Assessing trace element and stable isotopic ratios as environmental recorders in a short lived bivalve

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Bivalve shells can record hydroclimate in their shell geochemistry, allowing us to trace modern and past environmental change from seasonal through to centennial timescales. However, modern calibrations must first be undertaken to determine system and species specific relationships. Here we present modern bivalve and water chemistry data from the Coorong Lagoons in South Australia. The Coorong is a RAMSAR listed reverse estuary at the terminus of the Murray River - Australia's largest waterway. Although short lived (<1 year), the micro-mollusc *Arthritica helmsi* has abundant modern and sub-sedimented populations, providing an opportunity to use multiple inviduals to assess sub-annual change through millenia. Synchronous monitoring of *A. helmsi* and the waters in which they inhabit can provide a modern calibration between geochemical ratios in the shells and physical and chemical water properties. A combination of isotopic and elemental data is required to untangle the the signals in this dynamic estuarine environment. Laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) scans of shells reveal sub-annual scale variations in trace elements (e.g. Sr/Ca, Mg/Ca, Ba/Ca), while bulk isotopic measurements collected via isotope ratio mass spectrometry (IRMS) reveal a signal over the lifetime of the individual. Sr/Ca ratios display a negative relationship with temperature in modern shells, while oxygen isotope ratios reveal a relationship with salinity as a function of water mass mixing and evaporation. These results indicate the utility of *A. helmsi* as a recorder of past environmental conditions in this internationally significant wetland.