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Exploring the magnesium isotope fractionation between Abu Dhabi sabkha fluids and related non-stoichiometric dolomites

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Dolomite is a common rock-forming mineral in the geological record. The key element within dolomite is magnesium, an important element in Earth surface processes. The main source of magnesium for dolomite precipitation is seawater. With the noteworthy exception of work of microbially induced precipitation experiments, geochemists fail to overcome to thermodynamic barriers of dolomite precipitation under Earth's surface conditions. For this reason, we make use of the actualistic dolomite depositional environment in the Gulf region. We intend to approach two main sets of questions: (i) What is the fractionation factor between fluid and dolomite; (ii) to which degree, if at all, differs sabkha pore water delta^{26}Mg from the known present day global seawater delta^{26}Mg of -0.83‰.The quantification of the fractionation factor is of fundamental significance for the interpretation of dolomite delta^{26}Mg in general. The presence of dolomite crystals in the tidal flat cores has been documented using X-ray diffraction and scanning electron microscopy but individual crystals are too small ($<$ 10 microns) to be mechanically separated from their matrix. At present, we test different methods to chemically separate the proto-dolomite crystals from coexisting calcite, high Mg-calcite, aragonite and MgCl. One of the techniques applied makes use of the different etching properties of calcite and dolomite using disodium ethylenediaminetetracetic acid (di-Na-EDTA) at pH 6.3. First delta^{26}Mg data of the pore fluid in cores are now available and indicate values of -0.40‰ i.e. are enriched in ^{26}Mg by about 0.43‰ relative to the present-day seawater signature. The sabkha groundwater collected in trenches displays delta^{26}Mg values of about -0.59‰ i.e. is moderately enriched in ^{26}Mg relative to seawater. Analytical work of dolomites is under progress. This work is considered significant as existing fractionation factors suggested in the literature are either based on theoretical considerations, on Mg-calcites or hemi-pelagic bulk sediments.