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Enhanced insights into late Quaternary African hydroclimate dynamics using a water-isotope enabled climate model

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The climate of intertropical Africa is strongly governed by the dynamics of the tropical rainbelt, which is often associated with the Intertropical Convergence Zone (ITCZ). On millennial time-scales the primary drivers of variation in the rainbelt include orbital configuration changes to insolation seasonality and high-latitude forcing (e.g. Heinrich events). The spatial pattern of precipitation variability in tropical and subtropical Africa over the late Quaternary is complex and has long been debated. Stable water isotopes from inland lakes and off-shore ocean core records have provided longitudinal records, variously interpreted as changes to precipitation intensity or changes to moisture source location due to atmospheric circulation changes (or a combination of several factors). In this preliminary study we have used a global climate model, HadCM3, in which water isotopes are interactively coupled to produce snapshots at 1000-year intervals covering the last deglaciation (21kyr to pre-industrial). In conjunction with a comparison to available palaeodata, this enables us to better elucidate the connections between precipitation and other climate factors with changes to the water isotope signature, as well as how this varies regionally and through time.