



High resolution climate records from modern and last interglacial period derived from giant clam shells (*Tridacnidae*) from Sulawesi, Indonesia.

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We studied *Tridacnidae* giant clams as environmental archives to reconstruct climate evolution in a region characterized by major ocean-atmosphere exchange on seasonal and inter-annual timescales: the Sulawesi archipelago. Using environmental proxies (^{18}O and trace elements) we present reconstructions of inter-annual climate change derived from modern and past interglacial period (MIS 5). For fossil archive, U-Th ages were obtained from fossil coral samples from the same paleo-reef of *Tridacna* samples, because these bivalves exhibit an open system behavior in U-Th series. Comparison of a ^{18}O profile derived from a 6 year old modern *T. squamosa* (2006-2012) and a predicted ^{18}O profile derived from local temperature and salinity records confirms the isotopic equilibrium in shell deposition. The strong sea surface temperature (SST) anomaly of 2010 related to a strong La Niña was also recorded in the shell ^{18}O signal. The modern ^{18}O record presents a mean seasonal range of $0.5 \pm 0.1 \text{ ‰}$. Additional trace element analyses show that Mg/Ca and Sr/Ca are also temperature dependent in this species and appear less affected by changes in salinity/rainfall. Finally, Ba/Ca ratio appears to reflect both primary production related to coastal up-welling during the dry season, and continental run-off during the wet season. Trace element profiles also exhibit strong anomalies reflecting changes in local hydrography related to the 2010 La Niña.

The ages of the *Tridacna* fossils derived from U-Th dating are around last interglacial MIS-5 period. ^{18}O records derived from a fossil *Tridacna gigas* specimen provide a time-window of 14 years. The record shows a reduced mean seasonal range of ^{18}O of around $0.4 \pm 0.2 \text{ ‰}$. Absence of Ba/Ca peaks during the wet season suggest a weakened monsoon rainfall activity, but the presence during the dry season suggests a persistent seasonal up-welling at this time. Our study illustrates the usefulness of *Tridacnidae* fossils in reconstructing past environmental processes with seasonal resolutions.

Keywords: *Tridacnidae*, ^{18}O , monsoon rainfall, SST, Interglacial periods.