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Marine geophysical evidence for ice sheet extension and recession on the Irish continental shelf

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Multibeam swath bathymetry data collected by the Irish National Seabed Survey provides evidence for extensive glaciation of the continental shelf west and northwest of Ireland. Streamlined subglacial bedforms on the mid to outer shelf record former offshore-directed ice flow and indicate the ice sheet was grounded in a zone of confluence between ice flowing onto the shelf from northwest Ireland and southwest Scotland. The major glacial features, however, consist of well developed arcuate moraines which mark the position of former ice sheet margins on various parts of the shelf. Distal to these moraines, on the outermost shelf, prominent zones of iceberg ploughmarks give way to the Barra/Donnegal fan and a well developed system of gullies and canyons which incise the continental slope. The moraines record the episodic retreat of lobate grounded ice sheets across this sector of the continental shelf during deglaciation. Initial retreat from the outer shelf was associated with an episode of ice sheet breakup and calving as recorded by extensive zones of iceberg ploughmarks distal to the outermost moraines. This initial phase of retreat may have been driven by rising sea level. The data indicate a major reorganisation of the British Irish Ice Sheet on the shelf during deglaciation; an initial elongate ice sheet configuration extending along the shelf edge changed to a pronounced lobate form during retreat. Consideration of dated, marine stratigraphic records from the wider northwest margin suggests that ice sheet advance to the shelf edge likely occurred at about 29–27 cal ka BP, but that retreat from this shelf edge position did not take place until after 24 cal ka BP. Large-scale contrasts in continental margin morphology west of Ireland, from trough mouth fans in the north to gully/canyon systems further to south, reflects a combination of factors including spatial variations in sediment flux related to palaeo-glaciology.