



Evaporite karst in the light toned deposits (LTDs) within a trough of Noctis Labyrinthus, Mars.

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Noctis Labyrinthus, is located on the eastern edge of the Tharsis Plateau in the equatorial region of Mars, and consists of a network of intersecting valleys that merge and coalesce with pit chains and larger troughs. In this area several studies showed the presence of units that were identified and classified as light toned deposits (LTDs) with spectral signatures of monohydrated and polyhydrated sulfate.

In this work we investigate the LTDs located within a trough that is centered at 6.8° S, 261.1°E and is approximately 50 x 60 km in dimension with a depth of about 5 km below the surrounding plateau. Here, in the southern part of the trough floor, LTDs that display clear spectral signature of gypsum have been discovered through the analysis of CRISM data.

We have analyzed in great detail the MRO HiRISE images of these gypsum deposits, focusing our investigation on the features that we interpreted as karst landforms, studying the possible processes involved in their formation and shaping. In particular, our investigation highlights the presence of rounded and elongate depressions of different sizes, which we interpreted as sinkholes of polygenetic origin, that can be observed in the whole study area. These landforms display similarities with the terrestrial sinkholes that commonly develop in all kinds of evaporite terrains in arid or cold regions on Earth. Moreover, they strongly resembled the evaporite sinkholes described in other regions of Mars.

The detailed analysis of the landforms clearly indicates the presence of karst processes, inconsistent with other processes such as wind erosion, volcanic, tectonic and thermokarst processes, or with impact craters heavily eroded or reworked by geomorphic processes.