

A Late-Glacial sedimentary sequence at Kilkeel, Northern Ireland: implications for the glaciation of the Irish Sea Basin

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This paper re-evaluates the nature and timing of a Late-Glacial ice sheet re-advance in the north western sector of the Irish Sea basin. The sedimentary archive in the region records the collapse of the Irish Sea Ice Stream, a major outlet glacier of the British-Irish Ice Sheet. The region documents the interplay between southerly flowing Scottish ice, ice flowing southeast from Lough Neagh and locally sourced Mourne ice.

We present the results of sedimentological analysis of a glacial sequence exposed in a modern cliff section ~3 km long between Derryoge and Kilkeel, Co. Down, Northern Ireland. The interaction between an advancing ice-sheet outlet lobe and rapidly changing sea levels are examined using facies analysis and micromorphology.

The section is composed of four lithofacies associations (LAs). These are, from the base, a laminated, fossiliferous and deformed silt (LA1) at least 4.5 m thick that contains lenses of diamicton and discontinuous rafts of sandy gravel. Marine shells form the axis of a fold hinge, part of a lightly tectonised channel fill within the raft. LA1 is overlain by a sandy diamict (LA2) up to 14 m thick containing mainly local clasts with some of northern provenance. Within LA2 are wide channel structures infilled by laminated clayey silts (LA2b). These form deposits up to 14 m thick and contain small-scale folds, discrete shear zones and ball-and-pillow structures. LA2b forms a lithofacies association with LA2, consisting of a lower subfacies of sheared and deformed silts, overlain by sandy diamicton, capped by a striated boulder pavement. These are interpreted to represent retreat/advance cycles of a marine terminating ice margin. Up to five such cycles are identified. LA2 is widely punctuated by fissures and conduits infilled by loose sands and gravels. These are inferred to be emplaced by subglacial meltwater during the final stages of ice sheet advance. Covering both LA2 and LA2b, LA3 is a unit of glaciofluvial outwash, composed of cross-trough stratified sandy gravels, with flame structures indicative of syn-depositional loading. The entire sequence is capped by loose interbedded sands and gravels (LA4) representing a Late-Glacial raised beach.

Evidence of a marine terminating ice margin provides support for high relative sea levels in the north western sector of the Irish Sea during deglaciation. Forthcoming dates from shells with the rafted subaqueous fan deposits underlying LF2 provide the opportunity to constrain either: a) sea-level rise prior to the onset of Irish Sea Basin glaciation, or, b) Late-Glacial sea level rise following deglaciation of the Irish Sea and prior to the re-advance of local ice masses.