
Many strange and puzzling phenomena were recognized during geologic studies and mapping programs following the Mariner and Viking missions to Mars. Some of the features are of regional extent and their origins remain subjects of speculation and controversy. Among those of greatest interest are the canyon systems of Valles Marineris, major channel networks, great circle boundary separating highland and lowland regions, Tharsis "bulge," polar layered deposits, aureoles and basal scarp of Olympus Mons, and the various forms of patterned ground in the northern lowland plains.

Many smaller features of geologic interest also have been found, however, whose origins and identities offer challenges to geologic interpretation and imagination. Some of them are relatively well known such as "Inca City" in the south polar region, "white rock" on the floor of a large crater in the Sinus Sabaeus quadrangle, the huge fan-like, concentrically striated lobe on the northwest flank of Arsia Mons, and the "table" mountains and pedestal craters scattered throughout the northern plains. Other, more recent discoveries include the following:

1) Narrow, sharp-crested ridges occur in the Elysium plain adjacent to cratered highlands in the Aeolis quadrangle (1° S., 210° W.). The ridges are only about 100 m wide, discontinuous in places, but may extend for several tens of kilometers across the plains. They have straight to sinuous traces marked by sharp, angular bends and have no resemblance to typical wrinkle ridges. In places they appear to be exhumed from beneath a cover of wind-eroded material tentatively identified as ash-flow tuff. They are visible on Viking frames 724A03-A13.

2) Material of unknown origin and composition fills a local depressed area at the junction of several large grabens and a deep canyon near the northern margin of Tempe Terra highlands (52° N.; 60° W.). It is light in color and completely covers the faulted topography over an areal extent of about 1200 km². The margins of the accumulation are lobate and prominently convex upward in places, but in others, particularly in downslope directions, no discernible front is present. Thus, the material has characteristics of both high and low viscosity flows. At another location (50° N.; 60° W.) in the same area a smaller, darker-colored patch of fill material partly covers the floors of another set of grabens. No volcanic structures are apparent in the vicinity of these occurrences.

3) Crescent-shaped pits resembling inverted barchan sand dunes are visible on high-resolution Viking images throughout the equatorial region between the Amazonis and Memnonia quadrangles. They occur in unconsolidated material, possibly nonwelded ignimbrites (1), and measure up to 100 m or more from horn to horn.

4) A blanket of dark material extends for several hundred kilometers across the highlands in the northwest quadrant of the Memnonia quadrangle. The blanket has well-defined boundaries that are nearly linear in places and covers terrain consisting of different geologic units.

5) Ejecta blankets of small young impact craters (<5 km) located within a small area of the Amazonis plains (12° N., 163° W.) show a remarkable diversity in morphology. The plains appear to consist of a single geologic unit, presumably basalt flows. The ejecta blankets around the fresh appearing craters, however, range from small, barely visible thin-edged sheets characteristic of a dry lunar-like crust to very large subcircular pedestals with serrated edges as well as flower-shaped patterns having raised margins, indicative of subsurface volatiles (2).
6) Remnants of river meander channels have been provisionally identified in the Chryse basin-Mare Acidalia and Cebrenia regions of the northern plains (3). Wherever these meander scars occur, they are marked by a prominent ridge along the channel floor. Terrestrial streams and rivers contain elongate bars along their courses from place to place, but not throughout their entire length.

References