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Mapping seabed geomorphology in the Inner Hebrides, Scotland; Bathymetric records of ice streaming and retreat

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Approximately 7,000 km^2 of new bathymetry have been stitched together with onshore airborne radar data, both gridded at 5m resolution, to map and describe the submarine glacial landscape of the Inner Hebrides sector of the former British-Irish Ice Sheet (BIIS). As part of the MAREMAP Project (http://www.maremap.ac.uk), and to build on previous work (Howe et al., 2012), we are using recently acquired swath bathymetry data, collected primarily by the UKHO Civil Hydrography Programme, to characterise the geomorphology, sea-bed sediments, and bedrock geology of the Inner Hebrides region.

Mapping has revealed an extensive array of well-preserved glacigenic landforms on the seabed associated with key stages of ice flow and retreat of the BIIS following the Last Glacial Maximum. On multiple submarine rock platforms and within overdeepened troughs, diverse assemblages of glacially streamlined landforms are present, forming a geomorphic continuum between rock drumlins and mega-flutes. Superimposed streamlined bedforms indicate different phases of fast flow at the ice sheet bed, and the convergence of flow sets suggest that ice sheet flow was organised into faster flowing topographically controlled corridors. Across the region, the streamlined landforms occur within a geographically controlled zone, semi-independent of the underlying geology. This is consistent with the onset zone of the Hebrides Ice Stream, as previously postulated (Howe et al., 2012).

Submarine moraine ridges are observed widely across the survey area: within sea lochs, atop rock platforms and superimposed on glacially streamlined bedforms, as well as pinned to topographic highs (i.e. islands). Some retreat patterns reveal clear glacial recession towards respective catchments, while others are more ambiguous and are the focus of ongoing work.

The bathymetry data notably reveal more geomorphic evidence of glaciation than adjacent land records, thus providing the opportunity to reassess onshore mapping where clear offshore examples may provide insights into poorly understood terrestrial geological and geomorphological features. And importantly, these new data provide the opportunity to greatly improve offshore geology maps of the region, which are in increasing demand by governmental, commercial, and conservation groups.