GEOLOGY OF THE NORTHERN CRATERED TERRAIN OF MARS: RESULTS OF THE VIKING SURVEY MISSION, A. L. Albee, N. Evans, R. S. Saunders, C. W. Snyder, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California 91103

The Viking Survey Mission has provided the first contiguous high resolution images of an extensive region of Mars. These images have provided new insight into processes that have modified the ancient cratered terrains. The Viking Survey Mission acquired data during the period of July through October 1979. The 2400 frames cover the region between Chryse Planitia and Isidis Planitia with resolution between 15 m/pixel and 60 m/pixel (Fig. 1). The purpose of the Survey Mission was to image a strip of northern hemisphere cratered terrain under optimum illumination conditions in order to have an image data base for planning a future Mars sample return mission.

Several distinct terrain types are observed in the images. These include intercrater ridged plains with normal crater populations, basin-related smooth plains, and a large region of complex small-scale irregularities, with no fresh craters. This latter terrain type has a geomorphic style that is best described as one of inversion of topography. Parts of valley systems and crater floors that were initially negative relief features now appear in positive relief. This suggests differential erosion in the area where the features occur.

On Earth topographic inversion of valleys occurs along the west flank of the Sierre Madre range where basaltic lava flows have occupied river valleys. Erosion has removed the unconsolidated gravels adjacent to the flows producing sinuous lava ridges where the river channels once were. Parts of several Martian channels in the region imaged by the Survey Mission exhibit a similar inversion of topography. This suggests that the valley floors were more resistant to erosion either because they were armored by material such as lava or have been indurated by some Martian diagenetic relief. The irregular pattern of the erosion suggests an eolian mechanism. The entire region is topographically somewhat higher than adjacent unmodified terrains.

The Survey Mission images have demonstrated the importance to geologic analysis of 1) wide area coverage, 2) contiguous coverage, and 3) better than 100 m/pixel resolution. A summary of recent Viking activity is given in Table 1.

VIKING SURVEY MISSION

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Table 1. Summary of Recent Viking Activity

Viking Survey Mission	July 20 - Nov. 5, 1989
Viking Completion Mission	Nov. 6 - May 30, 1980

4 weeks very high resolution mapping 500 - 800 km
11 weeks high resolution contiguous mapping 1000 - 25000 km
35 weeks medium range "gore-filling" mapping 3000 - 10,000 km
50 weeks meteorological monitoring utilizing IRTM, MAWD, and VIS instruments
7 Lander-2 relays
18 Lander-1 direct-link, high-rate telemetry passes
30 Lander-1 ranging passes with near simultaneous Orbiter-1 ranging
30 Radio occultation passes

Plus the following special events:

Search for a third Martian satellite
4 full-disk mosaics near Mars opposition simultaneously with observations from Hawaii and Australia
The largest color panorama ever acquired from the Landers

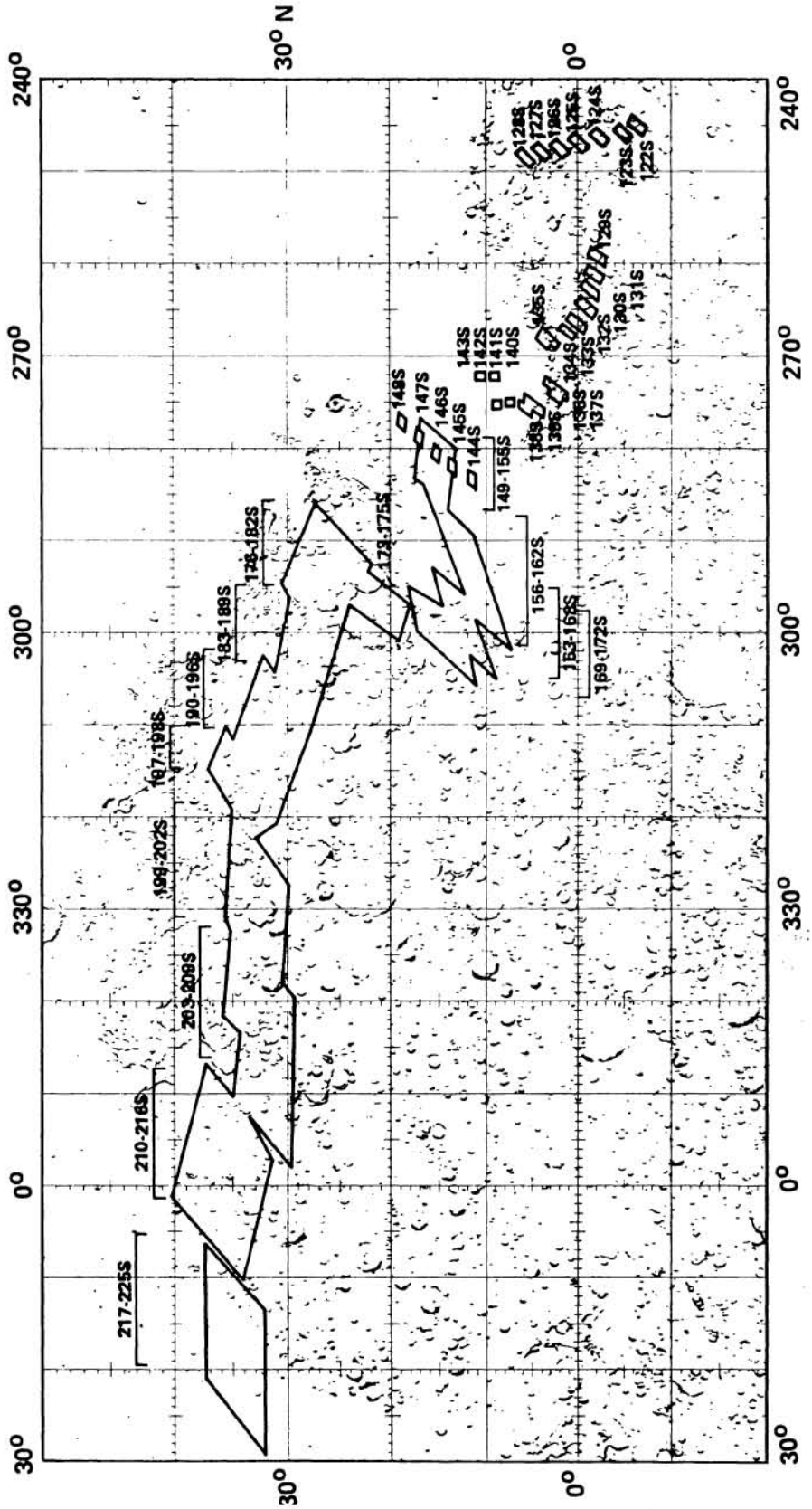

Figure 1. Survey Mission Coverage: Plot of high resolution strips and high resolution contiguous mapping coverage.