



Coherent monsoonal changes in the northern tropics revealed by Chadian lakes (L. Chad and Yoa) sedimentary archives during the African Humid Period

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In northern African tropics, it is now well established that the Last Glacial Maximum (LGM) was extremely dry followed by a wetter Holocene. Numerous palaeolake records reveal a fairly consistent pattern of a moister early Holocene resulting in a green Sahara followed by the onset of aridification about 4000 years ago. These palaeoenvironmental conditions are deciphered from several continental records distributed over the sub-Saharan zone and including diverse environments. However, pronounced differences in the timing and amplitude of these moisture changes inferred from sedimentary records point to both regional climatic variability change and site-specific influences of local topographic-hydrogeological factors which biased the evolution of water balance reconstructed from individual lacustrine archives.

Here we present hydrological reconstructions from Chadian lakes, i.e. Lake Chad (c. 13°N) and Lake Yoa (19°N). Because of their location, both records allow to reconstruct lake level fluctuations and environmental changes according to a gradient from Sahelian to Saharan latitudes. Whereas Lake Chad is considered as a good sensor of climatic changes because of its large drainage basin covering 610,000 km² in the Sudanian belt, Lake Yoa logs the northern precipitation changes in the Sahara. Combining sedimentological (laser diffraction grain size) and geochemical (XRF analysis) data associated with bio-indicators proxies (diatoms, pollen), we compare lake-level fluctuations and environmental changes during the last 12,000 years.

After the hyperarid Last Glacial Maximum period during which dunes covered the Lake Chad basin, both lake records indicate an onset of more humid conditions between 12.5-11 ka cal BP. These resulted in lacustrine transgressions approaching their maximum extension at c. 10.5 ka cal BP. The lacustrine phase was probably interrupted by a relatively short drying event occurring around 8.2 ka cal BP which is well-defined in Lake Yoa by abrupt changes in the diatom flora, while in Lake Chad water levels decreased substantially. The lakes may have reached their highest levels between 8 and 7 ka cal BP until regressions started at about 6 ka cal BP. Lake Yoa, after a rapid change from freshwater to saline diatom species at that time, is characterized by a progressive lowering of its lake level which is punctuated by short humid episodes after 5 ka cal BP. In Lake Chad, the transition occurring at 5 ka BP is more abrupt, indicating a rapid decrease in freshwater input from tropical regions.