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Deglacial and post-glacial sea-level history for Bantry Bay (SW Ireland) based on offshore evidence

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As part of a large NERC funded project, seven areas around the Irish Sea were investigated in order to provide offshore field data on the depth and age of the relative sea-level (RSL) minimum since the post-Last Glacial Maximum (LGM). Such evidence is currently sparse, resulting in poorly constrained glacio-isostatic adjustment (GIA) models, particularly for areas where RSL was significantly lower than present during the Late Pleistocene and Early Holocene.

We present offshore geomorphological and stratigraphic evidence for a lower than present sea level from SW Ireland (Bantry Bay), and compare our findings with the current GIA model.

Data examined consists of: multibeam bathymetry and backscatter, pinger sub-bottom and vibrocores (25 sites). A bluff line in the outer bay detected on the multibeam in water depths of c. 80 m forms the western edge of a large sediment lobe. The south-western boundary of this lobe is marked by a series of long (up to 22 km), parallel ridges at depths between -96 m and -131 m, with iceberg scouring evident on the offshore margin. This sediment lobe is interpreted as the top of a lowstand delta with the ridges representing ice-marginal submarine morainic or deltaic sediments, reworked by stronger-than-present tidal currents during the lowstand (c. -80 m pre- 14.6 ka cal BP). The bluff line could then represent the eroded northern edge of this lowstand delta.

The seismic data show a prominent unit, which can be traced throughout the basin, sitting on an erosional surface and characterised by a turbid acoustic signature. In the cores, this unit is identified as alternating sand and clay layers with some traces of organic material and gas. The micro-palaeontological data shows an increase in marine and estuarine foraminifera in this unit, becoming predominantly marine in the overlying sediments. Based on the integration of all data, we interpret the erosional surface as the transgressive surface, underlying intertidal-estuarine sediments. A first set of radiocarbon dates indicates that the transgressive unit developed pre-11 ka cal BP between depths of -75 m and -30 m. Mapping the extent of the transgressive surface and comparison of its depth profile with the existing GIA-modelled post-LGM sea-level curve shows clear similarities, especially with respect to the depth of the lowstand, but also displays clear differences. Whereas the model suggests a ‘slowstand’ between 13.5 and 11 ka cal BP, our data indicates the transgression continued at a constant rate. It is envisaged that our results will be used to fine-tune the Earth and ice model parameters in future GIA models.