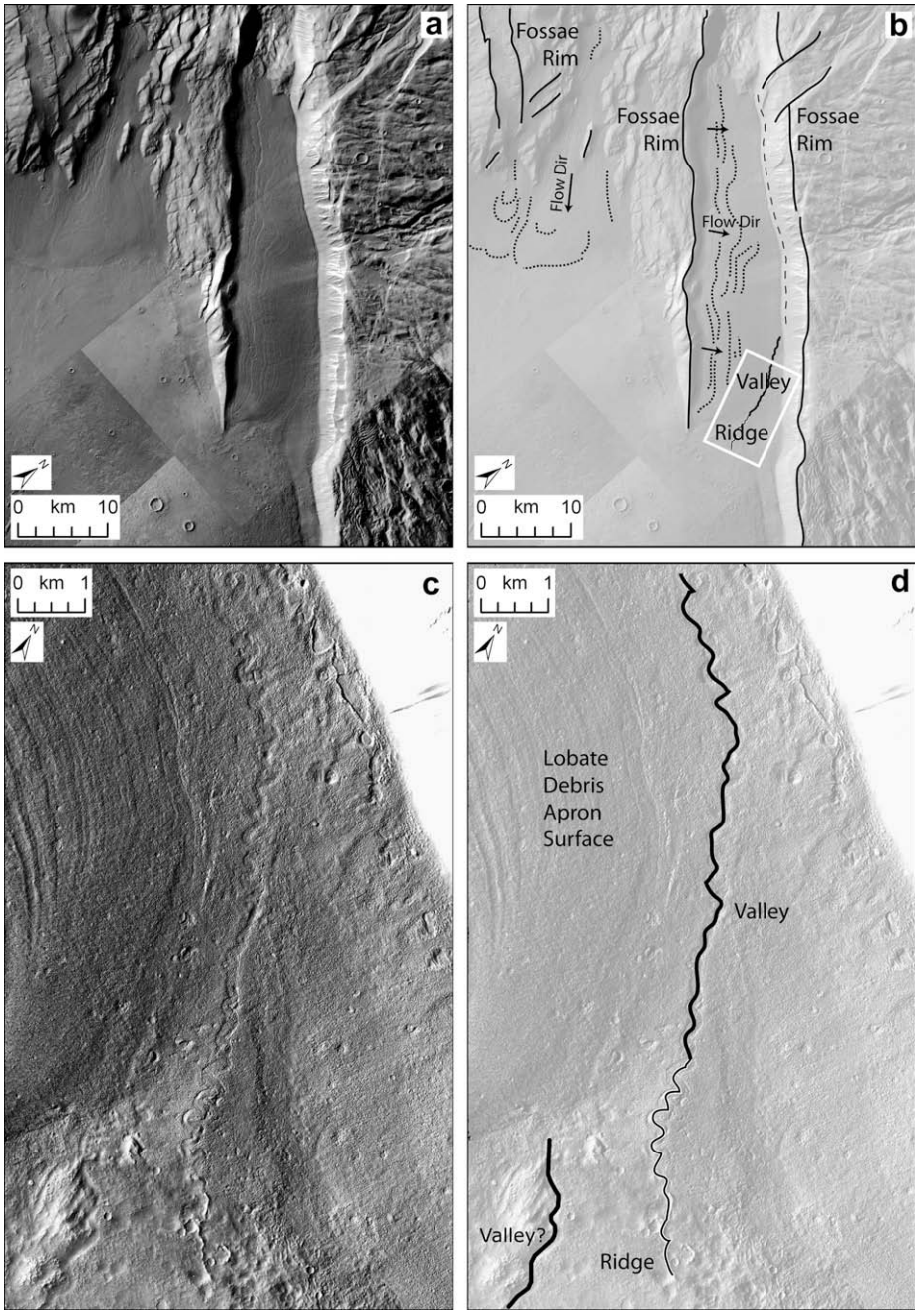

Fig. 8. (a and b) Image and interpretative sketch of a large trough within the Acheron Fossae in northern Tharsis (230°E, 35.9°N). The trough is filled with lineated valley fill, the surface of which is incised by a small valley. Downhill (the direction of glacial flow) was to the north (right in this image); CTX images P01_001590_2160, P02_001933_2174, P03_002144_2165, P04_002632_2173, P05_003067_2160, and P15_006825_2179). (c and d) A small, degraded, and highly sinuous valley that incised the lineated valley fill surface in this location. At the margin of the lineated valley fill, it transitions into a positive ridge (c).

sedimentary deposit that appears to emerge from the incised notch or breach.

There are at least two plausible mechanisms consistent with the observations of the incision of the 16-km Hourglass crater rim and the valleys on its exterior; in either case, the source of the water was likely top-down melting of the ice-rich lobe within the 16-km crater. In the first scenario, the rim of the crater was an impoundment to this meltwater, leading to ponding until the crater rim crest was breached. Rapid drainage and down-cutting would then occur, which is consistent with the larger channels observed here than in other proglacial valleys, which may have resulted from more gradual erosion (compare to examples in Figs. 2–9). Alternatively, if thicker ice was present in the Hourglass crater (>∼100 m above present surface), supraglacial streams may have flowed to the glacier's margins at the crater rim, incised the rim notch, and eroded the valleys outside the crater. This second mechanism requires significant downwasting of the glacier to reach the present state; some observations supporting such downwasting (possible moraines and other glacial remnants) are present, particularly near the narrow gap of the Hourglass. Given these two plausible formation scenarios, these valleys may have resulted from either proglacial or supraglacial melting.