

Variations in the oxygen isotope composition and minor element ratios in the shell microstructure of modern brachiopods

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In the frame of the European BASE-LiNE Earth Project, this study focuses on the impact of brachiopod shell biomineralization processes on the geochemical proxy record. Oxygen isotope analyses were performed at the micrometre scale with ion microprobe and trace element (TE) ratios (Li/Ca, B/Ca, Na/Ca, Mg/Ca, Sr/Ca) with LA-ICP-MS in eight modern brachiopods species (*T. transversa*, *M. sanguinea*, *P. atlantica*, *L. neozelanica*, *G. vitreus*, *N. nigricans*, *C. inconspicua* and *M. venosa*). The $\delta^{18}\text{O}$ values show a progression towards equilibrium field from the outer primary layer (PL) to the inner secondary layer (SL). The $\delta^{18}\text{O}$ values of the columnar tertiary shell layer (TL) in *L. neozelanica* are comparable to that of calcite precipitated in equilibrium, calculated with the range of temperature measured at the sampling location. The SL shows a large range of variations that cannot be explained by changes in environmental parameters (T, pH). This variation is likely due to kinetic effects as precipitation rate changes during brachiopod lifetime (Carpenter & Lohmann, 1995). TE ratios indicate a dependence on the shell microstructure. Except for Na content, all the TE are depleted in the TL.

In summary, while TL and the innermost SL seem good targets for O isotope measurements, the TL, if present, seems not suitable for isotopic studies of minor elements, due to their very low content.

Carpenter & Lohmann (1995) GCA, 59, 3749-3764.