GEOMORPHOLOGY OF PROTONILUS MENSES MAMBA REGION: WASTING AWAY ON MARS

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Protonilus Mensae, the south-central portion of the Ismenius Lacus Quadrangle of Mars, is a fretted terrain (1, 2). The study area (Figs. 1, 2) is representative of the fretted terrain located between 310° and 320° longitude at 45° north. Geomorphic mapping of the region (Fig. 2) illustrates the complexity of surface features. Degradation by mass wasting processes is the dominant form of surface modification of former hilly and cratered terrain similar to the area south of the fretted region.

The eastern half of the area has large debris aprons surrounding isolated plateau remnants of dissected hilly and cratered terrain. The western half is less degraded and is characterized by well-defined linear waste valleys between upland blocks. These valleys are covered by debris that appears to have slid into these valleys. Lines of compression are common near sites of convergence of flows from opposite valley walls. Dominant geomorphological features include debris mantles wasted from plateau escarpments, plateau remnants, and crater walls. Overlapping debris lobes in the western part of the region are evidence of several episodes of debris wasting or at least several phases of wasting at any locality (Fig. 1, 2). Relative ages are indicated by overlapping patterns (shown by the topographic symbols). The surfaces of the debris aprons display ridges and furrows formed by extensional and compressional forces during flow.

Overall surface morphology is like that of degraded ground ice and debris movement aided by interstitial ice (3, 4, 5). That ground ice may actually be involved is evidenced by thermokarst depressions, lobate flow-ejecta craters, debris flow over crater rims, and sapping channels (Figs. 1, 2).

We are currently mapping the distribution of debris aprons around isolated plateau remnants in fretted terrain to determine statistical relationships with azimuth which might be expected if ground-ice degradation was important in emplacing these debris sheets.


Figure 1.
Viking photo-mosaic 211-5582 of Protonilus Mensae mapped in Figure 2.

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Geomorphology of Protonilus Mensae, Mars

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Figure 2. Geomorphic map of a portion of Protonilus Mensae. Legend is to the right.