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The thermochronological record across the West African continental margin: implications for erosion, tectonics, and climate.

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Thermochronology has the potential to constrain rock cooling paths through the upper crust. Apatite fission-track (AFT) and (U-Th-Sm)/He (AHe) thermochronology, with a combined temperature sensitivity of c. 120 – 30°C, has proved particular powerful at resolving the cooling history of divergent continental margins worldwide. These thermal history constraints have been used to infer magnitudes, rates, and spatial patterns of erosion, which can provide new insights into the response of surface processes to changes in tectonics, climate, and thermal events in the upper crust. The long-term continental evolution of Transform margins has received comparatively less attention, however, quantitative constraints on continental denudation derived from thermochronology can help us better understand sediment routing and the development of on- and offshore sedimentary basins and the tectonic and climatic forcings on continental erosion.

Here, we present our recently published AFT data and associated thermal histories from Guinea and Ivory Coast [1] alongside our previously published AFT and AHe data from Benin [2], and the regional thermochronological record published elsewhere to contrast the thermal history of the West African margin from the extensional domain of the Central Atlantic to the transform dominated Equatorial Atlantic. From this dataset we reveal the thermal influence of the Central Atlantic Magmatic Province, the timing, rate, and pattern of denudation in response to syn- and post-break-up tectonic processes during the Mesozoic, and constrain the amount of denudation attributable to Cenozoic climate changes and mantle driven dynamic uplift.

Finally, we integrate our interpretations on the history of onshore erosion, derived from thermochronology, with the onshore geomorphic record, chronology of weathering profiles, palaeogeography reconstructions [3] and offshore sediment accumulation volumes. In this way, we attempt to reconstruct the tectonic evolution and source-to-sink history across the West African margin over the last 200 Myr and highlight where knowledge gaps and analytical challenges remain.

[1] Wildman et al., (2022), *Gondwana Research*, 111, 249-264.

[2] Wildman et al., (2019),. *Journal of the Geological Society*, 176(1), 97-114.

[3] Ye, (2017), *Geosphere*, 13(4), 1254-1284.