Geophysical Research Abstracts
Vol. 21, EGU2019-9659-4, 2019
EGU General Assembly 2019

Deciphering climate forcing, basin evolution and biotic events on the NW Australian shelf: The Pliocene "Humid Interval" case study.

Boris Theofanis Karatsolis (1), David De Vleeschouwer (2), Jeroen Groeneveld (2), Beth Christensen (3), and Jorijntje Henderiks (1)

(1) Department of Earth Sciences, Uppsala University, Uppsala, Sweden, (2) MARUM-Center for Marine and Environmental Sciences and Department of Geosciences, University of Bremen, Bremen, Germany, (3) School of Earth and Environment, Rowan University, Glassboro NJ, USA

The geological and climatic history of NW Australia includes significant tectonic activity and climate change during the late Miocene to early Pliocene. The reported events are part of the reactivation of major faults in the area (Müller et al., 1998) as well as a transition from a dry to a more humid climate (the "Humid Interval" as defined by Christensen et al., 2017). Here we investigate two sites (IODP Expedition 356 Sites U1463 and U1464) that are only 100 km apart, but situated in two adjacent basins (Carnarvon and Roebuck) of the NW Australian shelf. Changes in lithofacies as well as astrochronologically dated time series of potassium (K) and calcareous nannofossil abundances reveal the complex interplay between basin evolution and climate change between 6.1-4 million years ago (Ma). Overall, the investigated proxies show high correlation between both sites, except during 6.1-5.7 Ma. During this time interval, Site U1463 recorded a gradual increase in K and coccolith abundances, correlated with a deepening trend in lithofacies, whereas at Site U1464 these changes happened abruptly at ∼6 Ma. These diachronous observations are most likely explained by differential basin subsidence during this time. Therefore, the tectonic control on these paleorecords makes it difficult to pinpoint the onset of the "Humid Interval". Nevertheless, we conclude that the high K values at Site U1464 indicate that humidity and continental runoff was already enhanced since at least 6 Ma. This age is consistent with data that support a southward movement of the Intertropical Convergence Zone rain belt at around 7 Ma (Holbourn et al., 2018).

Christensen, B. A., Renema, W., Henderiks, J., De Vleeschouwer, D., Groeneveld, J., Castañeda, I. S., et al. (2017). Indonesian Throughflow drove Australian climate from humid Pliocene to arid Pleistocene. Geophysical Research Letters, 44(13), 6914–6925.

Holbourn, A. E., Kunht, W., Clemens, S. C., Kochhann, K. G. D., Jöhnck J., Lübbers, J., & Andersen, N. (2018). Late Miocene climate cooling and intensification of southeast Asian winter monsoon. Nature Communications, 9, 1584

Müller, D., Mihut, D., & Baldwin, S. (1998). A new kinematic model for the formation and evolution of the Northwest and West Australian margin. In The Sedimentary Basins of Western Australia (pp. 55–72).