GLACIAL FLOW WITHIN MARTIAN LOBATE DEBRIS APRONS: EVIDENCE FROM SURFACE TEXTURE MAPPING IN DEUTERONILUS MENSAE. A.V. Pathare[1], E.C.S. Joseph[1], F.C. Chuang[1], D.A. Crown[`1], D.C. Berman[1], and M.R. Koutnik[2], [1]Planetary Science Institute, Tucson, AZ (pathare@psi.edu), [2]University of Washington, Seattle WA.

Introduction: Lobate debris aprons (LDAs) are broad, thick accumulations of ice-rich material found at the base of prominent topographic features such as massifs (Fig. 1a). LDAs likely represent the largest non-polar reservoir of bulk water ice on Mars.

Surface Texture Mapping: Following up on our study [1] of glacial flow within LDAs in eastern Hellas [EH], we have conducted extensive surface texture mapping of several LDAs in Deuteronilus Mensae (DM) using both ConTeXt Camera (CTX) and High Resolution Imaging Science Experiment (HiRISE) imagery. As shown in Fig. 1b, eight different textural units have been defined (building on past work for DM [2,3], EH [4,5], and Tempe Terra/Mareotis [6]) that can be grouped from least to most heavily eroded: starting at the top with the Upper Smooth unit (corresponding to minimally-dissected mid-latitude mantle deposits [2]), progressing downward through a variety of Pitted, Knobby, Ridge & Valley, and Transitional terrains, and culminating in Lower Ridged and Smooth textures at the base of the degradational sequence.

Additionally, we have identified the portions of these textural units that exhibit features indicative of glacial flow (denoted in Fig. 1a by hatch marks), such as flow lineations, elongated craters, crevasses, and moraine-like ridges [7]. For example, Fig. 1c shows an LDA subregion just off the eastern edge of the central massif, where the surface of the Upper Smooth ("USm+F") unit is dominated by prominent compressive striations perpendicular to the direction of flow that are more subtly paralleled in the adjacent Lower Ridged ("LRdg+F") units. Note also the large, elongated crater within the USm+F striations (Fig. 1c).

Conclusions: We find that approximately 30% of the textural units that we have mapped within DM (and EH: [1]) lobate debris aprons have been modified by flow. We have also constrained the time scales of such LDA flow with crater counts: for example, Fig. 1d indicates that the LDA shown in Fig. 1a is consistent with a 100 Myr crater retention surface age and erosional turnover at lower crater diameters.

References: [1] Pathare, A.V., et al. (2017) *LPSC XLVII*, abs# 2859. [2] Mangold N. (2003), *JGR, 108 (E4)*, 8021. [3] Chuang F.C. and Crown D.A. (2009) *USGS SIM 3079*. [4] Pierce S.C. and Crown D.A. (2003), *Icarus, 163*, 46-65. [5] Joseph, E.C.S. et al. (2016) *LPSC XLVII*, abs# 2962. [6] Chuang F.C. and Crown D.A. (2005) *Icarus*, *179*, 24-42. [7] Brough S.B. et al. (2016), *Journal of Maps*, *12.3*, 530-542.

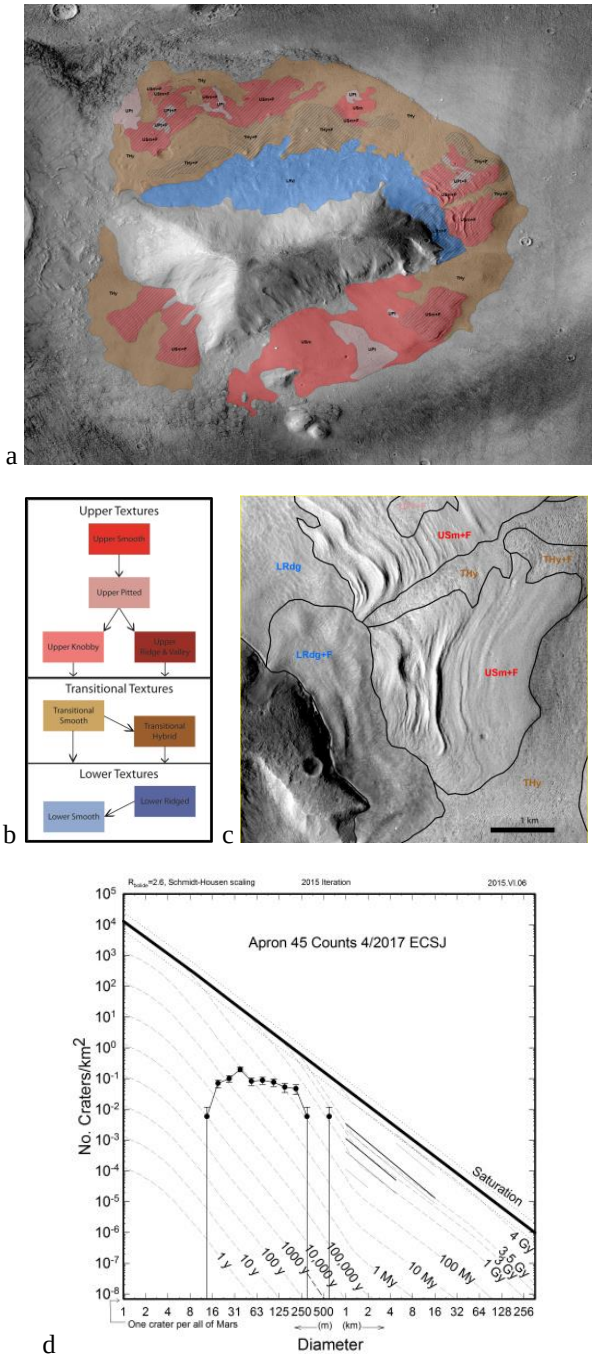

Figure 1: (a) Surface texture map of LDA located at 41°N, 22°E. Hatching indicated modification by flow; colors refer to units shown in (b) Legend depicting degradation sequence for LDA textures. (c) Surface texture map for LDA subregion in (a) along eastern edge of massif. (d) Crater count of LDA shown in (a).