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The Dynamic History of the Saharan Desert revealed by 11 Million Years of Exported Dust

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The Sahara is the largest hot desert on Earth and the source of about half of the world's atmospheric dust which acts to fertilize the Atlantic Ocean and Amazon Basin. The timing and cause of Saharan desert inception are vigorously debated, but northern Africa is widely suggested to have dried progressively with global cooling through the late Cenozoic, favoring both desert and C₄-grassland savanna expansion. We present a wide range of data, encompassing sediment geochemistry and grain size distributions, plant wax isotopic signatures and lithogenic radiogenic isotopes to explore when and why desert conditions were established on North Africa. Our work on North Atlantic deep-sea sediments reveals persistent waxing and waning of Saharan dust input, with astronomically forced aridity in the interior of northern Africa more than three times earlier than the widely invoked date for the onset of desert conditions and no major changes in dust source regions over the last 11 Myr. This result strongly suggests that the Saharan desert is older and more dynamic than previously documented. Our data also challenge suggestions of a simple long-term escalation of northern African aridity driving an associated grassland expansion and provide a new framework from which to assess floral and faunal evolutionary outcomes on Africa, including the expansion of the C₄-savanna ecosystem and the development of our hominid ancestors. □