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Reconstructing Retreat Dynamics of the British Ice Sheet Using Glacial Lake Sediments

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Modern ice sheets have retreated profoundly during the last century in response to rising global air temperatures. Understanding the rate and pattern of current deglaciation relies on long-term records of ice sheet behaviour spanning several millennia. The British Isles contains such a record, in the form of landforms and sediments preserved from the retreat and breakup of the British-Irish Ice Sheet (BIIS) during the Last Glacial Termination (LGT, c.21-14 ka).

Existing reconstructions of the BIIS are based on geomorphological mapping of landforms, which are inherently discontinuous in their distribution and preservation, and therefore provide only snapshots of glacial history. A more continuous archive is preserved in proglacial lake sediments. These lakes are sinks for glacially-derived meltwater and sediment, and enable continuous, spatially-integrated reconstructions of glacial and foreland environmental change, including annually or seasonally-resolved (varved) records that far exceed the temporal resolution of other techniques. Multiple glaciolacustrine settings have been identified in lowland Britain, but their potential for multiproxy paleo-ice sheet reconstruction remains largely untapped.

We present a new contribution to the reconstruction of the BIIS during the LGT using a suite of physical, chemical, and biological analyses of proglacial lake sediments from the margins of the former Irish Sea Ice Stream, including:

• Sediment characterisation: particle size analysis, macro/micro morphologies and scanning electron microscopy
• Sediment geochemistry: X-ray fluorescence and x-ray diffraction, carbon analysis
• Biological proxies: Biomarkers (GDGTs, long chain Alkanes and BHPs)
• Geochronology: Optically stimulated luminescence (OSL), radiocarbon (14C), varve chronology.

This preliminary analysis examines the use of multiproxy data to produce detailed reconstructions of the timing and nature of BIIS retreat, and provides a platform for further high-resolution analysis.