Mass Wasting Processes in Vesta's South Polar Region

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Images of Asteroid Vesta taken by the Dawn framing camera give insight to a wide range of geologic phenomena on Vesta's surface. In this abstract we focus on the evidence of different types of gravity-driven mass wasting that can be seen on Vesta with an emphasis on the south polar region where the formation of the giant impact basin of Rheasilvia (1, 2) caused significant mass movements and lateral displacement.

During the formation of the impact basin various processes such as uplift and stretching moved material of the impact site (3). The remnant are fault scarps, ridges, and uplift features inside the Rheasilvia basin (2). Beside these mass movements, there are also three types of debris movement associated with the Rheasilvia impact basin: block slumping of solid material, granular landslides, and flow-like features. They all occur on the rim of the basin and the central peak with slopes varying from 10° to 40°. The movement, however, is in different directions. While the block slumping and landslides occur on the steep slopes of the crater wall facing inward, the flow-like movements go outward from the crater rim on less steep slopes. The block slumping is most prominent in the region between 80° and 120° east and 50° and 60° south (4). The slump blocks in a rotational movement showing multiple scarps and ridges. Landslides on the steep slopes inward of Rheasilvia have a length to height ratio of about 1. The flow-like features occur in the region between 50° and 90° east and 20° to 40° south. They are in a relatively young area and have a length to height ratio up to 35. Additionally, many small elongate depressions of about 1.5 km length can be found near the central peak of Rheasilvia. They are mainly arranged parallel to the slope with a slight curvature and are related to instability of granular material on a slope.

References: (1) Jaumann et al., Science 336, 687 (2012); (2) Schenk et al., Science 336, 694 (2012); (3) Melosh, *Impact Cratering – A Geologic Process,* Oxford University Press (1989); (4) Krohn et al., LPSC 43 (2012), #1901