δ^{26}Mg of recent dolomites - Dohat Faishakh Sabkha, Qatar

N. SHALEV[1]*, T.R.R. BONTOGNALI[1,2] AND D. VANCE[1]

[1] ETH Zürich, Clausiusstrasse 25, 8092 Zürich, Switzerland; (*correspondence: netta.shalev@erdw.ethz.ch)

[2] Space Exploration Institute, Fbg de l'Hopital 68, 2002 Neuchâtel, Switzerland

The magnesuim isotope composition (δ^{26}Mg) of dolomite, $CaMg(CO_3)_2$, has recently been used to reconstruct past changes in seawater δ^{26}Mg, and the Mg budget of the past ocean. Dolomite is abundant through the entire Phanerozoic Eon and, therefore, it is a promising archive for seawater Mg. Furthermore, Mg is a major element in dolomite and the analytical procedure for measuring Mg isotopes in dolomite is well established. The Mg isotope fractionation between dolomite and its precipitating solution has recently been investigated[e.g., 1,2]. However, the δ^{26}Mg recorded in dolomite may be affected by a range of natural processes, such as mixing, Rayleigh distillation in a closed system, or vital effects[e.g.,3].

To explore the suitabilty of dolomite as an archive for seawater δ^{26}Mg, and the natural factors that may modify the seawater signal recorded in dolomites, we studied recent dolomites and co-existing pore-water from Dohat Faishakh Sabkha in Qatar. In some places, samples were found to contain close to pure (>95%) and ordered dolomite[4], making them simpler to study relative to recent dolomites in other locations (e.g., in Abu Dhabi) that precipitate together with significant amounts of other Ca-carbonates.

Preliminary results show that the δ^{26}Mg value recorded in dolomites (-2.5‰) is fractionated by about -1.8‰ relative to the δ^{26}Mg value of pore-water (-0.7‰). This is in accordance with previous suggestions for the fractionation at 20-30°C, suggesting that temperature is the only factor affecting the Mg isotope fractionation factor. However, pore-water is slightly enriched in ^{26}Mg relative to seawater (by ca. 0.1‰), pointing to a Rayleigh distillation process and/or mixing. These results imply that dolomite-based reconstructions of δ^{26}Mg for ancient seawater may be slightly biased to higher values by these processes. Additional data from the Dohat Faishakh Sabkha will help to quantify the magnitude of bias possible in the sabkha environment.

[1] Higgins J.A. & Schrag D.P. (2015) *Earth. Planet. Sc. Lett.*, 416, 73-81; [2] Li W., et al. (2015) *Geochim. Cosmoch. Acta*, 157, 164-181; [3] Geske A., et al. (2015) *Chemi. Geol.*, 393, 112-124; [4] Al Disi Z.A., et al. (2017) *Front. Environ. Sci.*, 5, 1.