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High- and low-latitude forcing of Plio-Pleistocene East African climate and human evolution

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The late Cenozoic climate of East African is punctuated by episodes of short, alternating periods of extreme wetness and aridity, superimposed on a regime of subdued moisture availability exhibiting a long-term drying trend. These periods of extreme climate variability appear to correlate with maxima in the 400 kyr component of the earth's eccentricity cycle. Prior to 2.7 Ma the wet phases appear every 400 kyrs, whereas after 2.7 Ma, the wet phases appear every 800 kyrs, with periods of precessional-forced extreme climate variability at 2.7-2.5 Ma, 1.9-1.7 Ma and 1.1-0.9 Ma before present. The last three major lake phases occur at the times of major global climatic transitions, such as the onset of Northern Hemisphere Glaciation (2.7-2.5 Ma), intensification of the Walker circulation (1.9-1.7 Ma) and the Mid-Pleistocene Revolution (1.0-0.7 Ma). High-latitude forcing is required to compress the Inter-Tropical Convergence Zone so that East Africa becomes locally sensitive to precessional forcing, resulting in rapid shifts from wet to dry conditions. These periods of extreme climate variability may have provided a catalyst for evolutionary change and driven key speciation and dispersal events amongst mammals and hominins in East Africa.