



Dune ages in the sand deserts of the southern Sahara and Sahel

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In this paper we aim to document the history of aeolian processes within the southern Sahara as part of the INQUA Dune Atlas. We review available luminescence ages for sand dunes across the southern Sahara and attempt to correlate periods of sand accumulation and to develop an improved understanding of the dune chronology on a regional basis. This was achieved by analysing dune age by country, as well as by latitude and longitude. The results show a very patchy spatial distribution of dune ages with large gaps that encompass some of the largest sand seas. Despite these gaps, some related patterns in dune morphology and stratigraphy appear to be consistent between northern Nigeria and southern Mali where older linear dunes are distinct from younger Late Holocene transverse and barchanoid dunes. Elsewhere in Mauretania linear dunes with different orientations appear to have accumulated at different times, most likely in response to changes in atmospheric circulation. Regional climatic changes are identified where dunes are transgressed by lake deposits within endorehic basins. We identify four locations where dune accumulation is terminated by lacustrine transgressions, two of which, in Lake Chad and the Bodélé Depression, occur shortly after the last glacial maximum (LGM). The third example at Gobiero in Niger occurred later, in the early Holocene, around 8.4 ka and a fourth marks a later transgression of Palaeolake MegaChad after 4.7 ka. Larger-scale latitudinal and longitudinal distributions in dune ages across the southern Sahara do not show any consistent patterns, though this may be due to the small sample size relative to the study area. In addition, local variations in external controls such as wind regime, rainfall, vegetation and sand supply need to be considered, sometimes on a site by site basis. Limiting the analysis to dune ages determined using the single-aliquot regenerative-dose (SAR) protocol indicates a lack of dune preservation during the LGM and the Younger Dryas, times associated with increased dust input to the oceans which is assumed to indicate increased aeolian activity. The SAR dune dates suggest that preservation of dunes at the onset of succeeding humid intervals is an important component of the dune record. The most striking examples of this phenomenon occur where dunes are preserved within endorehic basins by lacustrine transgressions.