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Multiproxy paleolimnological reconstruction of Lake Victoria's environmental history, East Africa

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Lake Victoria (LV), Africa's largest lake is situated in the African Great Rift Valley. Due to its shallowness (max.68 m; mean 40 m) and limited river inflow, LV is very sensitive to variations in climate and lake level fluctuations. As a result, LV has undergone repeated low stand periods, or even complete desiccation during the Late Pleistocene with profound effects on the aquatic ecosystem. One example is the emergence of a unique biodiversity of endemic cichlid species following the lake's last desiccation event during the last glacial and subsequent refilling commencing ~15,000 years ago.

In an interdisciplinary project we aim at reconstructing linkages between paleoenvironmental variability, disturbances and adaptive species radiation by combining approaches from paleogenomics, paleoecology and paleolimnology. For this purpose, four sediment cores along a depth-transect (near-shore to offshore), covering ca. the past 14,000 years, are analyzed.

We present first paleolimnological results of long-term changes of using (isotope-)geochemical indicators including: Sedimentary pigments and biogenic silica to infer aquatic productivity supported by micro X-ray Fluorescence (XRF) derived element geochemistry, ^{13}C and ^{15}N, and sedimentary phosphorus fraction analyses providing information on changes in sediment composition.

The results suggest that the infilling of the LV basin was a long-term step-wise process. This is shown by elevated and variable indicators for lithogenic input (e.g Ti, Zr and K) and interpreted as mobilization of substrate from the shorelines by a dynamic lake level prior to its stabilization in the Early and Mid-Holocene. This process is mainly reflected in the core taken at the greatest water depth (65 m). Simultaneously, the aquatic productivity (BSi and chloropigments) increased rapidly after the refilling of the lake basin in the Late-Glacial. A gradual drying of the climate and a following shift to a more oxygenated water column is observed in the Mid-to Late Holocene indicated by a decline in chemically weathered material (e.g Rb/K & K/Al ratios) and abundance of Mn.