EGU2020-10826
https://doi.org/10.5194/egusphere-egu2020-10826
EGU General Assembly 2020

An ocean view of African climate change during the last 620,000 years

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It has been a long-standing and passionately discussed hypothesis that important developments in human origins over the last 6-8 Ma coincided with environmental change, including cooling, drying, and wider climate fluctuations. However, testing these hypotheses is difficult as both high resolution climate records and fossil records of early human populations are often incomplete and poorly dated. Thus, to better understand the role that past African climate changes might have played in the evolution and dispersal of our ancestors, in particular Homo sapiens, we have developed a ~620,000 year record of humidity variability from the Chew Bahir basin situated in southern Ethiopia. This 293 m composite lacustrine sediment succession was compiled from two parallel cores HSPDP-CHB14-2A and 2B collected as part of the Hominin Sites and Paleolakes Drilling Project (HSPDP) in 2014. We utilized the log(K/Zr) ratio determined by micro X-ray fluorescence (μXRF) scanning to analyse past moisture changes in the Chew Bahir basin. By placing our results into the existing framework of marine and terrestrial proxy records from various parts of Africa and its surrounding oceans we document a close coupling between the spatio-temporal distribution of African rainfall and sea-surface temperature changes in the Indo-Pacific realm on orbital time scales. We argue that this coupling is facilitated by shifts in the Walker and Hadley circulations in response to insolation variability at the same time.