

Seasonally-resolved records from giant clams – Snapshots of the Miocene climate of East Kalimantan

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The restriction of the Indonesian Throughflow is considered as a key trigger for climate change during the Miocene, not only for the SE Asian region but on a global scale. However, the interaction between the complex tectonic history of the gateway, the associated climate and environmental change and resulting biotic response is not well understood.

To better characterize the Miocene climate, it is crucial to reconstruct its seasonal variability. Changes in seasonality seem to play an important role in regards to (abrupt) climate changes. This highlights the need for sub-annually resolved palaeoclimate reconstructions.

However, unaltered palaeoclimate archives are rarely preserved in 'deep time' Miocene strata.

Here, we present records of Late Miocene *Tridacna* spp. shells from Bontang, East Kalimantan, Indonesia.

Via a combination of XRD, cathodoluminescence/SEM-imaging and LA-ICPMS element analysis, we identify pristine vs. diagenetically-altered areas within the shells.

Our multi-proxy approach utilizes spatially-resolved E/Ca ratios (Mg/Ca, Sr/Ca, Ba/Ca, B/Ca) and micromilled $\delta^{18}\text{O}$ records, which are aligned with the banding pattern of the shells.

Although the fossil giant clams have been noticeably affected by alteration in their outermost parts, their internal aragonitic structure overall is excellently preserved. High resolution trace element and $\delta^{18}\text{O}$ records confirm that the presented tridacnid shells are well suitable as sub-annual palaeoclimate archive and record seasonality information of the Miocene Indo-Pacific region.