



## **Multidecadal variability in East African hydroclimate controlled by the Indian Ocean**

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The recent decades-long decline in East African rainfall suggests that multidecadal variability is an important component of the climate in this vulnerable region. Prior work based on analyses of the instrumental record implicates both Indian and Pacific ocean sea surface temperatures (SSTs) as possible drivers of East African multidecadal climate variability, but the short length of the instrumental record precludes a full elucidation of the underlying physical mechanisms. Here we show that on timescales beyond decades, the Indian Ocean drives East African rainfall variability by altering the local Walker circulation, whereas the influence of the Pacific Ocean is minimal. Our results, based on proxy indicators of relative moisture balance for the past millennium paired with long control simulations from coupled climate models, reveal that moist conditions in coastal East Africa are associated with cool SSTs (and related descending circulation) in the eastern Indian Ocean and ascending circulation over East Africa. The most prominent event identified in the proxy record - a coastal pluvial from 1680 to 1765 - occurred when Indo-Pacific warm pool SSTs reached their minimum values of the past millennium. Taken together, the proxy and model evidence suggests that Indian Ocean SSTs are the primary influence on East African rainfall over multidecadal and perhaps longer timescales.