The distribution of long-chain *n*-alkan-2-ones in peat can be used to infer past changes in pH

YIMING ZHANG [1,2], XIANYU HUANG [1*], RUICHENG WANG [1], B. DAVID A. NAAFS [2]

[1] State Key Laboratory of Biogeology and Environmental Geology, Hubei Key Laboratory of Critical Zone Evolution, School of Geography and Information Engineering, China University of Geosciences, Wuhan 430074, China.

[2] Organic Geochemistry Unit, School of Chemistry, Cabot Institute for the Environment, University of Bristol, Bristol BS8 1TS, UK

Long-chain *n*-alkan-2-ones are biomarkers ubiquitous in peat deposits, however, their paleoenvironmental significance lacks constraints. Here we evaluate the influence pH exerts on the occurrence of long-chain *n*-alkan-2-ones in peat. A comparison of the distribution in a collection (n= 65) of modern peat samples with different pH (pH values 4.4-8.6) from China demonstrates that their distribution is significantly different between acid and alkaline peat. This difference can be explained by the pH control on the conversion of *n*-alkan-2-one precursor compounds (*n*-alkanes and fatty acids). Transfer functions between pH and *n*-alkan-2-one ratios were established using linear and logarithmic regression models. We then applied these proxies to reconstruct variations of paleo-pH in the Dajiuhu peat sequence to identify the history of peatland acidification over the last 13 kyr. We find significant changes in paleo-pH during the deglaciation/early Holocene and related these to times of dry climate in the region. The drought-induced peat acidification is supported by observations from modern drying events in the peatland. We propose that long-chain *n*-alkan-2-ones in peats have potential to trace paleo-pH changes across the deglaciation and Holocene, although further research from different peatlands and time periods is still needed.