PHAENNA DORSUM, AN ESKER ON MARS: INSIGHTS FROM THEMIS AND HIRISE IMAGES AND MOLA DATA. Neil Coleman, University of Pittsburgh at Johnstown (Department of Earth & Planetary Science, Johnstown, PA 15904; Mars4Neil@Yahoo.com).

Introduction: The southern flank of the Argyre Planitia impact basin is crisscrossed by low ridges with characteristics similar to terrestrial eskers [1]. Banks et al. [2] present strong evidence that they are indeed eskers. Here I examine Phaenna Dorsum, one of the widest (up to 8 km) and longest (>160 km) of these ridges (Figs. 1, 2).

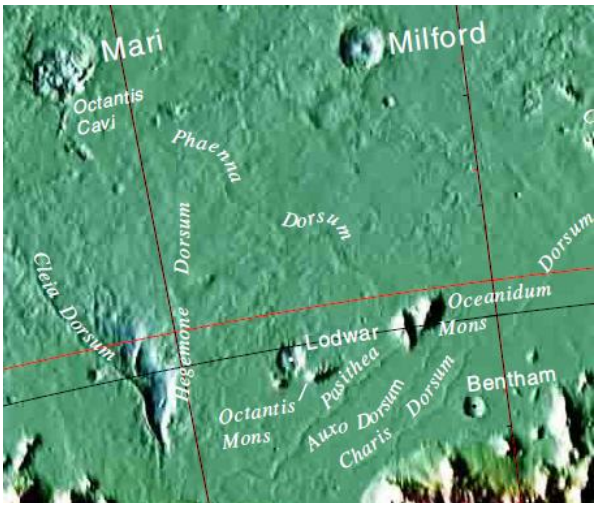

Fig. 1. Esker-like sinuous ridges in southern Argyre Planitia. Milford Crater is 23 km wide. (http://planetarynames.wr.usgs.gov/images/mc26_mola.pdf).

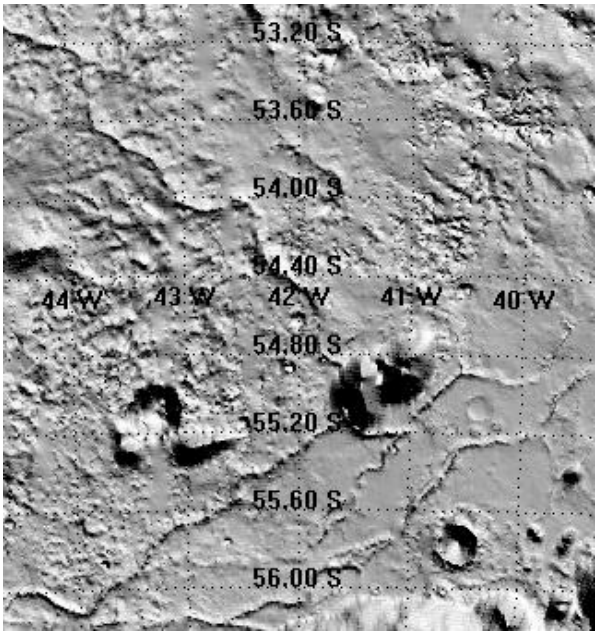

Fig. 2. Study area with superimposed latitude-longitude grid. Image made with GRIDVIEW [3].

Two MOLA passes that cross Phaenna Dorsum at right angles reveal the ridge has a height of ~110 m and a basal width of ~8 km at this location. The base of the ridge resides in a trough (Figs. 3 to 5; made with GRIDVIEW [3]).

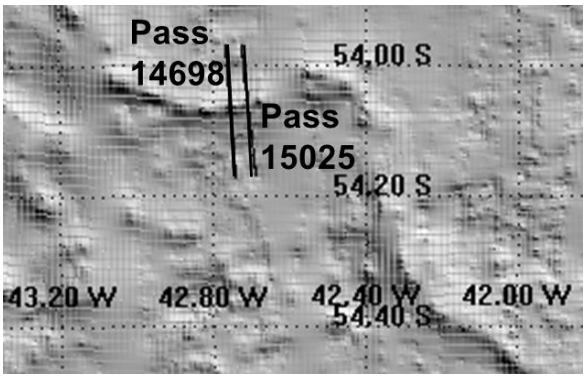

Fig. 3. Two MOLA crossings of Phaenna Dorsum.

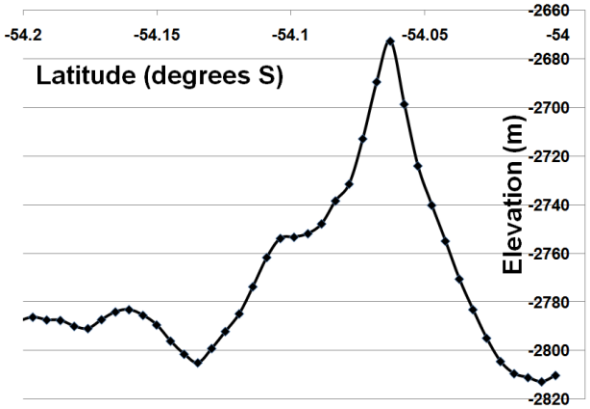

Fig. 4. Topographic profile - MOLA Pass 14698.

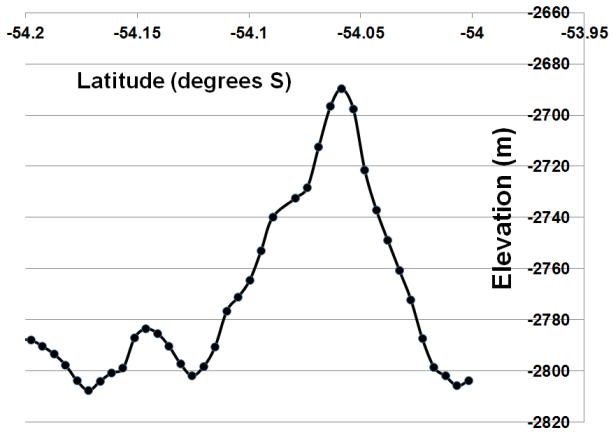

Fig. 5. Topographic profile, MOLA pass 15025.

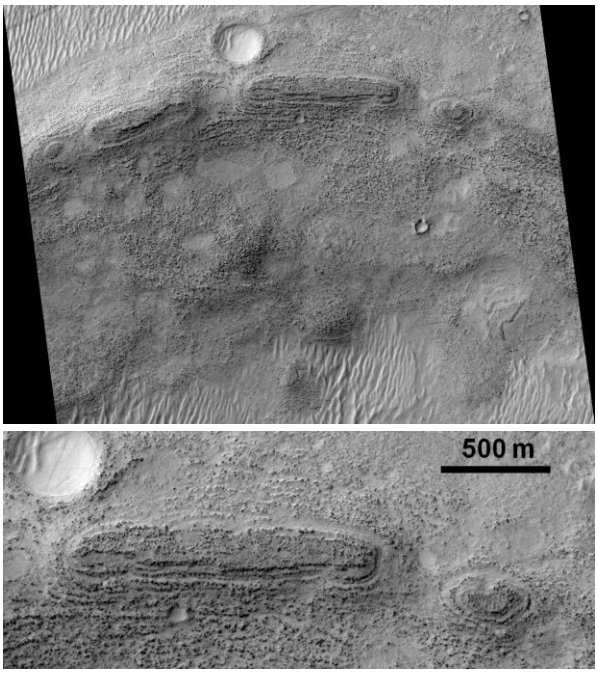

Fig. 6. Top panel shows HiRISE image PSP_006875_1255 [4]. Expanded view in lower panel shows terraced layers, indicating significant erosion of the esker-like ridge has occurred.

Discussion: My examination of imagery and MOLA data for Phaenna Dorsum leads to the same conclusions reached by Banks et al. [2] for the ridge complex further south. The ridge is sinuous, coarsely layered, with a triangular topographic profile. Fig. 6 shows that the central portion of Phaenna Dorsum is discontinuous, and exhibits evidence of layers that variably resist erosion. The layers can be traced for several km. Comparison of THEMIS images (Fig. 7) reveals thermal properties that indicate the esker-like ridge consists of coarser materials than the adjacent plain, consistent with HiRISE imagery in Fig. 6. These coarser materials likely consist of sand and gravel, but may also include finer materials cemented into aggregates.

Conclusion: Phaenna Dorsum is most likely an esker. The remarkable esker complex in southern Argyre Planitia reveals that great volumes of liquid water were produced at latitudes >54º S, associated with a large ice sheet.

References: [1] Head, J. W. (2000) LPSC XXXI, Abstract 1116. [2] Banks, M. E. et al. (2009) An analysis of sinuous ridges in the southern Argyre Planitia, Mars using HiRISE and CTX images and MOLA data, JGR, doi:10.1029/2008JE003244. [3] GRIDVIEW program and MOLA data are available from NASA Goddard at http://core2.gsfc.nasa.gov/gridview/. [4] HiRISE image credit: NASA/JPL/Univ. of Arizona. [5] Christensen et al., THEMIS public releases, http://THEMIS-data.asu.edu/.

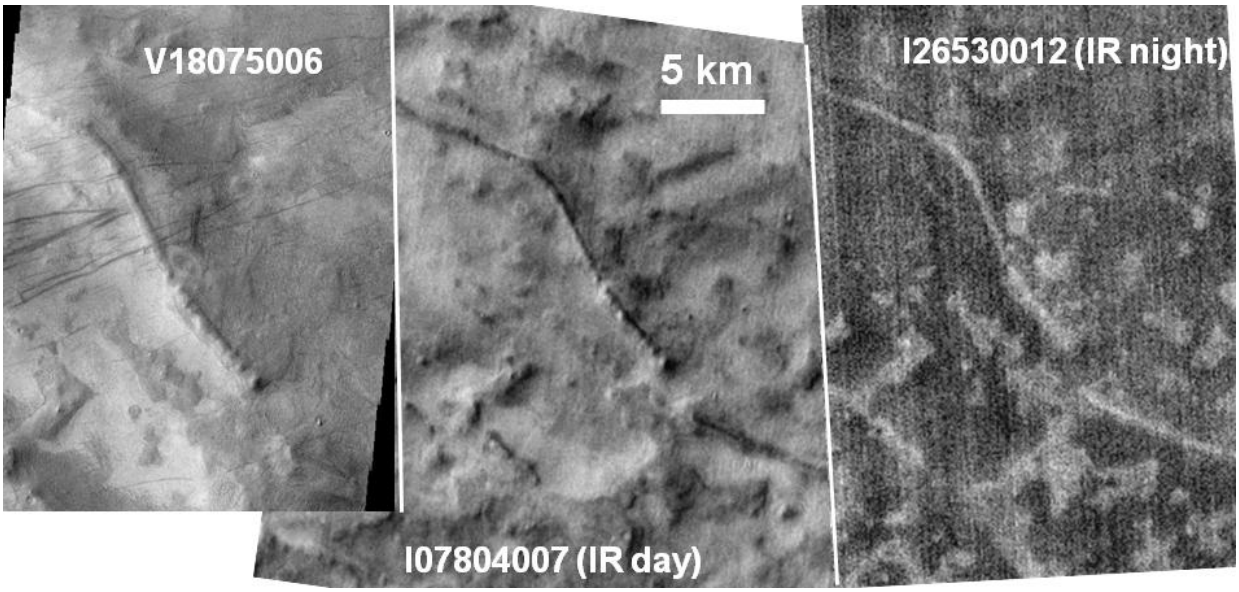

Fig 7. THEMIS images [5] of Phaenna Dorsum. The esker crest is dark in daytime IR and brighter than adjacent terrain in night IR, indicating relatively high thermal inertia consistent with blocky terrain in HiRISE images. The ridge is interpreted as layered deposits dominated by water-transported sand and gravel. Thick dust does not accumulate on the windswept ridge crest. Note dust devil tracks in visible light image (far left).