Insights of modern- and palaeo-hydrology of the Coorong based on Strontium Isotope Tracers: $^{87}Sr/^{86}Sr$ and $\delta^{88/86}Sr$

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The Coorong lagoon, as part of the wetland system at the terminus of the River Murray, is recognised not only for its ecological improtance but also for its unique geomorphology and salinity gradient that ranges from fresh/brackish (< 35 PSU) in the north lagoon to hypersaline (> 70 PSU) in the south lagoon. The lagoon hydrology is controlled by seawater-continental water mixing processes that are traceable via the radiogenic Strontium (Sr) isotopes ($^{87}Sr/^{86}Sr$). The hypersaline south lagoon is a sink for dissolved inorganic carbon (DIC); local carbonate precipitation is caused by calcite and aragonite oversaturation linked to high rates of evaporation. These processes are traceable via the novel stable Sr isotope ($\delta^{88/86}Sr$), which is particularly sensitive to mass-dependent isotope fractionation processes such as carbonate precipitation/dissolution. On site observations and measurements suggested seasonal variations in water quality of the Coorong, which brought discussion to local water resource management. Importantly, the south lagoon has seen dramatic hydrological and ecological changes over the last ~200 years, evident from geochemical and diatom records from sediment cores [1]. This study focuses on Sr isotope analyses ($^{87}Sr/^{86}Sr$ and $\delta^{88/86}Sr$) of summner and winter waters in the modern Coorong and fossil shells (species *Arthritica helmsi*) from a sediment core in the south lagoon, and is complemented by elemental concentrations to better constrain (i) variability in the mixing of water sources in modern seasons and over the last ~2500 years; and (ii) changing modern- and palaeo-salinity associated with changes in carbonate precipitation/dissolution. These results are not only useful for understamding the hydrological history of the Coorong, but also important for recovering of the coastal environment, which is one of the major focuses of local communities [2].

[1] McKirdy *et al.* (2010) *Organic Geochemistry* **41**, 96-110.

[2] Brookes *et al.* (2018). Goyder Institute for Water Research Technical Report Series No. 18/04, Adelaide, South Australia. ISSN: 1839-2725.