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Southeast African paleo-hydrological evolution for the last 35 kyr

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The modern precipitation in Southeast Africa is modulated by multitude of factors, particularly the sea surface temperature (SST). However, the degree of coupling between SST and hydrological cycles during the past in Southeast Africa is still poorly understood. In this study, we use the δD and δ^{13}C of sedimentary with odd numbered long-chain n-alkanes (n-$C_{27,29,31,33}$), in concert with other marine proxies (i.e. SST based on alkenones, Mg/Ca, δ^{18}O of foraminifera, XRF core scanning) from a marine sediment core 16160-3 near the Zambezi river mouth (18º14.47'S, 37º52.27'W, 1334 m water depth) to reconstruct past hydrological changes and infer climate controlling mechanisms for Southeast Africa. The preliminary results show that δD from the very abundant long-chain alkane n-C_{29}, which mostly derives from terrestrial trees, anti-correlates strongly with the SST record, but the correlation is less pronounced for the other abundant n-C_{31}alkane. The δD signal of n-alkane is assumed to reflect changes in humidity, as lower/higher values indicate wetter/drier conditions. When δD values of n-alkanes increased (drier conditions) during the last glacial-interglacial cycle (35-15kyr in our record), the SST was also getting cooler. The observed coolest SST period was between 20 and 15kyr, which was also the driest on the continent. The high fluctuations of n-alkane δD (both n-C_{31} and n-C_{29}) are observed from 15 to 10kyr, which may indicate that the δD records from Southeast Africa are highly sensitive to rapid climate changes during Bølling/Allerød and Younger Dryas. $n-$Alkane concentrations throughout the core show covariance with the XRF records of Ti /Ca ratio and Fe/Ca ratio, both proxies for continental runoff. Together, the XRF data and $n-$alkane concentrations suggest much greater runoff during the glacial period (35 to 14kyr) compared to the Holocene. The $n-$alkane concentrations do not follow the δD humidity signal completely; suggesting the terrestrial weathering and run off are partly independent from precipitation changes.