Potential Identification of sublimation-driven downslope mass movement on Mercury

Conference or Workshop Item

POTENTIAL IDENTIFICATION OF SUBLIMATION-DRIVEN DOWNSLOPE MASS MOVEMENT ON MERCURY. C.C. Malliband[1], S.J. Conway*[2], D.A. Rothery[1], and M.R. Balme[1], [1]School of Physical Sciences, The Open University, Milton Keynes, MK7 6AA, UK (chris.malliband@open.ac.uk), [2]CNRS, LPG, Université de Nantes, France (susan.conway@univ-nantes.fr) *presenting author

Introduction: Mass movement has been recognised on many solar system bodies. Evidence of mass movement on Mercury has previously been limited to a single documented example, found in the pyroclastic vent NE of Rachmaninoff crater. Here we present the identification of a second example in a small, recent impact crater, ≈285 km north of Nabokov.

Mass movement at NE Rachmaninoff Vent: Attention was drawn to the slope features in the NE Rachmaninoff vent (Fig. 1) on the MESSENGER website, but so far as we are aware there has been no formal study. The features are downslope erosion-deposition systems with an alcove at the head, chute and a fan at the base. Feature heads appear to develop in a stratigraphic layer of brighter material (Fig. 1B). This brighter material appears to be related to hollows [1].

Slope features in unnamed crater (≈285 km N of Nabokov): The newly identified slope features are in a ≈12 km diameter simple impact crater. The crater is surrounded by low reflectance material and has an area of hollows on the NE crater rim. The slope features start just below the crater rim, in a bright stratigraphic layer. This may be similar to the hollow forming layer in NE Rachmaninoff.

Current work: We are examining other areas with steep slopes and catalogued hollows, and are performing a global survey to identify any further examples. We will compare the topography of these features to erosion-deposition systems on Mars [2,3] and Vesta [4]. Our working hypothesis is that these downslope movements are caused by sublimation.

References: [1] Blewett D.T. et al. (2011) *Science*, *333*, 1856–1859. [2] Conway S.J. et al. (2015) *Icarus*, *253*, 189–204. [3] Brusnikin E.S. et al. (2016) *Icarus*, *278*, 52–61. [4] Scully J.E.C. et al. (2015) *EPSL*, *411*, 151–163.

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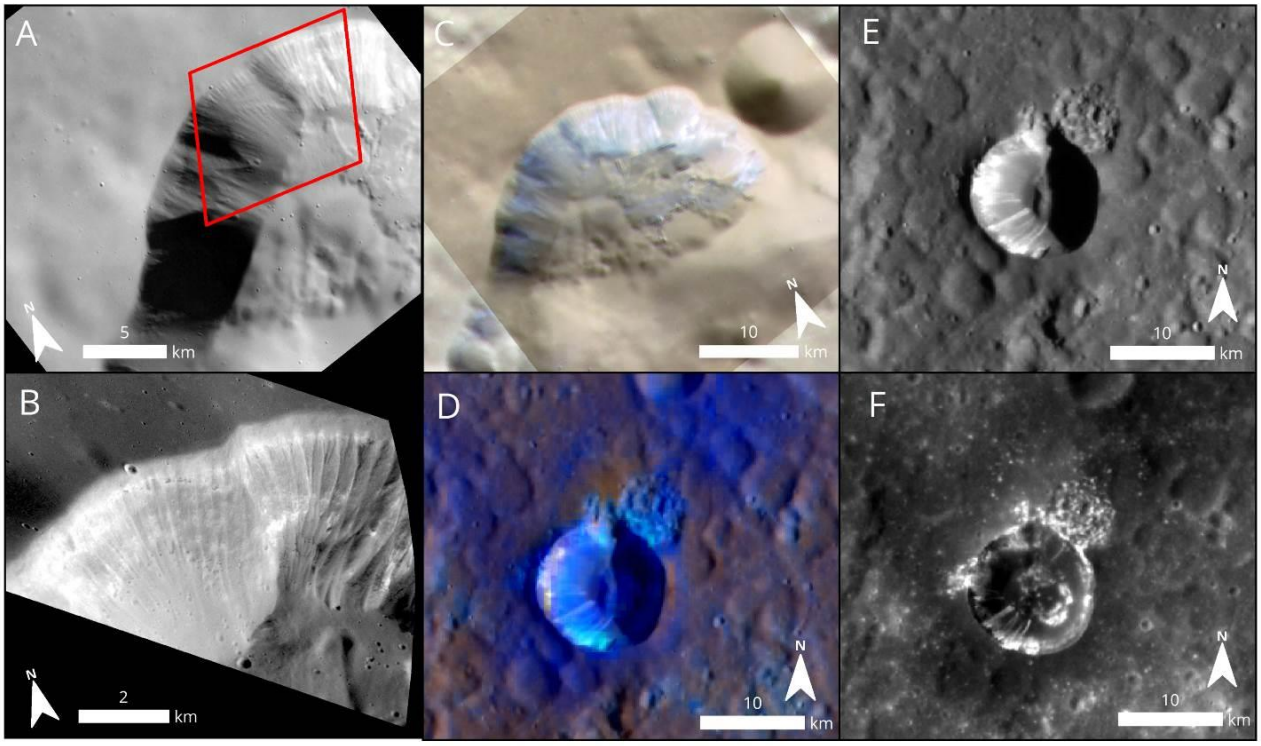

Fig. 1: A,B,C Gully-like slope features in vent NE of Rachmaninoff. A:Context image centered on 36°N, 63.8°E showing widespread slope features. Box shows location of B. (NAC: EN1003843866M) B: High resolution (6.4m/pixel) image showing source at bright layer (NAC: EN1028933034M) C: Enhanced color. D, E, F. Newly discovered slope features at 8°S, 55°E. D, enhanced color; E, high incidence angle (NAC: EN0252295266M) F, low incidence angle. Note bright, possibly hollow forming, material, high in crater wall (NAC: EN1028933034M).