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diocarbon ages, with ΔR=140yrs 

A) δ18Owater, s.s. (250-300μm) for all measurements. Ba/Ca and δ18Owater are often used to determine past SSS, since in the vicinity of river deltas SSS is strongly influenced by river runoff, hence reflecting precipitation changes in the rivers’ catchment. Note that our records A) and B) do not correlate. The age model is based on nine AMS radiocarbon ages, with ΔR=140yrs (SOUTHON ET AL., 2002).

We present δ18Owater (ice volume-corrected, in VSMOW), Ba/Ca-based past sea surface salinity (SSS) estimations and Sea Surface Temperature (SST) reconstructions, based on Mg/Ca ratios, of sediment core GeoB12615-4 (Fig. 2). We used Globigerinoides ruber white, s.s. (250-300μm) for all measurements. Ba/Ca and δ18Owater are often used to determine past SSS, since in the vicinity of river deltas SSS is strongly influenced by river runoff, hence reflecting precipitation changes in the rivers’ catchment. Note that our records A) and B) do not correlate. The age model is based on nine AMS radiocarbon ages, with ΔR=140yrs (SOUTHON ET AL., 2002).

Since the Ba/Ca record does not correlate to our reconstruction of δ18Owater during the mid- and late Holocene (Fig 3), we conclude that the oxygen isotopy of the seawater is partly influenced by δ18O changes of the Rufiji River water, rather than solely reflecting past SSS.

We compared the δ18Owater record to the δ18O record of the Kilimanjaro ice core (THOMPSON ET AL., 2002), as the latter represents the isotopic variability of East African precipitation for the Holocene (Fig 4).

The rough correlation (Fig. 4) suggests that our δ18Owater partially reflects changes in rain-pose to varying δ18O in West African precipitation.

As proposed recently, longitudinal shifts of the Congo Air boundary (CAB) play a role in modulating precipitation (TIRNERY ET AL., 2011 and JUNGINGER, 2011). These shifts also change the trajectory of Indian Ocean moisture into the continent and therefore affect δ18O of the East African rainout.

The position of the CAB (Fig. 1), dividing the rainwater range of Indian Ocean and Atlantic Ocean, depends on SST gradients within and between oceans. We calculated a difference (ΔSST) of our record and GeoB4905-4 from the tropical Atlantic (WELDEAHER ET AL., 2005, Fig. 1), showing that ΔSST variability resembles the pattern of the Kilimanjaro ice core record (Fig 5).

We argue that both oxygen isotope records (GeoB12615-4 and Kilimanjaro ice core) partially reflect changes in the rainwater isotopy (rather than SSS or temperature variability), which is controlled by SST gradients between the tropical oceans surrounding Africa.

CONCLUSIONS

Whereas the ITZC is considered to be the dominant control on Holocene hydroclimate, the CAB has a relevant impact on the regional distribution of precipitation as well. This has to be taken into account when comparing near-shore proxy data to terrestrial records.