PRELIMINARY GEOLOGIC MAPPING NEAR THE NILOSYRTIS MENSAE, MARS; Steven H. Williams, Lunar and Planetary Institute, 3303 NASA Road 1, Houston, TX 77058 and James R. Zimbelman, Center for Earth and Planetary Studies, National Air and Space Museum, Smithsonian Institution, Washington, DC, 20560.

Geologic mapping at 1:500,000 scale of the MTM 40292 and 40297 quadrangles in southwestern Utopia north of the Protonilus Mensae is being conducted as a part of the Mars Geologic Mapping program; this is a preliminary report. The study area is located in MC-6SW on the lowland side of the global dichotomy boundary, extending between latitudes 37.5^{o} and 42.5^{o} and longitudes 290^{o} and 300^{o}. The area near the dichotomy boundary is of considerable interest because the nature and timing of geologic events that have occured there can be used to constrain models of the origin and evolution of the dichotomy. The mapping will address the sequence of geologic events that have formed and modified the lowland terrain near the boundary, specifically the origin, nature, and erosion of any mantling deposits.

The regional geology of the study area is relatively straightforward. Previous mapping on a global scale (1) identified the basic regional geologic units: Hesperian-age rolling plains to the north, Hesperian-age knobby materials, and Amazonian-age cratered plains. Later mapping grouped the older units together and identified the smoother materials in the study area as Amazonian-age smooth and etched plains (2). Outside of the study area, there are Hesperian-age plains to the north in Utopia Planitia and Noachian-age plateau units to the south whose surface morphology indicates they overlie heavily cratered terrain (2).

The local geology is substantially more complex (Figures 1 and 2). The plains of presumed Amazonian age that mantle most of the study area are not uniformly thick and are composed of many subunits that have limited lateral continuity. Knobs abound in the study area; many are presumably caused by the mantling of pre-existing topography, and, in many cases, the older core of the knob is exposed. Many such knob cores are surrounded by small scarplets; it is not yet clear whether the scarplets are the eroded edges of mantle beds that at one time draped over the knob core and have been subsequently exposed by erosion or they are eroded versions of the lobate debris aprons described in (3).

There appears to be a morphologic distinction between the knobs that are remnants of the Noachian-age plateau units to the south and those that are reflections of the topography of the heavily cratered basement, as indicated by their distribution. Many craters in the study area contain concentric crater fill, which may indicate downslope movement of volatile-rich material (4) or repeated cycles of aeolian gradation (5). The mantle is probably fine-grained and poorly consolidated, as indicated by its much greater susceptibility to erosion relative to other units. Occasional channels and terrain softening features are additional evidence that the mantle was at one time volatile-rich (Figures 1 and 2); perhaps the mantle is an air-fall deposit of some sort (6).

REFERENCES

1) Scott, D.H. and M.H. Carr (1978), *USGS Map I-1083*; 2) Greeley, R. and J.E. Guest (1987), *USGS Map I-1802-B*; 3) Squyres, S.W. (1979), *J. Geophys. Res.*, *84*, 8087-8096; 4) Squyres, S.W. (1989), Icarus, 79, 229-288; 5) Zimbelman, J.R., S.M. Clifford, and S.H. Williams (1989), *Proceedings 19th LPSC*, 397-407; 6) Williams, S.H. and J.R. Zimbelman (1989), in *LPSC XX*, 1209-1210.

MAPPING NEAR NILOSYRTIS, MARS: Williams S.H. and Zimbelman J.R.

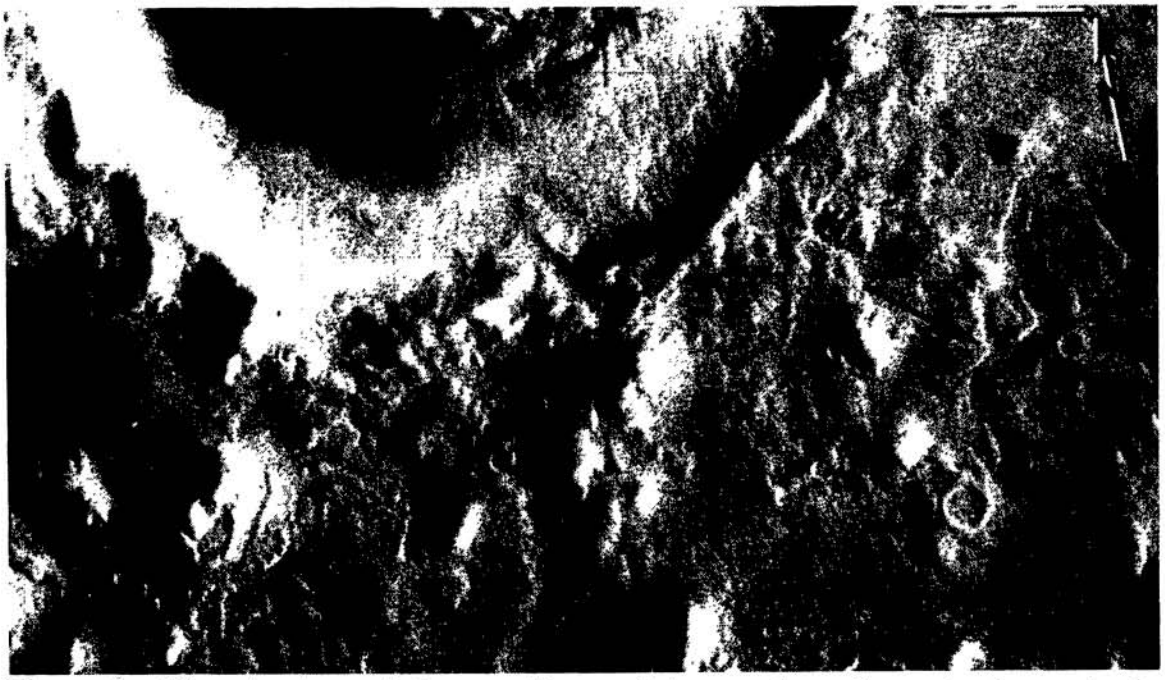

Figure 1. The structure of the mantling unit is complex. Some knobs protrude above the mantle, others do not; it is not yet clear whether the mantle used to drape over the knobs and has been eroded back or the knobs are surrounded by an eroded debris apron. The mantle appears to be draped over the rim of crater Renaudot at the top of the image and locally has undergone surface channeling (arrow). Viking frame 234S76, NGF orthographic version; the scale bar is 10 km long.

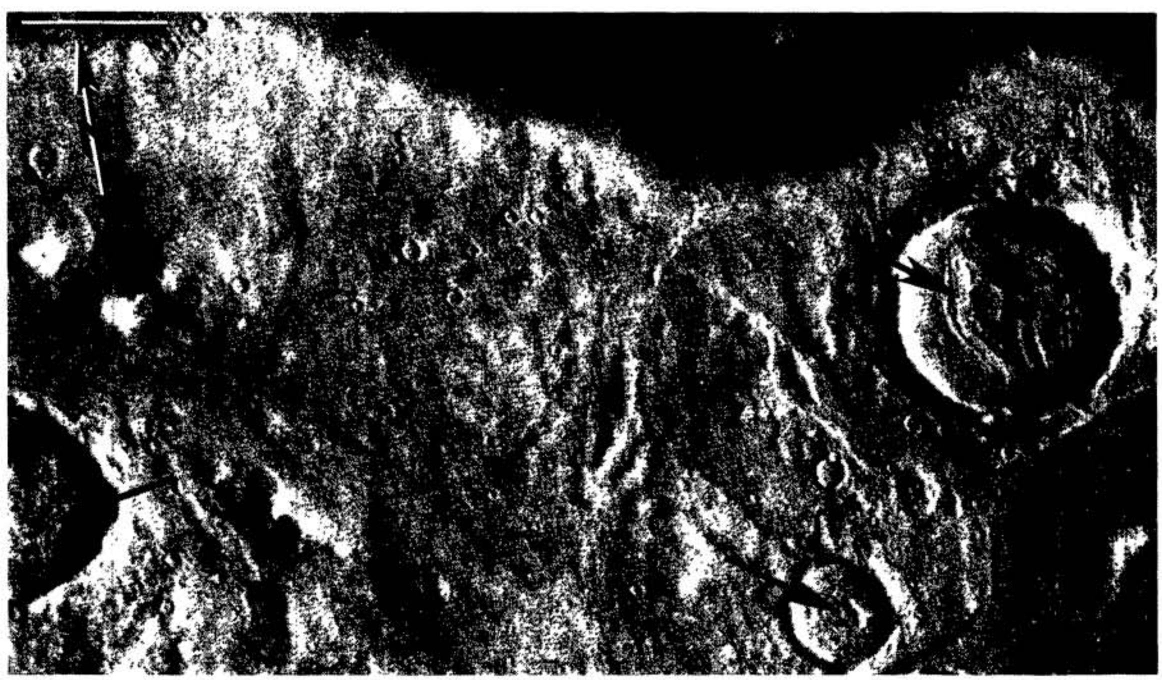

Figure 2. The study area has many craters with concentric crater fill (arrows). The mantle is not so thick that it completely buries the small craters on the unit beneath it. Naturally, the best-developed channels (right side) lie just outside the study area. Viking frame 235S03, NGF orthographic version; the scale bar is 10 km long.