Sahara dust fluxes over the last 20 kyrs record the limits of the African Humid Period "green Sahara"

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The Sahara Desert was exposed to significantly wetter conditions, relative to present, between the early to mid-Holocene (~11-5 ka) during a period known as the African Humid Period (AHP). An increase in Northern Hemisphere summer insolation drove the intensification and expansion of the Africa monsoon rains up the currently hyper-arid Sahara Desert. Combined with a subsequent expansion of vegetation cover, regional dust uptake was significantly supressed, with potential global-scale impacts through a change in the albedo, cloud properties, and ocean and land dust fertilization. Yet, most of the relevant terrestrial records across the Sahara cover a limited time span, with contentious chronologic controls. Continuous, well-dated sediment records of the AHP are limited to the marine records from the sub-equatorial Atlantic Ocean and tropical Lake Bosumtwi to the west, the Gulf of Aden to the east and the Mediterranean Sea, mainly in front of the Nile Delta to the north.

Here, we present new records of ^{230}Th-normalized terrigenous dust accumulation rates over the last 20 kyrs in marine sediment cores across the Red Sea – Gulf of Aden meridional transect, covering the entire eastern margins of the Sahara Desert. We combine the dust accumulation rates with additional records to establish a robust framework for the geographic span of the AHP. We show that dust fluxes from the Sahara to the Red Sea declined by ~50% during the AHP only between 12°N and 19°N, over a narrower corridor than previously thought, while dust fluxes to the northern sector of the Red Sea (north of ~25°N) remained unchanged throughout the Holocene. These results coincide with evidence from the Atlantic Ocean where dust deposition dropped by ~80% across a well constrained corridor (~21-28°N) [1]. The results provide the first quantitative record of dust accumulation rates in the Red Sea and the Gulf of Aden over the past 20 kyrs, and constrain the geographic extent of the AHP hydrological impact.

[1] McGee, deMenocal, Winckler, Stuut & Bradtmiller (2013) *EPSL* 371–372, 163–176