

EGU2020-3527

<https://doi.org/10.5194/egusphere-egu2020-3527>

EGU General Assembly 2020

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Controls of Li incorporation in aragonite

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The cation-to-Ca ratio in natural carbonate minerals is routinely used by the geoscientific community in order to reveal information about the conditions occurred during mineral formation in the geological past. Environmental reconstruction, however, relies on our understanding on the mechanisms controlling mineral growth but also on the physico-chemical properties of cations. In this respect experimental studies and laboratory calibrations of elemental ratios in synthetic carbonates provide important insights on the interpretation of the chemical signatures in natural samples. This holds especially truth for the chemical and isotopic signals of carbonates forming in continental environments that are characterized by the absence of bio-induced precipitation, low concentration of solutes in the forming fluid and slow growth rates (e.g. speleothems). In this study, we examine the incorporation of Li in aragonite, owing to its use as a temperature proxy and its importance in paleo-weathering reconstruction. Our preliminary results suggest that aragonite growth rate is likely the most important parameter controlling Li content in the forming phase. This finding comes in excellent agreement with the recent study by Föger et al. (2019). In addition, the experimental work suggest that temperature is also affecting the distribution of Li in aragonite but to a lesser extent than growth rate. It is anticipated that once completed this work will provide the fundamental knowledge needed for adequate interpretation of Li partitioning in aragonite and significantly improve our ability to interpret Li signatures in natural carbonates.

References: Föger et al. 2019. Effect of growth rate and pH on lithium incorporation in calcite, *Geochim. Cosmochim. Acta.*, 248, 14-24.