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Spectral analysis of possible Martian evaporite analogues

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The primary water related minerals detected so far on Mars surface appear to be the hydrated forms of Ca and Mg sulfates. Similar deposits on Earth are known to be connected with periods with high evaporation rates and low water input, in evaporitic basins such as Permian Zechstein Basin in Northern Europe and upper Miocene, Messinian crisis in the Mediterranean basin. The origin of evaporite rich material on Mars is put into balance between a dry deposition, with desert like conditions in the presence of SO_3 rich atmosphere and a similar to Earth like deposition in a basinwide and/or sabkha settings. One way to asses the possibility of either of the accepted formational paths for these hydrated minerals is to look for minerals that usually form paragenesis in similar deposits on Earth.

We choose a series of salts that constitute the final stages of evaporation for concentrated brines and form paragenesis with the Mg and Ca sulfates, and perform spectroscopic infrared measurements as a function of grain size. The chosen minerals were Epsomite, Hexahydrite, Starkeyite, Kieserite, Bischofite, Antarcticite, and Sylvite. This mineral series will constitute as a laboratory base for future spectrometric studies for terrestrial mineral analogues on hyperspectral data such as MEX/OMEGA and MRO/CRISM.

This ongoing multidisciplinary study will help clarify the origins of Mars identified salt minerals from the geologic, paleoclimatic and water span era points of view.