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DEM-based analysis of glacial bedforms in Clew Bay, western Ireland

Jasper Knight (1) and Mike Smith ()

(1) University of the Witwatersrand, Johannesburg, South Africa (jasper.knight@wits.ac.za), (2) University of Plymouth, Plymouth, UK (editor@journalofmaps.com)

Clew Bay, western Ireland, contains abundant late Pleistocene glacial bedforms and long exposures of glacial sediments that have allowed for interpretation of glacial processes and environments during several late Pleistocene ice flow phases. The high density, variety and complexity of different bedform types attest to their potential for a range of processes leading to their formation, as well as the presence of cross-cutting that may have resulted from multiple glacial episodes. Today, many bedforms are present as islands within the bay, reflecting initial ice streaming across the present coastline when sea levels were lower during the last glacial maximum, followed by coastal erosion and island formation during postglacial sea-level rise. Whilst maps of glacial bedforms have been published for both current submarine and subaerial surfaces, there is a problem in combining these two datasets, notably due to a lack of nearshore bathymetric data. This is compounded by the availability of terrestrial digital elevation models (DEMs) that are able to sufficiently resolve the size and morphological complexity of bedforms in the region. Here we present the first glacial bedform map of Clew Bay that combines nearshore LiDAR bathymetry data from the INFOMAR programme, with high resolution 5 m DEM data from Intermap's NEXTMap product for land areas around the bay. For the wider context, 10 m DEM data from the Geological Survey of Ireland are able to resolve larger bedforms and the underlying structural grain. Initial findings from this analysis suggest a complex bedform record demonstrating the existence of large bedforms oriented broadly east-west that have been overidden and reworked by a subsequent glacial event from southeast to northwest. Bedform morphometric patterns vary along these flow paths. Future work will involve a full reconstruction of the palaeoglaciology of the region, including calculations of sediment volume and estimates of potential sediment fluxes associated with the different glacial episodes identified.