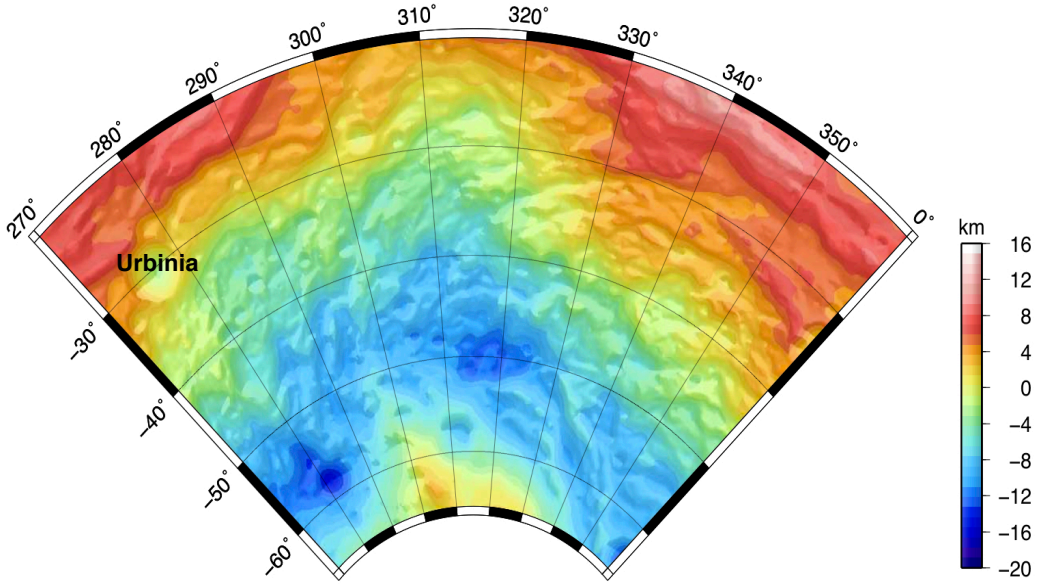

Figure 2. DTM of the Av-14 Urbinia quad showing elevation relative to the geoid of 4Vesta [10].