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Geologic Mapping of Av-10 Oppia Quadrangle of Asteroid 4 Vesta

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NASA's Dawn spacecraft is collecting a variety of imaging, spectral, and elemental abundance data to characterize the geology, geochemistry, shape and internal structure of Vesta. Geologic mapping of Vesta's surface is being conducted at the global scale and as a series of 15 regional quadrangles. We report results from the mapping of quadrangle Av-10 (Oppia). A mosaic of monochrome (clear filter) Framing Camera (FC) images from the High Altitude Mapping Orbit (HAMO) (70 m/pixel) serves as the base image with additional information about the surface gathered from Visible and Infra-Red (VIR) hyperspectral images, FC color ratio images, and a Digital Terrain Model (DTM: lateral spacing of 450 m/pixel and vertical accuracy of ∼30 meters) derived from FC images. Quadrangle Av-10 Oppia is located within the equatorial region of Vesta, and covers 22°S to 22°N latitude and 288° to 0°/360°E longitude. The four global units in Av-10 are 1) cratered terrain in the north, 2) a broad, topographic low (Feralia Planitia) that dominates the central portion of the quadrangle and 3) a topographically higher area towards the south, and 4) equatorial troughs and ridges that cut across the quadrangle between 10°S and 10°N latitude. The northern cratered terrain is one of the older geologic units in Av-10. A portion of this terrain was excavated by the impact that formed Feralia Planitia, one of the larger basin-like features on Vesta. Feralia Planitia is 270 km across and ∼15 km deep in relation to the surrounding topographically higher terrain. This topographic low, which is bound by Vestalia Terra to the west (see quadrangle Av-9 Numisia), has been reshaped by Oppia crater on the southern basin boundary, an unnamed crater (50 km) on the northern basin boundary, and by the ridge and trough terrain. A portion of a large northern trough (Saturnalia Fossa) is present in the northwest corner of the quadrangle (see quadrangles Av-4 Domitia and Av-9 Numisia) and E-W-trending equatorial troughs (Divalia Fossa) are located in the eastern half of the (see quadrangle Av-6 Gegania). Oppia crater (D=34 km, 8°S, 309°E) has a sharp rim and a smooth ejecta blanket with a low abundance of impact craters that indicates the crater is relatively young. In FC color-ratio images using approximations of Clementine ratios (Red: 750/430 nm; Green: 750/920 nm; Blue: 430/750 nm), the ejecta blanket has a distinct coloration in comparison to the surrounding terrain. Further study is underway to better understand the nature of this ejecta blanket. The authors gratefully acknowledge the support of the Dawn Instrument, Operations, and Science Teams. This work is supported by NASA through Dawn at Vesta Participating Scientist grant #NNH09ZDA001N.