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Glacial to Holocene weathering patterns across tropical Africa: implications for the dynamics of the tropical rainbelt

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The large semi-arid regions of Africa bordering the equatorial regions are prone to drought. It is thus important to understand the mechanisms influencing African rainfall. Most of the rain in Africa is delivered by the tropical rainbelt, which oscillates seasonally between 20°N and 20°S. The distribution of rainfall is determined by the latitude, the width and the intensity of the rainbelt. Late Pleistocene and Holocene drought in Africa is traditionally attributed to displacement of the average latitudinal position of the rainbelt. However, this mechanism is not consistent with many new climate records, which suggest that drought in Africa occurred at the same time in Northern and Southern Hemispheres.

Here we measure the bulk Fe/K and Al/K ratios of hemipelagic sediments as a proxy for chemical weathering and hence rainfall intensity. We use 8 sediment cores spanning a N-S transect off the West coast of Africa in order to assess the latitude, width and intensity of the rainbelt. We analyse 4 timeslices, based on pre-existing 14C chronology: Last Glacial Maximum, Heinrich Stadial 1, mid-Holocene and Recent. Preliminary results suggest that although latitudinal displacement takes place, changes in the width and intensity of the rainbelt play a significant role in causing drought in Africa, particularly during times of reduced meridional overturning circulation.