Geophysical Research Abstracts
Vol. 20, EGU2018-14642, 2018
EGU General Assembly 2018

Proglacial lakes and the deglaciation of the terrestrial-terminating sector of the Irish Sea Ice Stream

Richard Chiverrell (1), Geoff Thomas (1), Rachel Smedley (1), Mark Bateman (2), Matt Burke (1), Chris Clark (2), Geoff Duller (3), Geraint Jenkins (3), Alicia Medialdea (2), and Helen Roberts (3)

(1) University of Liverpool, Environmental Sciences, Geography and Planning, Liverpool, United Kingdom (rchiv@liv.ac.uk), (2) Department of Geography, University of Sheffield, Sheffield, UK, (3) Department of Geography and Earth Sciences, Aberystwyth University, Ceredigion, UK

Proglacial lakes and the subglacial topography were significant regulators of dynamics during the last deglaciation of an extensive ice lobe of the former British Irish Ice Sheet that invaded lowland northwest England and the English Midlands. The eastern sector of the Irish Sea Ice Stream, at the last glacial maximum, extended onto land and then south into the English Midlands as an extensive grounded terrestrial ice lobe. These lowlands received flows from Irish Sea ice and valley glaciers exiting from Wales. New fine resolution mapping of the sediment landform assemblages of Cheshire, Shropshire, Staffordshire and the Welsh borderlands record the advance to maximum limits and the progressive unzipping of the different ice masses during subsequent retreat. The palaeogeography reveals with ice marginal retreat the repeated development and then abandonment of ice contact land-systems with numerous and differing styles of proglacial lake, sandur and moraines. Major sand and gravel quarries in the region reveal the sedimentology of these environments and provided access to deposits for Optically Stimulated Luminescence (OSL) dating. This new chronology exploits parallel approaches of single grain and small aliquot measurements of quartz, and cobble-based luminescence of feldspars in outwash gravels. The new chronology constrains ice marginal retreat to the period after ~25 kyrs, with ice eventually vacating the region by ~22-21 kyrs.

Active oscillation of the ice margin during retreat produced more extensive moraine ridges, with complex terrains of ridges and kettle-basins developing in zones characterised by stagnation of the ice margin. The most substantial deglacial landform in the retreat sequence is the Oswestry-Whitchurch-Barr Hill-Woare moraine complex formed as the ice margins passed northwards of substantial bedrock highs. Lakes were an endemic component of this deglacial landsystem, and comprise a myriad of forms including glacial over-deepenings, both moraine and bed-rock confined ice contact lakes and ice meltout hollows (kettle basins). Late during this deglaciation ice masses sourced from Wales took advantage of the accommodation space vacated by the Irish Sea glacier and advanced crossing-cutting and overprinting the Irish Sea retreat signature with a series of lobate moraine ridges. Retreat northwards and down-wasting of ice meant that individual ice sources increasingly regulated the ice flow dynamics producing the lobate moraine systems in the developing Dee, Weaver basins and the Manchester embayment. Pinned between the 120-140m mid-Cheshire bedrock high and retreating ice margins separate proglacial lake basins developed, and extensive delta have developed (e.g. the Wrexham and Delamere deltas). Ultimately, ice marginal retreat led to the evacuation of the basins and the escape of lake waters west into a deglaciated western Irish Sea basin.