SCARPS AND UNUSUSAL CRATER IN THE SEXTILIA REGION ON VESTA. K. Krohn[1], R. Jaumann[1,2], K. Stephan[1], P. Schenk[3], F. Preusker[1], E. Kersten[1], T. Roatsch[1], C.A. Raymond[4] and C. T. Russell[5], [1] Institute of Planetary Research, German Aerospace Center (DLR), Berlin, Germany (Katrin.Krohn@dlr.de), [2] Freie Universität Berlin, Inst. of Geosciences, Planetology and Remote Sensing, [3] Lunar and Planetary Institute, Houston, USA, [4] Jet Propulsion Laboratory, California Institute of Technology, Pasadena, USA, [5] UCLA, Institute of Geophysics, Los Angeles, USA

Introduction: NASA's *Dawn* spacecraft entered orbit of the inner main belt asteroid 4 Vesta on July 16, 2011, and is spending about one year in orbit to characterize the geology, elemental and mineralogical composition, topography, shape, and internal structure of Vesta before departing to asteroid 1 Ceres in late 2012 [1]. During the detailed investigation of the geological characteristics of Vesta's surface in the surroundings of the prominent impact crater Sextilia (~39°S/146°E) a complex morphology of impact craters become apparent: 1) Numerous impact craters are characterized by unusual distribution of ejecta and/or shape of the crater rim indicating peculiar conditions during the impact process [2,3]. 2) The region is dominated by huge scarps representing the rim of the south polar Rheasilvia impact basin.

Scarps and unusual crater: The Sextilia region exhibits extreme topographic variations, causing many craters to be formed on slopes. The shape of these craters is asymmetrical, with one sharp and one smooth rim [2]. DTMs and profiles of these unusual craters normally reveal a steep slope uphill and a shallower one downhill, like the crater Helena (Fig.1). Another expression of this phenomenon is craters with a wider crater floor, which passes into the downhill slope with a reduced crater rim (Fig.2). The formation of these unusual craters is controlled by the topographic conditions, and thus by the steepness of the slopes [2].

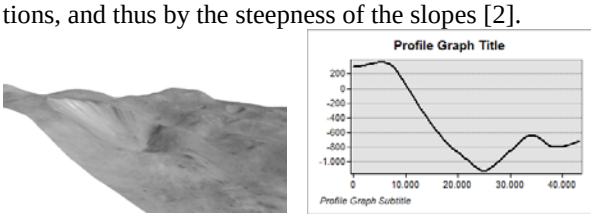

Fig.1: Helena crater, formed on a slope, shows a smooth downhill and a sharp uphill rim, a narrow crater floor, and a prominent unit boundary between the uphill and downhill crater regions.

Craters on steep slopes and mass-wasting features also occur in the rim region of the Rheasilvia impact basin. The basin is centered at -75 S and 301 E and is about 500 km in diameter [3]. On the steep slopes of its rim scarps, incompetent material broke off and formed slump blocks.

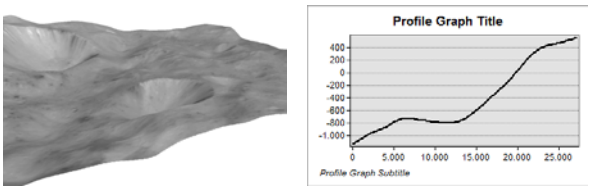

Fig.2: This crater, also formed on a slope, has smooth and a sharp rim expression as well. The crater floor is very flat and the downhill rim passes into the overall slope [2].

These features seem to show different stages of mass movement, with relatively older slumping features overlain by younger slumps oriented perpendicular [2].

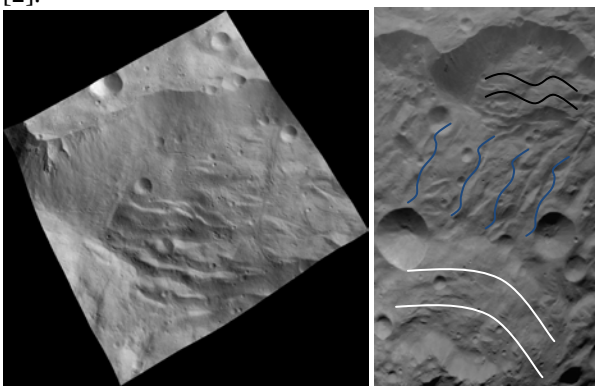

Fig.3: Mass wasting on the Rheasilvia flank. Left: Reletavly young slumps and fan-shaped mass-wasting features at the rim. Right: Different mass wasting stages.

Upcoming higher-resolution images and DTMs will allow us to quantitativley investigate crater sizes, slope angle frequency, angle of repose, ejecta thickness and distribution, and the relationship between slope and crater shape. Additional spectral information will allow us to estimate the composition of the crater rim and ejecta material. This information will enable us to understand the mechanical process of mass wasting on Vesta, and its different stages.

References: [1] Russel, C.T. et al. (2012) *LPSC XXXXIII*, Abstract #1633. [2] Jaumann, R. et al. (2012), *LPSC XXXXIII*, Abstract #1788. [3] Schenk, P. (2012) *LPSC XXXXIII*, Abstract #2757.