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Mass movements at steep scarps and crater rims in the Sextilia Quadrangle on Vesta

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Detailed geologic mapping of the Sextilia Quadrangle was conducted with the help of high resolution Framing Camera (FC) (1) and Visible and Infrared Spectrometer (VIR) (2) data of the Dawn spacecraft. Av-12 Sextilia Quadrangle is located between 21° - 66° South and 90° - 180° East. This region hosts a set of different geologic features. Primary geologic features of this region include Rheasilvia impact material, smooth material and different kinds of impact crater structures and materials, such as bimodal craters (3), dark and bright crater ray material and dark ejecta material (4) and different types of mass wasting features such as slumping blocks at the steep scarp Matronalia Rupes (centered at $\sim$ 49°S and 85°E), spur-and-gully morphologies and landslides in craters (5). We analyzed several craters and the mass wasting features at Matronalia Rupes. Collapse processes, instability of slopes and seismic triggered events cause the landslides, rotational slumping blocks on scarps as well as spur-and-gully morphologies on crater walls and scarps. Spur-and-gully morphology is known to form on Mars and Earth normally supported by liquid flow but on Vesta these features formed under dry conditions. For that the individual particle settling has to be slower than characteristic debris flow speeds (5). At Matronalia Rupes rotational rock slumping blocks are clearly exposed as material slumped down the scarp wall in a stair-stepped pattern, which is interrupted by minor scarps and covers the underlying Rheasilvia ridge-and-groove terrain. This rotational rock slumping is affected by slope instability and gravitationally triggered events such as seismic shaking mostly produced by impacts elsewhere on Vesta (5).

(1) Sierks et al. (2011) Space Science Rev. 163, 263-327. (2) De Sanctis et al. (2011) Space Science Rev. 163, 329-369. (3) Krohn et al. (2012) EPSC 7th, 463-3. (4) Jaumann, et al. (2012) Science 336, 687-690; (5) Krohn et al. (2013) submitted to Icarus.