

Using organic biomarkers for paleoclimatic and paleoenvironmental reconstruction at low latitudes: the NGAoundaba peat record

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Past climate and environment reconstructions are limited by the availability and quality of the sedimentary archives particularly in the continental domain. As organic-rich sediments, peat deposits are promising archives but their full exploitation for paleoenvironmental and paleoclimatic reconstructions in tropical Africa is still at its beginning [e.g., 1, 2]. In this study, we present a 10-ka multi-proxy record at a centennial time scale resolution from the NGAoundaba peatland (Northeastern Cameroon). Based on bulk geochemical data, a broad panel of lipid biomarkers [isoprenoid and branched glycerol dialkyl glycerol tetraethers (isoGDGT and brGDGT respectively), *n*-alkane distribution and carbon and hydrogen stable isotopic compositions, hopanoids and plant degradation products] and pollen data, we reconstruct Holocene changes in West African temperature, precipitation, vegetation and methane cycle.

The range of δD variation, as recorded by *n*-alkanes, is large compared to other West African sites [e.g., 2, 3]. Mid- and high-elevation tropical peat deposits are generally dominated by sedges growing in a water-laden environment and producing long-chain *n*-alkanes that can be affected by water enrichment through evaporation and thus affect δD variations.

Higher GDGT-based temperatures associated with $\delta^{13}C$ signature of C₃ plant *n*-alkanes and increased precipitation indicated by the δD composition of the C₃₁ *n*-alkane between 10 and 5.8 ka cal BP are consistent with the timing of the African Humid Period [4]. This period is interrupted by a millennial-scale event at 8-9 ka that seems to have affected in-situ microbial production, plant growth and the dynamics of the colonial microalga *Botryococcus braunii*. The impact on local vegetation is not yet clear as long-chain *n*-alkanes are unevenly affected, suggesting a complex response of the local and regional environment. We compare absolute values and relative abundances of GDGT-0 and Crenarchaeol to assess past methanogenic activity. The $\delta^{13}C$ of hopanes is used to assess the

contribution of methanotrophs in bacterial populations.

[1] Aucour et al. (1996) *Chemical Geology*, 129(3-4), 341-359.

[2] Garcin et al. (2022) *Nature*, 612, 277-282

[3] Shanahan et al. (2015) *Nature Geoscience*, 8(2), 140-144.

[4] Demenocal et al. (2000) *Quaternary science reviews*, 19(1-5), 347-361.