



Control of growth rate on Li/Ca values during the growth of calcite - An experimental approach

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Lithium in seawater essentially originates from chemical weathering of continental silicate rocks. Dissolved Li ions in seawater are incorporated into marine carbonates, e.g. brachiopod shells, corals, authigenic carbonates, and Li incorporation and its isotope variations in the precipitated carbonates can be used to study the evolution of environmental conditions in seawater over geological timescales. In order to understand the Li incorporation during carbonate mineral formation, constrained inorganic precipitation experiments are necessary to identify the influence of parameters controlling fractionation (e.g. temperature, pH, calcification rate). In this study we performed Li co-precipitation experiments with calcite at 25 °C using a mixed flow reactor. Therefore two separate solutions (CaCl₂ with LiCl and Na₂CO₃) are mixed together using a peristaltic pump, at controlled flowrate. The pH is adjusted to be constant by bubbling continuous air or CO₂ gas in the reactor during the experiment. In the present study we aim to quantify the dependence of precipitation rate, pH, calcification rate and Mg impact on Li/Ca values during the growth of calcium carbonate, in order to understand the incorporation behavior of Li into the calcite structure as well as the isotopic fractionation mechanisms. Preliminary results show that the distribution coefficient of Li into calcite, D_{Li} (i.e. $\sim 10^{-3.56}$), does not depend on the precipitation rate. The pH seems to play a crucial role during the incorporation of Li in calcium carbonate. In the pH range between 6.3 and 8.5, the distribution coefficient D_{Li} decreases with increasing pH from $10^{-3.56}$ to $10^{-2.18}$. Experiments with respect to calcification rate and the impact of aqueous Mg on the incorporation are ongoing as well as Li isotope measurements are planned.