



Quantitative bedform characterisation of mega-scale ridge features in the Celtic Sea Ireland: Implications for different formation models

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By far the most significant morpho-sedimentary features of the Celtic Sea shelf are a system of mega-scale, discontinuous, seabed ridges that fan oceanward for over 200km from the mid- to outer shelf. Bathymetric profiling of sections of the ridge system by the RIDGES project (INFOMAR) using data collected during campaigns of the R/V OGS Explora in 2009 (GLAMAR) and R/V Celtic Voyager in 2012 (GATEWAYS), has revealed three types of bedform, at decreasing spatial scales: the ridge segments themselves, transverse ribs and superimposed crenellations. There are competing models for the formation of the features with the prevailing view being that the ridges are out-sized, tidal sand ridges formed during the post-glacial marine transgression by mega-tides. An alternate formation scenario is that the features are post-glacial erosional features carved from the remnants of a formerly continuous BIIS/Fleuve Manche estuarine-deltaic sheet. A third hypothesis envisages the ridges as sub-glacial features formed by meltwater drainage beneath a tidewater ice sheet margin much more extensive than that currently accepted. A precise characterisation of the spatial distribution, orientation and dimensions of bedforms can help establish parameters of the formation processes such as sediment transport direction and magnitude. It can also help identify similar bedforms and processes and so assist in the interpretation of relict features by comparison with their modern analogues, if any. In this study, we perform a quantitative, morphological characterisation of the Celtic Sea ridges and their secondary and tertiary bedform features with a view to testing the competing formation models.