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Paleoecological reconstruction of Lake Liambezi, Botswana using multidisciplinary proxies

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Lake Liambezi is located at the Eastern side of Caprivi Strip, straddling the border between Namibia and Botswana. The drainage basin of the lake is a large, flat wetland, including some woodlands, which contains a typically slow-flowing floodplain river (Seaman et al., 1978; Peel et al., 2015). The Lake changes its shape, size, and depth seasonally and over the years due to fluctuating contributions of water from its distinct source regions. The lake forms two elongated basins with a South-West to North-West direction joined by a main channel.
The present study is based on multiple methods conducted on the watershed as well as on the lake. The aim is to give a paleoecological interpretation of the lake with isotopic and multi-proxy records. During the two field campaigns conducted during the dry season (September 2016) as well as at the end of the rainy season during March 2017, water from multiple sources of ground and surface waters were collected to better understand the drainage and hydrodynamics (Dyer, 2017). It was also established that the present climate supports a vegetation representing both the C3 and C4 photosynthetic cycles (Ballif, 2018). As they discriminate very differently against 13C during photosynthesis, such that the C-isotope composition of organic matter accumulated in soils or sediments may provide valuable information on the local ecosystem. In parallel to these geochemical studies three cores of 40 cm each were sampled in the lake. Sediments of the cores were first characterized by scanning electron microscopy that indicated a large fraction of diatoms in the sediments. Subsequent isotope analysis of carbon (13C/12C and 14C), nitrogen, hydrogen and oxygen of the organic matter and also RockEval measurements will evaluate the composition and quality of the organic matter. The lithogenic fraction is analysed via X-ray diffraction and fluorescence for the mineralogy and bulk chemical composition. Collectively, these analyses should allow for good estimates of the sedimentation rates, age of the sediment and a paleoecological interpretation that will then be compared to information obtained from endospore forming communities, a novel biological marker proposed in paleoecological reconstructions.

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