

Boron isotope record of end-Ordovician climate change

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We present $\delta^{11}\text{B}$ values for stratigraphically well-constrained, well-characterized Late Ordovician brachiopod shells. Sample preservation was evaluated using petrographic and major and trace element analyses. Only samples with Sr concentrations >400 ppm were used and $^{87}\text{Sr}/^{86}\text{Sr}$ and $\delta^{11}\text{B}$ values are consistent with previously published Late Ordovician [1,2] and Silurian values [2,3].

The end Ordovician is marked by large perturbations in the $\delta^{13}\text{C}$ record [4], the 2nd largest extinction event in Earth history [5], and the onset of widespread glaciation. The glaciation may have resulted from a large-scale drawdown of CO_2 [4]. We show that $\delta^{11}\text{B}$ increases from $\sim 11.6\text{‰}$ to $\sim 15\text{‰}$ from the Maysvillian to Richmondian, which corresponds to changes in the $\delta^{13}\text{C}$ record (Fig. 1). The short time scale of this change suggests that it is at least in part driven by changes in seawater pH. The data also suggest Ordovician seawater $\delta^{11}\text{B}$ values are as much as 5‰ lower than today.

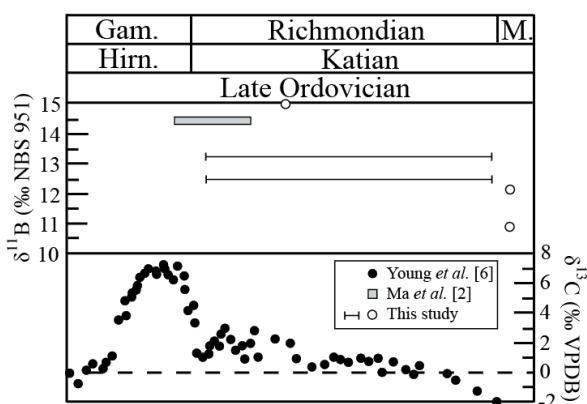


Figure 1: Late Ordovician $\delta^{11}\text{B}$ and $\delta^{13}\text{C}$. M = Maysvillian.

[1] Veizer *et al* (1999) *Chem. Geol.* **161**, 59-88. [2] Ma *et al* (2011) *Sci China Earth Sci* **54**, 1912-1925. [3] Joachimski *et al* (2005) *Geochim. Cosmochim. Acta* **69**, 4035-4044. [4] Kump *et al* (1999) *Palaeogeog. Palaeoclimatol. Palaeoecol.* **152**, 173-187. [5] Jablonski (1991) *Science* **253**, 754-757. [6] Young *et al* (2009) *Geol.* **37**, 951-954.