



## **Lake Mega-Chad, a West African Monsoon indicator and tipping element**

Simon Armitage (1), Charlie Bristow (2), and Nick Drake (3)

(1) Royal Holloway, University of London, Department of Geography, Egham, United Kingdom (simon.armitage@rhul.ac.uk), (2) Department of Earth and Planetary Sciences, Birkbeck College, University of London, Malet Street, London, WC1E 7HX, United Kingdom., (3) Department of Geography, King's College London, Strand, London, WC2R 2LS, United Kingdom.

From the deglacial period to the mid-Holocene, North Africa was characterised by much wetter conditions than today. The broad timing of this period, termed the African Humid Period, is well known. However, the rapidity of the onset and termination of the African Humid Period are contested, with strong evidence for both abrupt and gradual change. We use optically stimulated luminescence dating of dunes, shorelines and fluvio-lacustrine deposits to reconstruct the fluctuations of Lake Mega-Chad, which was the largest pluvial lake in Africa. Humid conditions first occur at  $\sim 15$  ka, followed by a return to relatively arid conditions. By 11.5 ka Lake Mega-Chad had reached a highstand, which persisted until 5.0 ka. Lake levels fell rapidly at 5 ka, indicating abrupt aridification across the entire Lake Mega-Chad Basin. This record provides strong terrestrial evidence that the African Humid Period ended abruptly, supporting the hypothesis that the African monsoon responds to insolation forcing in a markedly non-linear manner. In addition, Lake Mega-Chad exerts strong control on global biogeochemical cycles since the northern (Bodélé) basin is currently the World's greatest single dust source, and possibly an important source of limiting nutrients for both the Amazon basin and equatorial Atlantic. However, we demonstrate that the final desiccation of the Bodélé Basin occurred around 1 ka. Consequently, the present-day mode and scale of dust production from Bodélé Basin cannot have occurred prior to 1 ka, suggesting that its role in fertilizing marine and terrestrial ecosystems is either overstated or geologically recent.