



Valles Marineris: a past glaciated valley landsystem along the Martian equator

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Various ice-related features occurring on the floor of Valles Marineris suggest that this canyon system that stretches along the Martian equator has experienced a period of past glacial activity. Three regions of Valles Marineris were investigated, Coprates Chasma, Candor Chasma, and Ius Chasma. Geomorphological observations are based on images and altimetry analysis by using the Context Camera (CTX), the High Resolution Imaging Science Experiment (HiRISE) and MOLA PEDR single tracks. The study reveals some features reminiscent of a past glaciated valley landsystem in these regions. A line running along the base of valley wallslopes and associated with spur and gully morphology can be interpreted as a periglacial trimline. Other landforms on the floor of Candor Chasma can be interpreted as stagnant ice features such as polygonal terrains, chaotic terrains which look similar to terrestrial ablation moraines with kettle holes. Ancient ice probably also persists now in Candor Chasma in the form of a debris covered glacier with a surface elevation that is consistent with that of the trimline. In Coprates Chasma, hanging valleys provide additional evidence for the former existence of an extensive glacial filling of Valles Marineris. Terraced mounds resting on the floor of Coprates Chasma and around basement domes can be interpreted as stagnant remnants of stratified ice. Altogether, these landforms define a full glacial landsystem consistent with global climate models that predict glaciations in Valles Marineris during the Late Amazonian.