High-resolution paleoclimate of the MIS 11 interglacial (423-360 ka) using geochemical proxies in giant *Tridacna* clams

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Interglacials are an important aspect of Late Quaternary climate, representing times of decreased global ice volumes and warm conditions similar to the present. The Marine Isotope Stage 11 (423-360 ka) interglacial is of particular interest to paleoclimatologists because isotopic records from ice cores and deep sea cores suggest it was exceptionally long. Also, during this interval, Earth's orbital eccentricity was similar to present-day, such that MIS 11 is often considered to be a good analogue for the current interglacial. High-resolution paleoclimate records are essential for resolving climate seasonality, and can provide insight into the natural range of climate variability that exists in the absence of anthropogenic forcing. However such records are rare beyond the Last Interglacial (~125 ka) owing to the effects of diagenesis on coral archives and their limited preservation above sea-level.

In this study, giant *Tridacna gigas* clams are investigated as a means to reconstruct MIS 11 climate in the Western Pacific Warm Pool (WPWP). Thickening of shell aragonite in *T. gigas* proceeds at rates up to 20 mm yr^{-1} during early growth years, and declines to ~2 mm yr^{-1} for later growth years. Given their dense skeleton, *T. gigas* has the potential to be well preserved in the geologic record and provide high-resolution snapshots of past tropical climate.

A modern specimen from Huon Peninsula, Papua New Guinea, was analysed to establish the fidelity of $\delta^{18}O$ as a composite proxy for sea surface temperature (SST) and sea surface salinity (SSS). *Tridacna* $\delta^{18}O$ displays good covariance with the Southern Oscillation Index, suggesting that this proxy can be used as an indicator of paleo-ENSO activity at this site. Using LA-ICPMS, trace element ratios Mg/Ca and Ba/Ca were investigated as potential environmental proxies, and appear to be influenced by SST and productivity respectively. Skeletal $\delta^{18}O$ in a MIS 11 fossil *T.gigas* specimen collected at ~1200 m elevation from the uplifted reef terraces of Huon Peninsula, suggests that during its 35-year lifespan, El Niño events were reduced in frequency compared to present-day (~14 events/century vs. ~26 events/century).