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Sediment composition, varve formation and paleolimnology of Lake Yoa, NE Chad

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Lake Yoa (19.03° N / 20.31° E, NE Chad, 380 m a.s.l.) is a groundwater-fed lake in the central Sahara situated in a deflation hollow below an escarpment close to the Chadian-Libyan border. The lake persists since the onset of the Holocene “Green Sahara” 11,000 years ago. It has survived the end of the early to mid-Holocene wet phase until today due to extensive groundwater supply from the so-called Nubian Sandstone Aquifer System. Continuous lake sedimentation has generated an unparalleled depositional archive of Holocene climatic and environmental changes in the presently hyper-arid central Sahara, which is characterized by less than 10 mm of annual precipitation against an annual evaporation of more than 6,000 mm.
An earlier 7.5 m long sediment core from Lake Yoa (OUNIK03/04) has provided unprecedented insight into the past 6,000 years cal BP (Kröpelin et al. 2008). Within the framework of the Collaborative Research Centre 806 “Our Way to Europe - Culture-Environment Interaction and Human Mobility in the Late Quaternary”, the record was extended to the base of the lake sediments at a depth of 16.25 m below the lake floor in 2010 (core Co1240).
Most of the sedimentary column is annually to sub-annually laminated. Varve counting resulted in a highly resolved robust chronology that is supported by AMS radiocarbon dating of various components (bulk sediment, bulk carbonate, humic acids, semi-aquatic plants and charcoal). The core material was examined in a multiproxy approach, including non-destructive geophysical (e.g. magnetic susceptibility) and elemental (XRF scanning) measurements as well as sedimentological, geochemical and paleontological analyses. The data not only give detailed information on changes in the lake body and catchment of Lake Yoa but also on the regional climate and environmental history during the past 11,000 years cal BP.

Kröpelin et al. (2008). Climate-Driven Ecosystem Succession in the Sahara: The Past 6000 Years. Science 320: 765-768. doi: 10.1126/science.1154913