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Geologic Mapping of the Av-11 Pinaria Quadrangle of Asteroid 4 Vesta

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As part of the Dawn's orbital mapping investigation of Vesta, the Science Team is conducting geologic mapping of the surface in the form of 15 quadrangle maps, including quadrangle Av-11 (Pinaria). The base map is a monochrome Framing Camera (FC) mosaic at ∼70 m/pixel, supplemented by Digital Terrain Models (DTM) and FC color ratio images, both at ∼250 m/pixel, slope and contour maps, and Visible and Infrared (VIR) hyperspectral images. Av-11 straddles the 45-degree longitude in the South Polar Region, and is dominated by the rim of the ∼505 km south polar topographic feature, Rheasilvia. Sparsely cratered (relatively), Av-11 is dominated by a 20 km high rim scarp (Matronalia Rupes) and by arcuate ridges and troughs forming a radial to spiral pattern across the basin floor. Primary geologic features of Av-11 include the following. Ridge-and-groove terrain radiating arcuately from the central mound unit, interpreted to be structural disruption of the basin floor associated with basin formation. The largest crater in Av-11 is Pinaria (37 km). Mass wasting deposits are observed on its floor. Secondary crater chains and fields are also evident. Mass wasting observed along Rheasilvia rim scarp and in the largest craters indicates scarp failure is a significant process. Parallel fault scarps mark this deposit of slumped debris at the base of 20 km high Matronalia Rupes, which may have formed during or shortly after basin excavation. We interpret most of these deposits as slump material emplaced as a result of the effects of basin formation and collapse. Lobate materials are characterized by lineations and lobate scarps and interpreted as Rheasilvia ejecta deposit outside Rheasilvia rim (the smoothest terrain on Vesta), and are consistent with formation by ejecta. Partial burial of older craters near the edge of these deposits are also observed.