

Lithium in Brachiopods – proxy for seawater evolution?

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Marine biogenic carbonates have the potential to serve as a proxy for evolution of seawater chemistry. In order to compile a record of the past and recent $\delta^7\text{Li}$ in the oceans, foraminifera shells, scleractinian corals and belemnites have been used. However, only foraminifera-based records appear to more accurately reflect the Li isotope composition of ocean water. At present, this record is available for the Cenozoic with implications for major events during this period of time, including K/T event [1]. However, a record for the entire Phanerozoic has not yet been obtained. In order to expand the current record to the more distant past, Li elemental/isotope systematics of brachiopods were investigated since they were already present in Early Cambrian oceans and because they are less sensitive to diagenesis-induced modifications due to their shell mineralogy (low-Mg calcite). The preliminary data indicate a species-, temperature- and salinity-independent behavior of Li isotopes in brachiopod shells. Furthermore, no vital effects have been observed for different shell parts. The consistent offset of $\sim -4\text{‰}$ relative to modern seawater is in accordance with experimental data [2]. Further data are now being collected for (i) modern seawater species from a ‘closed-system’ region to test inter-species Li isotope signature relative to the seawater signal, (ii) brachiopods from the Devonian/Carboniferous transition, representing the first known major extinction event, and (iii) other Phanerozoic specimens to more rigorously test brachiopods, in comparison to the existing foraminiferal records, as possible archives of past seawater and major geological events in the Earth’s history.

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[1] Misra & Froelich (2012) *Science* 335, 818-823. [2] Marriott et al. (2004) *Chem Geol* 212, 5-15