ANCIENT MARTIAN CRATERED TERRAIN MATERIALS EXPOSED BY DEFLATION NORTHWEST OF THE BALDET AND ANTONIADI BASINS; R. Arvidson, E. Guinness, C. Leff, M. Presley, Dept. of Earth and Planetary Sci., Washington Univ., St. Louis, Mo. 63130 and R. Saunders, L. Roth, Jet Propulsion Laboratory, Pasadena, Ca. 91109

In 1979 some 2400 Viking Orbiter images were acquired in the northern cratered terrains of Mars, between Chryse Planitia and Isidis Planitia (Albee et al., 1980). The data provide contiguous coverage over a strip approximately 350km wide in a N-S direction and 6500km wide in an E-W direction. The spatial resolution varies from 15 to 60 meters per pixel. These data provide both the high resolution needed to identify surface processes that have operated within the cratered terrains, and the synoptic coverage needed to determine the areal extent and importance of the processes. As the starting point of an interdisciplinary examination of the morphology, color, albedo, thermal, and radar properties of the northern cratered terrains, we have characterized the landforms and processes evident in the cratered terrains to the north and northwest of the basins Baldet and Antoniadi (see Orbiter mosaics 211-5936 to 5939).

The cratered terrain centered at approximately 25° N. lat, 295° W. long, is distinctly different in appearance than the cratered terrain several hundred kilometers to the west. The western area exhibits smooth intercrater plains supporting a population of craters that appears to be in production. Numerous clusters of well preserved secondary craters can also be seen. Toward the east, north of Baldet and Antoniadi, the cratered terrain has been dissected into a series of elongate plateaus and ridges. Generally, the elongation directions are aligned with vectors that are radial to Baldet (180 km diameter), Antoniadi (380km diameter), and in some cases to the basin Cassini, located several hundred kilometers to the southwest. In addition, a number of dissected, overlapping ejecta deposits from smaller (30 to 50 km diameter) craters can be discerned. Crater size frequency distributions show a paucity of small ($\lesssim$ 10km) craters, consistent with a slow, steady degradation process that destroys smaller craters faster than larger craters. It appears as if this region has been deflated to depths of hundreds of meters by wind action, exposing ejecta from both basins and local craters. Perhaps the reason that this area has been dissected, while the cratered terrains to the west have not, is because the western areas were capped with resistant volcanic flows that now comprise the intercrater plains. Thus, the deflated cratered terrain may provide a window into the development of a megaregolith on Mars and important implications about the mechanics of ejecta emplacement for a variety of impact events. For example, what appear to be ejecta deposits from Baldet can be seen partially filling craters up to 7 radii from this basin. Sculpted crater rims analogous to the lunar Imbrium sculpture can also be seen. However, the sculpturing has a much finer texture on Mars. It is evident that emplacement of crater ejecta deposits, probably involving a great deal of fine grained, local material, was an important process for modifying the cratered terrain during early heavy bombardment. In fact, craters up to 50km across are currently being exposed through deflation of overlying ejecta deposits. Finally, the sculpted terrain may expose some of the oldest, most primitive materials on Mars, a finding that has important implications for both the MGCO and sample return missions.

The morphological differences between the western and eastern cratered terrains might be reflected in terms of variations in mineral chemistry (reflected light data) or in terms of thermophysical or radar scattering properties. Examining such a wide variety of data presently is difficult,

both because the data are located at a number of institutions, and because no one is an expert at interpreting data acquired from the visible through the microwave parts of the spectrum. To circumvent these problems, we plan a set of technology experiments in distributed data base management. The experiments, done as part of NASA/JPL Planetary Pilot Data System, will include networking, use of high capacity storage media such as videodisks, and development of data base software to efficiently search, access, and process data acquired over the same geographic region. The intent is to gain experience with ways to manage data that are distributed at a number of sites, using characterization of Martian surface materials as a driver. Results should be directly applicable to data system planning for such future missions as the Mars Geochemical Climate Orbiter.

Reference:

Albee, A., Evans, N., Saunders, R., and Snyder, C. (1980) Abstract, LPSC 11, p. 9-11.