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Pleistocene ice streaming and marine-margin breakup revealed by multibeam bathymetry data: The Minch, NW Scotland

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Extensive dynamically driven breakup and rapid ice loss is currently ongoing at tidewater margins of the Greenland and Antarctica Ice Sheets, yet few good analogues from the palaeo-record exist. Using ca. 55,000 km2 of echosounder bathymetry data from the continental shelf around NW Scotland we have mapped submarine glacial landforms relating to an ice sheet that covered much of the continental shelf during the Late Pleistocene and had extensive tidewater margins. Focusing on new multibeam bathymetry from the inner part of the shelf (The Minch), we present seabed geomorphological evidence showing breakup of a large marine portion of a palaeo-ice stream within the British-Irish Ice Sheet. Clearly defined, well preserved glacial lineations, elongate bedforms and seabed drumlins indicate former fast flow of a grounded palaeo-ice stream in a northerly direction in The Minch. In addition, the absence of moraines and grounding-line features deposited during ice sheet retreat and the abundance of large overprinted iceberg scours collectively indicate rapid marine-margin breakup by flotation and thinning. We suggest that this marine-margin breakup event was probably driven by unstable ice sheet retreat into shoreward deepening water and was inextricably linked with the abrupt demise of The Minch palaeo-ice stream. Importantly, this new evidence indicates that potentially large areas of the ice sheet margin were floating at times during British-Irish Ice Sheet retreat on the continental shelf. Ongoing work is seeking to date the timing of ice sheet breakup and ice stream demise in northern Scotland.