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The role of the sulfur cycling during Sabkha-dolomite formation in Abu-Dhabi

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During the last decades, the role of microbial sulfate reduction was discussed for the recent low-temperature dolomite precipitation in hypersaline lagoons. For a detailed investigation of the influence of microbial sulfate reduction to dolomite formation, we studied a 0.55m long sediment core from a hypersaline lagoon in Abu Dhabi. The drill core has an upper evaporite layer, a 16cm thick microbial mat with dolomite and pyrite and a lower carbonate layer. The δ34S and δ18O isotopic signatures of sulfate (mainly gypsum) reveal in the upper sediment layer an isotopic seawater signature and in the lower part a penetration of meteoric water. In addition, the δ34S of pore water also represents the sulfur isotope trend of the sulfate minerals and confirms the input of meteoric water into the lower part of the drill core. In the microbial mat, pyrite was also detected. The δ34S values of -26.95‰ for pyrite close to the precipitated Sabkha-dolomite reflect the activity of sulfate reducing microbes. Therefore, the presence of microbial sulfate reduction close to Sabkha-dolomite formation in microbial mats is evident from the light sulfur isotopic composition of pyrite and confirms the important role of microbial sulfate reduction during the dolomite precipitation. To further test this hypothesis, we will also analyze the δ34S of carbonate-associated sulfate (CAS) in Sabkha-dolomite and compare its sulfur isotopic composition to the δ34S of the pyrite. Both, the δ34S of pyrite and of CAS will provide evidence for the role of microbial sulfate reduction during the Sabkha-dolomite precipitation.