INFOMAR Integrated Mapping for the Sustainable Development of Ireland's Marine Resource
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Marine Geoscience Report 003

Esker-like Ridges off the South Coast

Overview

The Quaternary Period, which began around 2.58 million years ago (Ma), was marked by repeated glaciations around Ireland. During the most recent glaciation, Ireland and Britain were covered by the British-Irish Ice Sheet. Its largest ice stream, the Irish Sea Ice Stream (ISIS), reached the Celtic Sea during the Last Glacial Maximum, around 24 ka (Ó Cofaigh, et al., 2012). As the ice advanced and retreated, it shaped the Irish landscape and continental shelf, leaving a range of glacial landforms both onshore and offshore. Off the coast of County Waterford, several narrow offshore ridges have been interpreted as possible eskers, as shown in Figure 2 (Tóth, et al., 2020).



Figure 1: Reconstruction of the maximum extent of the Irish Sea Ice Stream across the Celtic Sea during the Last Glacial Maximum, with ice-flow directions indicated by red arrows. Image from (John, 2019).

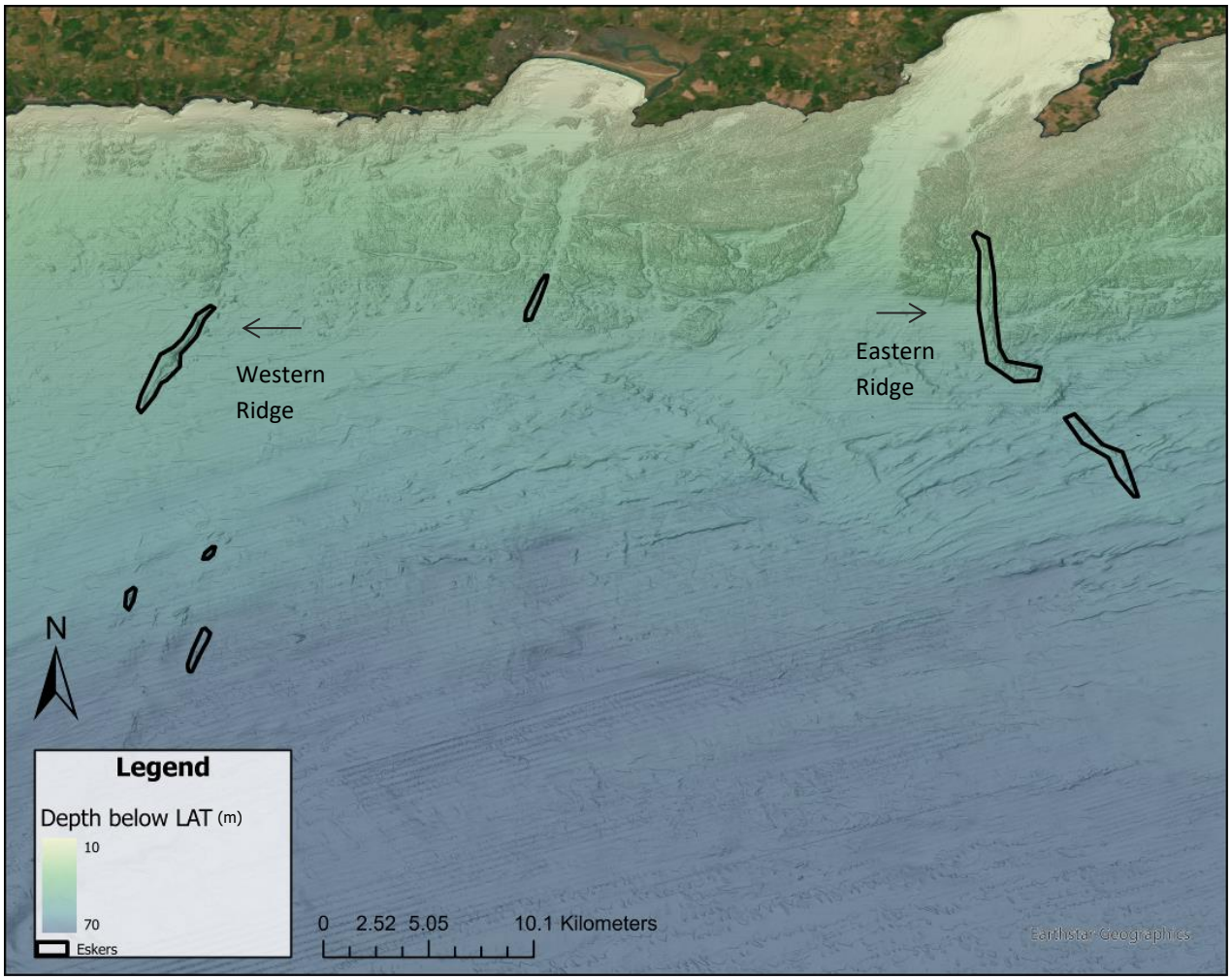


Figure 2: Bathymetry of the seabed off County Waterford, with esker-like ridges outlined in black and the western and eastern ridges indicated. Depths are referenced to Lowest Astronomical Tide (LAT).

Eskers

Eskers are meandering ridges of sand, gravel and occasional boulders that form in glaciofluvial environments. They develop when meltwater flowing through tunnels within or beneath a glacier deposits coarse sediment along its route (Butcher, 2020). When the ice retreats, the sediment ridge is left behind, marking the former course of the meltwater channel. The size, shape and continuity of an esker reflect the discharge, sediment supply and stability of the meltwater system that formed it.

Esker-like Ridges in the Celtic Sea

Several esker-like ridges are visible in the bathymetry off the coast of County Waterford, reaching up to 5 km in length and rising more than 2 m above the surrounding seabed. The western ridge trends NNE – SSW, while the eastern ridge follows a more N – S orientation. These alignments are consistent with southward subglacial meltwater drainage. Tóth et al. (2020) interpreted a N – S ridge in this area as an esker associated with a restricted advance of Irish-sourced ice onto the Celtic Sea shelf.

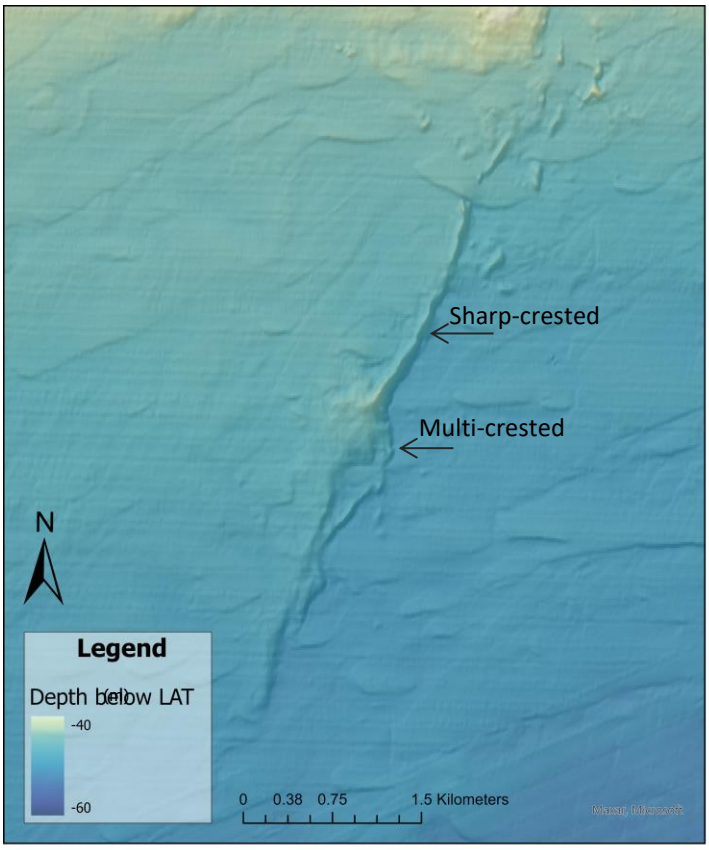


Figure 3: Bathymetry of the western ridge, with sharp-crested and multi-crested sections indicated.

The western ridge is narrow and elongate, and rests on the underlying bedrock surface (Tóth, et al., 2020). Located in water depths of between 40 m and 50 m below LAT, the ridge varies from sharp-crested to multi-crested along its length.

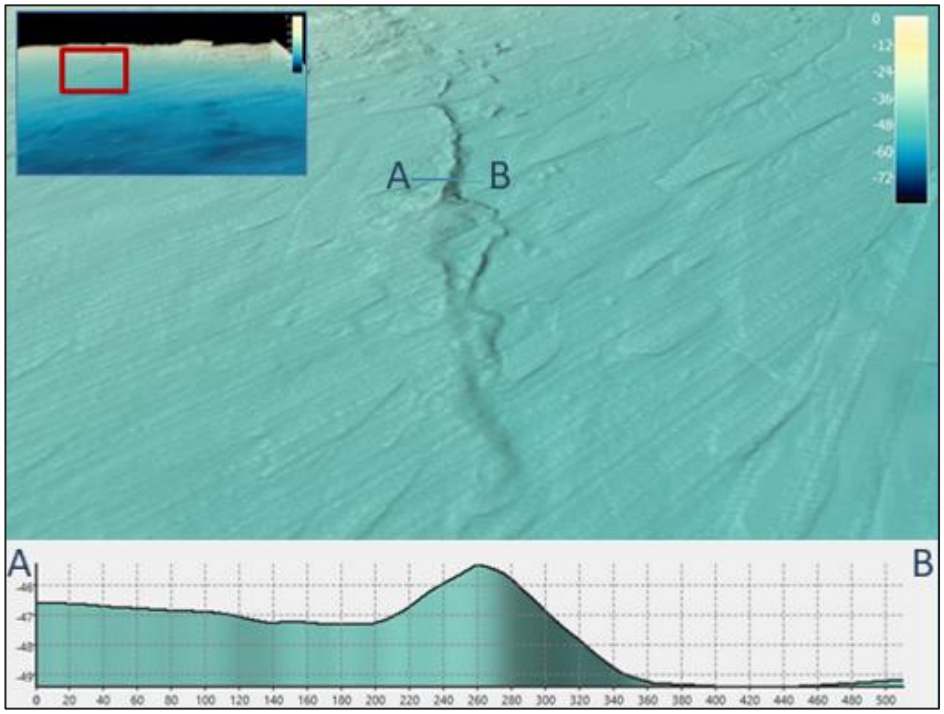


Figure 4: Elevation profile of the western ridge, with an overview location inset.

In contrast, the eastern ridge is less clearly defined, and more sinuous in nature, occurring at depths between 30 and 50 m.

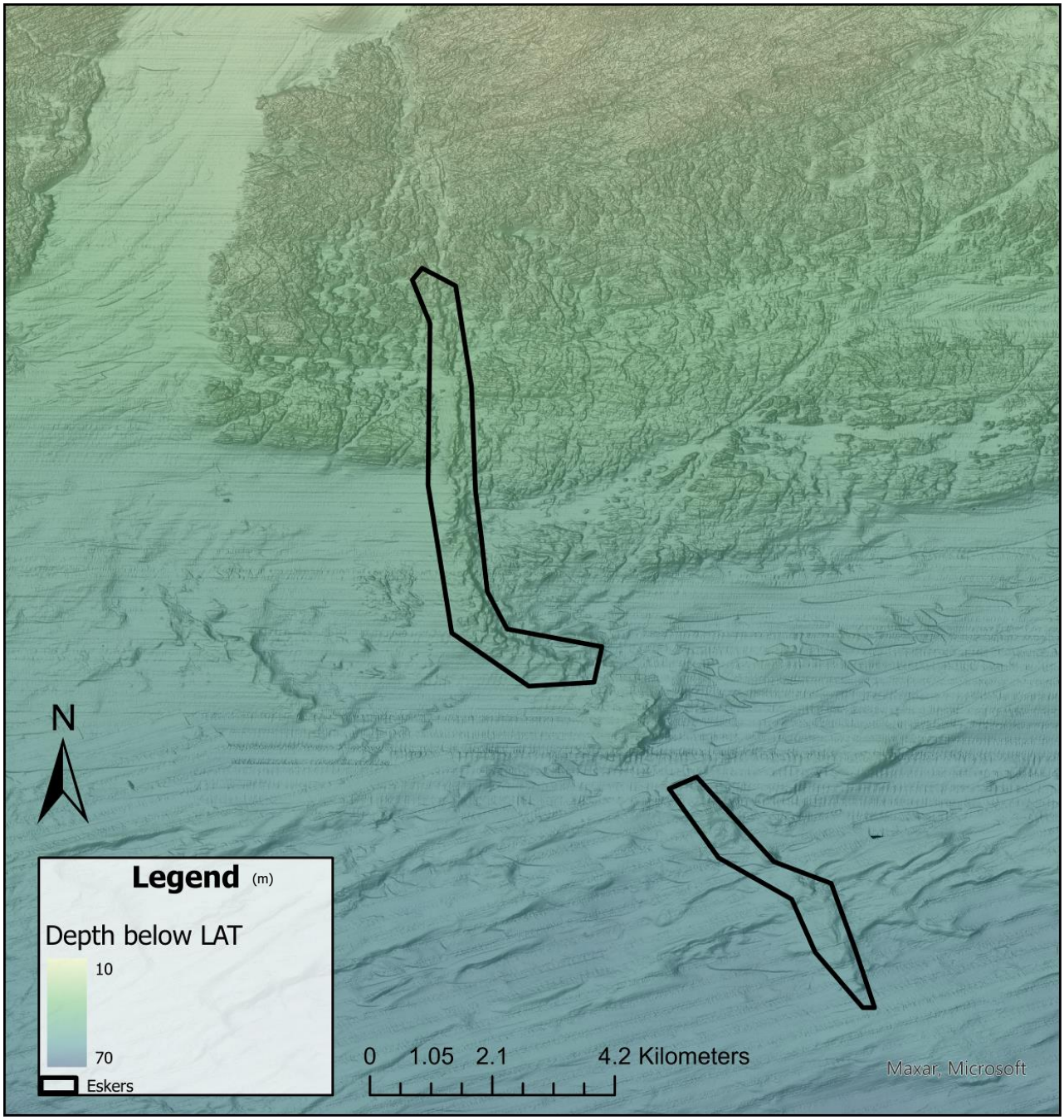


Figure 5: Bathymetry of the eastern ridge.

These ridges have been identified as eskers based on their narrow, elongated, and occasionally sinuous forms, with automated identification processes carried out by (Arosio, et al., 2023) further supporting this interpretation. Their alignment with onshore eskers also supports a glaciofluvial origin, as shown in Figure 6. Sediment cores would help establish whether the ridges contain the stratified sand and gravel typical of eskers. A moraine origin is possible, but is less consistent with the narrow, sinuous morphology and mapped alignment of these ridges (Earle, 2015).

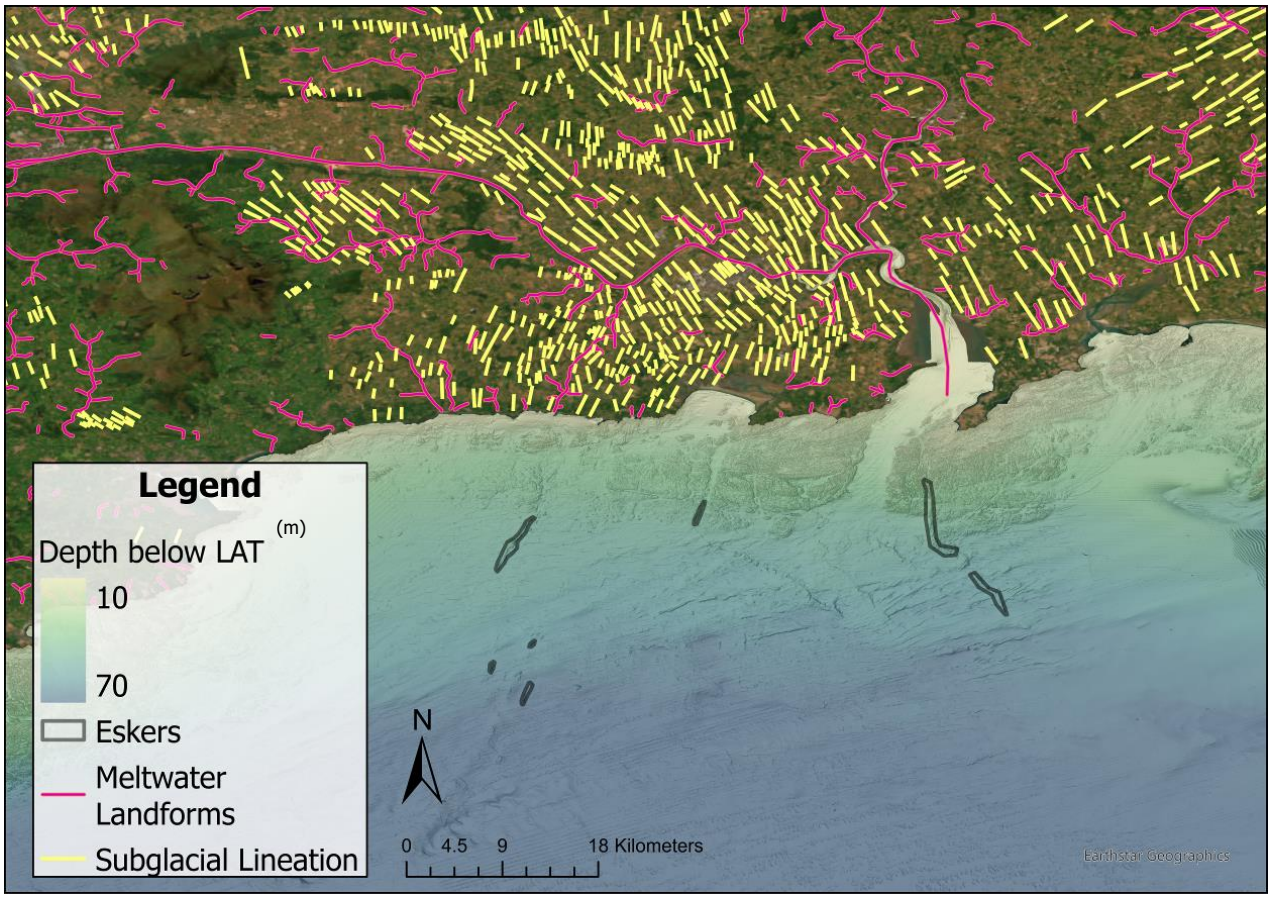


Figure 6: Onshore glacial landforms shown alongside offshore bathymetry, with esker-like ridges outlined.

Conclusion

The esker-like ridges off County Waterford may preserve evidence of subglacial meltwater drainage associated with glaciation of the northern Celtic Sea shelf. Their form, orientation and alignment with onshore glacial features support a possible glaciofluvial origin, although their formation and relationship to different phases of ice advance and retreat remain uncertain. Sediment cores would be needed to confirm whether they are true eskers, but their preservation on the seabed helps link onshore and offshore glacial records along Ireland's south coast.

Bibliography

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