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Postglacial fire regime changes and vegetation dynamics at Lake Victoria, Africa

Yunuén Temoltzin-Loranca^{1,2,3}, Erika Gobet^{2,3}, Boris Vannièrè^{2,6}, Jacqueline F.N. van Leeuwen², Colin Courtney-Mustaphi⁵, Giulia Wienhues^{1,3}, Sönke Szidat^{3,4}, Martin Grosjean^{1,3}, and Willy Tinner^{2,3}

¹Institute of Geography, University of Bern, Bern, Switzerland (yunuen.temoltzin@giub.unibe.ch)

²Institute of Plant Sciences, University of Bern, Bern, Switzerland

³Oeschger Center for Climate Change Research, University of Bern, Bern, Switzerland

⁴Department of Chemistry and Biochemistry, University of Bern, Bern, Switzerland

⁵Department of Environmental Sciences, Geoecology, University of Basel, Basel, Switzerland

⁶Université Bourgogne Franche Comté, CNRS UMR 6249 Laboratoire Chrono-environnement, F-25030, Besançon, France

Lake Victoria is the largest tropical lake on the planet. Located in East Africa at an altitude of 1135 m asl, it lies across the limits between two major climatic zones with a temperature and moisture gradient and associated tropical biomes, the rain forest, and the savanna. At higher altitudes > 1200–2500 m a.s.l. temperatures are significantly lower and vegetation forms an Afromontane belt. Primarily triggered by climate shifts, these three biomes and fire regimes have been dynamically interspersing over the last 17,000 years.

Here, we present a robust ¹⁴C chronology mainly based on macroscopic charcoal using the MICADAS system of LARA at the University of Bern, new palynological data used as biostratigraphic control, and the first continuous charcoal record in Lake Victoria to establish the fire history.

Our pollen and macro-charcoal records, support the assumption that throughout time regional fire dynamics are controlled by biome's changes, and that climate was the main driver of these vegetation shifts at least until the Iron Age. Our results indicate that during the Last Glacial Maxima and Heinrich Stadial 1, under dry and colder climates the savanna was dominating, with low fire regimes before 15,000 cal yr BP and increased fire occurrence between 15,000 and 14,000 cal yr BP. After this period, the Afromontane forest started to expand, and warmer and humid climates promoted the growth of rain forests and reduced fire events, which is particularly observed in the African Humid Period (between ca. 11,500 and 5000 cal yr BP). Subsequently, our records indicate a global maximum of fire occurrence at 5000 cal yr BP, followed by unexpectedly low fire regimes during the Iron Age and the subsequent periods.

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