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Multi-proxy study of the Leeuwin Current System evolution along the northwestern coast of Australia during the Middle Pleistocene Transition

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The Middle Pleistocene Transition (MPT) represents a critical rearrangement in the Earth's climate state, expressed as a switch from obliquity-dominated glacial/interglacial patterns towards the quasi-periodic 100 kyr cyclicity that characterized the Earth's recent climatic history. This fundamental reorganization in the climatic response to orbital forcing occurred without comparable changes in the astronomical rhythms before or during the MPT. Although the MPT has been intensely studied, the triggering mechanisms still remain poorly understood.

High-resolution records from the equatorial to mid-latitude shelf areas are to date rarely considered. For this reason, we investigated an expanded MPT section from International Ocean Discovery Program (IODP) Expedition 356 Site U1460A (eastern Indian Ocean, 27°22.4949'S, 112°55.4296'E, 214.5 mbsl). At Site U1460A, we combine high-resolution records of shallow marine productivity and organic matter flux (Auer et al., 2021) with new benthic and planktonic foraminifera records. By implementing this multi-proxy approach, we aim to better define the response of the Leeuwin Current System over the MPT on tropical shelf regions.

We will investigate benthic foraminifera assemblages at Site U1460A to reconstruct the bottom water community response to the Leeuwin Current System variations during the MPT. At the same time, the benthos/plankton (B/P) ratio of U1460A will be used to constrain the local impact of sea-level changes. Presently work is in progress to generate a B/P ratio for the MPT interval to better assess the impact of sea-level changes on a highly dynamic shelf setting on the western coast of Australia. Shallow coastal areas are markedly sensitive to the glacial/interglacial connected sea-level oscillations. Monitoring the variation in the B/P ratio can provide a preliminary overview of local sea-level changes along the Australian shelf which could be linked to the glacial/interglacial changes of the MPT. Higher values in this ratio indicate lowstand phases, while lower values are characteristic of higher sea level phases. The foraminifera data will be compared to a multi-proxy dataset (Auer et al., 2021) to constrain the local sea-level-driven environmental change over the MPT. Using this we will be able to untangle the impact of local versus global climatic change over the MPT.

Taxonomic identifications are underway following an extensive washing procedure developed for the sample material. Benthic foraminifera show moderate to good preservation, while the planktonic assemblage exhibits moderate to very good preservation. Foraminiferal tests appear white, opaque with apertures, and pores moderately covered by sediment. Some individuals are chipped or partially broken. Specimen preservation (plankton and benthos) decreases during glacial intervals where the abundance of planktonic foraminifera is low.

Finally, we recorded the presence of *Globorotalia tosaensis* at the top of our study interval at a depth of 61.72 mbsf (corresponding to sample U1460A-14F-3W, 20-24 cm). The continuous presence of this taxon indicates an age older than 0.61 Ma (Wade et al., 2011) at the top of our study interval, and therefore supports the age model of Auer et al. (2021).