High resolution seasonal signals in bivalve shells from Lake Rotorua, New Zealand

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Here we present results on *Echyridella menziesii* freshwater bivalve shells from Lake Rotorua, New Zealand, aimed at exploring their potential as paleoclimate proxy archive. Growth rates of this species reduce considerably with age. Therefore, obtaining samples at high enough resolution to build the $\delta^{18}O$ chronology by conventional micro-drilling is difficult. $\delta^{18}O$ analyses by micro-drilling and combustion mass spectrometry result in reconstructed temperatures approximately averaging summer and winter temperatures rather than reflecting seasonality.

Here, we compare micro-drilled sampling with *in situ* $\delta^{18}O$ measurements by Secondary Ion Mass Spectrometry (SIMS) taken at 20 µm intervals. Oxygen isotopic data are combined with high resolution Sr/Ca, Ba/Ca and Mn/Ca series using LA-ICPMS (continuous line ablation) and with a large background dataset of lake water parameters obtained during a twelve month monitoring study in the vicinity of the mussel beds. Our initial results show that data obtained by SIMS have high enough resolution to reveal strong seasonal cycles which correlate well with temperatures measured in Lake Rotorua. The seasonal $\delta^{18}O$ signal further verifies that growth lines in *Echyridella menziesii* occur annually. Overlapping and correlating the SIMS stable isotope dataset with the Sr/Ca series clearly distinguish single annual peaks in Sr/Ca ratios. Results suggest that improving the spatial resolution in the $\delta^{18}O$ series can assist in identifying trace element relationships with temperature and thus support building chronologies for climatological and environmental studies.