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Changes in atmospheric relative humidity during the Late Holocene reconstructed using the ^{17}O-excess of phytoliths from sediments of Lake Ngofouo (Republic of Congo, Central Africa)

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Atmospheric relative humidity (RH) is used to estimate the vapor pressure deficit (VPD), a parameter which controls soil evaporation, photosynthesis and evapotranspiration. RH and VPD drive the primary productivity and dynamics of the ecosystems, especially in tropics where variations in air temperature are limited. RH and VPD are also important factors to predict the probability of fire occurrence and intensity by controlling the moisture content of fuel. RH is therefore a key parameter to study vegetation-climate interactions. Since the last century, continental RH tend to decrease (and VPD to increase), causing an increased mortality of tropical trees. Past annual precipitation is commonly used to describe past climate variability in tropical regions. Reconstructing past changes in RH, independently of past changes in vegetation, would add a new constrain to investigate past vegetation-climate interactions. The triple isotopic composition of phytoliths expressed by the ^{17}O-excess ($d'^{17}O - 0.528 \times d'^{18}O$) has been recently calibrated to quantitatively estimate RH. The ^{17}O-excess of phytoliths reflects the magnitude of evaporation in leaf water. Here, with the aim to reconstruct past changes in RH, the ^{17}O-excess of phytoliths from late Holocene (~2000 years BP) sediments of Lake Ngofouo (Republic of Congo, Central Africa) is analysed. Prior to isotope analysis, a purification protocol is developed to remove biogenic silica particles other than phytoliths from the purified samples. Phytolith morphological types are counted for vegetation reconstruction. Fires and human impact have been previously reconstructed from the same sedimentary core. The set of proxies shows a decoupling of RH and vegetation changes. A forest-savanna transition can be identified between 1534-1460 years BP, after a decrease in RH and an intensification of the fire regime around 1540 years BP. Despite the subsequent increase in RH, the savanna which burns regularly, remains in the landscape.