

Lithium isotope and elemental partitioning in inorganic calcite and aragonite

CORINNE HITE¹, JOJI UCHIKAWA², SAMBUDDHA MISRA³, NEHA TANWAR³ AND RICHARD ZEEBE⁴

¹University of Hawai'i at Manoa

²Dept. of Oceanography, Univ. of Hawaii

³Indian Institute of Science

⁴U Hawaii

Presenting Author: cghite@hawaii.edu

Secular changes in the lithium isotopic concentration ($\delta^7\text{Li}$) of seawater are thought to reflect changes in silicate weathering, an important process in sequestering atmospheric CO_2 throughout geologic history. Studies have focused on the $\delta^7\text{Li}$ of marine biogenic CaCO_3 , such as the tests of foraminifera, as a tracer for silicate weathering. However, there is new evidence of additional controls on the $\delta^7\text{Li}$ of foraminifera such as pH and the concentration of dissolved inorganic carbon (DIC). Additionally, there is some evidence that the abundance of Li in CaCO_3 (Li/Ca) is sensitive to seawater carbonate chemistry. This indicates a need for a better understanding of the physical and chemical controls on lithium incorporation in inorganic CaCO_3 , without the complications of vital effects from a biological system. To this end, we will present some preliminary results from a new set of inorganic CaCO_3 precipitation experiments. The experiments used appropriate seeds to allow precipitation of calcite and aragonite under identical conditions from a parent solution consisting of CaCl_2 , MgCl_2 , LiCl , and Na_2CO_3 . Variations in the parent solution chemistry is reflected by changes in the precipitation rate of calcite and aragonite seed overgrowth. With systematic manipulations of carbonate chemistry parameters (pH, total DIC), we aim to identify the major controls on $\delta^7\text{Li}$ and Li/Ca of the two CaCO_3 polymorphs.