



The geomorphology of a glaciated continental shelf, Western Scotland, UK

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Abstract

We present recently collected swath bathymetry and legacy seismic data from two regions of the north-west UK continental shelf: the Sea of the Hebrides; and the Firth of Lorn, western Scotland. Both regions have experienced extensive Pleistocene ice sheet glaciation and both provide abundant geomorphological evidence of subglacial and postglacial processes. The Sea of the Hebrides bathymetry data cover 2200 km² and provide new geomorphological evidence for an ice stream flowing from western Scotland and the Inner Hebrides focusing towards a trough-mouth fan (the Barra Fan) at the continental shelf break during the height of the last glaciation. Notably, bedrock structures provide a control on the location and orientation of glacially overdeepened basins and troughs on the inner shelf. Whilst around the Islands of Canna and Rum, convergent seabed glacial lineations and other subglacially streamlined features eroded in bedrock preserve the direction of ice sheet movement – indicating ice streaming in a south-westerly direction across the continental shelf. We propose that this fast-flow zone formed part of a larger convergent ice stream system draining much of western Scotland and the north of Ireland. The Firth of Lorn bathymetry acquisition comprises 553 km² of data, collected as part of the INIS Hydro program (Ireland, Northern Ireland and Scotland Hydrographic Survey). This region of nearshore continental shelf is revealed as predominantly bedrock-dominated seabed, characterised by a series of narrow, strongly fault-controlled troughs, part of the Great Glen Fault Zone complex. Evidence for glaciation is widespread and well preserved in the Firth of Lorn and surrounding seabed with moraines, bedrock lineations (?megagrooves?) and overdeepened basins common across the area. Initial mapping shows that our understanding of the configuration and style of deglaciation in these sectors of the former British-Irish Ice Sheet can be greatly improved by the collection of these new high-resolution bathymetric datasets.