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Layered Deposits in Chaotic Terrains on Mars

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Layered deposits are exposed within various locations on Mars, which are mainly depressions. Whether they are of sedimentary or volcanic origin is still under debate. We concentrate on layered deposits (LDs) in some of the chaotic terrains. Their morphology, elevation, thickness, geometry, and consolidation is analyzed using high-resolution image and elevation data in order to ascertain a possible formation.

LDs differ from their surroundings by their lighter colour, layering, and morphology. Often they are observed as mounds, material enclosing chaotic structures, terrace-like appearances, and knobs. Massive cap rock at their top and layering in lower parts is very common. Varying surfaces (knobby, rough, fractured, grooved, cap rock) are widespread as well as debris fans exhibited on steep slopes. Yardangs on the surface indicate wind erosion. Dust covered parts often mark the contact between LDs and chaotic terrain that is superimposed and therefore older. Dunes located in fractures on LD surfaces also indicate wind activity. Thermo-physical data (TES thermal inertia, THEMIS brightness-temperature at nighttime) confirm that the material is more consolidated than its surroundings as it shows a higher thermal inertia and surface temperature respectively. LDs show different surfaces textures that have comparable elevations, thermophysical properties, and mineralogical compositions (sulphates, hematite). These features might therefore be explained by formation, erosion and/or age.

In the eastern chaotic terrains (Iani, Aram, Aureum) shallow slopes are $< 10^{\circ}$ while scarps are up to 30°. The western chaotic terrains (Ganges, Capri) show huge LD

mounds that have shallow slopes of $< 20^{\circ}$ and steep slopes of up to 45°. Layering is observed on shallow slopes contrary to steep massive scarps exhibiting dark debris.