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# Reconstructing abrupt climate changes over the European land mass during the late Holocene using biomarker analysis of ombrotrophic peats

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Ombrotrophic peats provide valuable stratigraphic archives of past climate change, due to the influence of climate over bog vegetation and hydrology. Biomarker proxies show potential for reconstructing past changes in vegetation and water table depth, and for recording meteorological change directly (e.g. temperature, precipitation). These proxies may be particularly important where peat humification has destroyed or decayed the macrofossil record. Here, we test, apply and develop further organic geochemistry techniques to reconstruct past climate change at two ombrotrophic peat bogs: Butterburn Flow in the UK, and at Kontolanrahka in Finland.

We have collected two cores at sites with high peat accumulation rates. At both sites, peat accumulation rates are around 0.1 cm $a^{-1}$, and thus our analyses can be undertaken with decadal-scale resolution. We show that biomarker distributions can be applied to reconstruct past changes in sedge inputs, recorded by 5-$n$-alkylresorcinols, and *Sphagnum* moss inputs, recorded by the chain-lengths of $n$-alkanes and the relative abundance of the *Sphagnum* acid pyrolysis product 4-isopropenylphenol. Differences are observed between the biomarker distributions of the Finnish and British sites, in response to the different vegetation inputs between the two locations. Nonetheless, biomarkers at these sites do reveal changes in bog vegetation and surface

wetness between the warm Medieval Warm Period and cooler Little Ice Age oscillations. The data presented here confirm that organic geochemical analyses are effective in tracing past environmental change within ombrotrophic peat archives. To further evaluate these proxies, we have assessed the impact of peat formation (through the decomposition of surface plant material) on biomarker distributions in the top 20 cm of the peat profile. While we identify changes in biomarker distributions associated with peat formation, these do not impact upon the environmental signal recorded by the biomarkers that we have applied in the two cores analysed here.