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Vegetation responses to abrupt climatic shifts during the Last Glacial-Interglacial Transition: Evidence from a north-south transect across the British Isles

Ashley M. Abrook (1), Ian P. Matthews (1), Alice M. Milner (1), Ian Candy (1), Adrian P. Palmer (1), David J. Maas (2), and Dirk Sachse (2)

(1) Royal Holloway, University of London, Centre for Quaternary Research, Department of Geography, Egham, Surrey, TW20 0EX, United Kingdom (email: ashley.abrook.2012@live.rhul.ac.uk) , (2) Helmholtz-Centre Potsdam, GFZ German Research Centre for Geosciences, Section 5.1 Geomorphology, Organic Surface Geochemistry Lab, Telegrafenberg, 14473, Potsdam, Germany

The Last Glacial-Interglacial Transition (LGIT; 16-8 ka BP) in northern Europe is a well-characterised period of abrupt climatic change where millennial-scale oscillations in climate led to large-scale reorganisation of ecosystems. Imprinted upon these longer-term episodes are a number of centennial-scale climatic oscillations which are far less well understood. These short-lived events appear to be spatially and temporally complex across northern Europe and frequently have either not been identified or are shown to have limited impact. Furthermore, many sequences have not been studied for proxies that provide evidence of a palaeoclimatic driver and vegetative response, or they are not resolved in sufficient detail. Consequently, landscape responses to these abrupt events are largely unknown and phase relationships cannot be adequately constrained.

We present research from a series of sites spanning a north-south climatic gradient across the British Isles, from Orkney to South Wales. The sites contain high-resolution palaeoclimatic data, including oxygen isotopic and chironomid-inferred temperature data, alongside high-resolution vegetation records. Key sequences also contain compound specific isotopic biomarker records. In general, the sequences demonstrate vegetative responses to abrupt climatic change, across millennial and centennial climatic transitions, during the LGIT. However, the characteristics of vegetation responses vary between individual sites. For example, during the Windermere Interstadial, following climatic oscillations, upland sites demonstrate wholescale landscape change with concomitant increases in disturbed ground indicators; whereas, lowland sites show an ‘opening’ of the landscape under similar climatic stress. In contrast, across all mainland sites, vegetation responses during the early Holocene appear muted.

The collection of data presented here also allows for an understanding of the phasing between climate and vegetation response within the sequences. Early Interstadial climatic oscillations appear not to exhibit a significant lag with the vegetation data. This is in contrast with the lag in vegetation response observed in the later Interstadial and early Holocene climatic oscillations. It is likely that a combination of the magnitude of the climatic event, non-linearity in vegetation response and stages of landscape development have important controls over the phasing of climatic drivers and vegetation responses.