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δ^{18}O, δ^{13}C and $\delta^{44/40}$Ca variations across the growth increments of the modern brachiopod *Terebratulina septentrionalis*: Record of ambient seasonal sea-surface temperature?

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Several authors have investigated δ^{18}O values of fossil and modern brachiopod shells in order to test their applicability as ambient seawater temperature recorders. Isotopic oscillations of the δ^{18}O values along an ontogenetic line are thought to reflect to a certain degree seasonal variations in temperature of the ambient seawater. However, further parameters such as vital effects (e.g., growth rate) are suspected to drive or to contribute to these isotopic seasonal variations.

The aim of this study is to investigate in high-resolution the δ^{18}O, δ^{13}C and $\delta^{44/40}$Ca composition of modern brachiopod shells along the ontogenetic growth direction in the quest for seasonal isotopic variations. Shallow water brachiopod shells from intermediate and low latitudes as well as deep-water shells will be examined. The study will be subsequently extended to fossil brachiopod shells in order to investigate seasonality of past climates.

Modern, shallow water shells of the brachiopod *Terebratulina septentrionalis* collected at the Bay of Fundy, New Brunswick, Canada have been analyzed. Two pedicle valves were sampled along the growth axis within the visible growth increments. C and O isotopes were measured at the University of Lausanne using a GasBench

II/Delta^{Plus}XL mass spectrometer. Ca isotopes were measured on a thermal ionization mass spectrometer using a double-spike technique at the University of Bern.

The δ^{18}O and δ^{13}C values of the two investigated valves display similar trends although the correlation coefficient is poor. On-site measured and δ^{18}O derived seawater temperature values are in good agreement. The general $\delta^{44/40}$Ca-isotope record appears to be opposite to δ^{18}O, albeit slightly out of phase. At this stage of investigation the δ^{18}O values of *Terebratulina septentrionalis* appear to be recording seasonal temperature variations of the ambient seawater along the ontogenetic growth direction of the shell. The observed opposite behavior of δ^{18}O and $\delta^{44/40}$Ca possibly points to temperature-dependent Ca isotope fractionation in brachiopod shells. This hypothesis should be further validated by other proxies such as the Mg/Ca-ratio measured on the same shell material.