



Interior Layered Deposits of the eastern Valles Marineris on Mars

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Throughout the whole Valles Marineris, Interior Layered Deposits (ILDs) are present. Their origin is still uncertain although they have been known and studied for many decades. Our studies concentrate on ILDs in the eastern Valles Marineris and adjacent chaotic terrains. We analyse their elevation, thickness, layer geometry, stratigraphic position, competence, and mineralogy. Mostly ILDs appear as light-toned layered outcrops but they show various morphologies. Plate-like morphologies which show cap rock material (Aureum, Aram Chaos), mounds with light and dark layering (Gangis Chasma), and flow-like structures embaying mounds of chaotic terrain (Iani Chaos) are observed. Further, ILDs are eroded into yardangs and exhibit heavily fractured and rugged surfaces. Many slopes demonstrate debris fans. The surface looks coarse and massive or fine with appearing cap rock. Few ILDs show a fine-layered lower part changing into a massive upper part. There is no correlation between elevation and morphology or surface structure. ILDs are hardly cratered which may indicate a young erosional age. Using ORION structural analysis software with HRSC DTMs (50m/px) and corresponding HRSC orthoimages strike and dip measurements are applied on ILDs with distinct layering. In Iani Chaos ILDs show horizontal layering (dip $< 10^\circ$). The deposits are located at different elevations. The elevation range is from -6000 up to \sim -800m and they are always situated below the surrounding plateau rim, in contrast to ILDs in the western Valles Marineris (e.g. Candor, Hebes and Ophir Chasma), which reach or even overlap the canyon rim with elevations from \sim -5000 up to \sim 3500 m. Sulfates and hematite detected by OMEGA and TES in Aram and

Iani Chaos as well as in Capri Chasma point on aquatic conditions because they form by hydrothermal alteration of volcanic material or evaporation due to decreasing water availability. We consider a possible lacustrine origin for the ILDs, because of their internal layering and their topographic position below the plateau rim. Debris fans and a lack of boulders at the base of the ILDs may indicate loose to partly consolidate sedimentary rocks. Episodic shifts of water availability may explain changes in mineralogy.