Geophysical Research Abstracts
Vol. 21, EGU2019-19149, 2019
EGU General Assembly 2019

A 5.3-million-year history of monsoonal precipitation in northwestern Australia

Patrick De Deckker (1), Franck Bassinot (2), Jan-Berend Stuut (3,4,5)

(1) ANU - The Australian National University, Canberra, Australia, (2) LSCE - Laboratoire des Sciences du Climate et de l'Environnement, Gif-sur-Yvette, France, (3) NIOZ - Royal Netherlands Institute for Sea Research, and Utrecht University, Texel, the Netherlands (jbstuut@nioz.nl), (4) MARUM - Center for Marine Environmental Sciences, Bremen University, Bremen, Germany, (5) VU - Vrije Universiteit Amsterdam, Faculty of Science, Amsterdam, The Netherlands (www.nioz.nl/dust)

Australia is the driest inhabited continent on the planet, with its moisture mostly sourced from the tropical monsoon in the north and the southern westerlies in the south. The continent has experienced large climate fluctuations in the geologic past, but long continuous records of palaeo-environmental changes are lacking, particularly prior to ~0.55Ma. Here, we address this paucity by presenting a continuous record of continental aridity and monsoonal activity in northwestern Australia since the Pliocene (5.3 Ma). Our records are based on bulk-chemical XRF-scans and particle-size distributions of the terrigenous fraction, in two cores from the northwestern Australian continental shelf: MD002361 and ODP122-762B. In our records we distinguish between aeolian- and fluvial sediments that were deposited at sea. Support for the distinction between aeolian and fluvial sediment fractions in the two marine sediment cores is found in the bulk-chemical composition of aeolian- and fluvial material in the potential source areas in northern West Australia. Our records show a warm and dry early Pliocene (~5.3 Ma) on the northwestern Australian continent, which experienced a gradual increase in humidity peaking at about 3.8 Ma with higher than present-day rainfall. Between 3.8 and about 2.8 Ma, climate became progressively more arid with more rainfall variability. Coinciding with the onset of the northern hemisphere glaciations and the intensification of the northern-hemisphere monsoon, aridity continued to increase overall from 2.8 Ma until today, with greater variance in precipitation and an increased frequency of large rainfall events. We associate the observed large-scale fluctuations in Australian aridity with variations in Indian Ocean sea-surface temperatures, which largely control the monsoonal precipitation in northwestern Australia.