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Geologic Map of the Northern Hemisphere of Vesta

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For more than a year, the NASA Dawn mission acquired Framing Camera (FC) images from orbit around Vesta. The surface of the asteroid was completely imaged [1] before Dawn left for its next target, the asteroid Ceres. In an early phase of the mission, the southern and equatorial regions were imaged, allowing the production of several geologic quadrangle maps [2]. During the second High Altitude Mapping Orbit (HAMO-2), the northern hemisphere became illuminated and visible. Here we present the first geologic map of the northern vestan hemisphere, from 21°N to 85°N, derived mainly from HAMO-2 observations. Detailed studies of specific geologic features within this hemisphere are presented elsewhere [e.g., 3,4].

For our geologic map we used high-resolution FC images [5] with ∼20 m/pixel from the Low Altitude Mapping Orbit (LAMO), which unfortunately only cover the southern part of the study area (21°N to 45°N). For areas farther north, LAMO images are supplemented with HAMO-2 images, which have a pixel scale of about 70 m/pixel. During the departure phase, images of the north pole area with even lower spatial resolutions were acquired. Due to observational constraints, considerable shadowing is present north of 75°. From these data, an albedo mosaic and a stereo-photogrammetric digital terrain model [6] was produced, which serve as basis for our geologic map. For the geologic mapping at a scale of 1:500,000, all data were incorporated into a Geographic Information System (ArcGIS).

We have identified several geologic units within the study area, including cratered highland material (ch) and the Saturnalia Formation (Sf), which is characterized by large-scale ridges and troughs, presumably associated with the south polar Veneneia impact [7]. In addition, we mapped undifferentiated crater material (uc), discontinuous ejecta material (dem), and dark/bright crater material and dark/bright crater ray material (dc/bc and dcr/bcr). We will present a detailed description of the geologic units and their relative stratigraphy [8].

References:
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