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Morphological Comparison of Terrestrial Karst Topography with Regions of Valles Marineris using Landsat ETM and HRSC Data of Mars Express

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Using HRSC data, a morphological comparison of the central regions of Valles Marineris and special so-called Graret karst terrains seen in parts of North Africa can be undertaken. While there are morphological similarities, the vertical dimensions of the Martian features are more than one order of magnitude larger than those on Earth. In the North African arid environment, the recent growth results from headward erosional processes, caused by chemical dissolution by ground water in combination with aeolian transport.

Further, features morphologically similar to tropical tower karsts, characteristic to South China, are also visible on Mars. The terrestrial tower karst formed as the result of dissolution of carbonates in a warm and wet environment.

It seems likely that the chemical and physical processes for the Martian terrains are similar to those shaping terrestrial karst landscapes. The Martian features resembling tower karsts may have been formed in a wetter environment than present, while the Martian karst-depression features could form under current arid conditions by dissolution of carbonates or silicates caused by small amounts of subsurface fluids.