

Late Quaternary channel systems in the southern North Sea

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The southern North Sea underwent a complex geological evolution greatly influenced by glacial and interglacial periods^{1,2}. During the last glaciation (115-11.7 ka BP), substantial climatic fluctuations occurred leading to a major drop in global sea levels by ~120 m below present sea levels³. The rapidly oscillating climate resulted in different depositional environments, the evidence of which is now retained in the offshore deposits. As the area offers a unique window into paleoenvironmental changes, this study aims to map the glacial and post-glacial depositional systems southeast of Dogger Bank and Oyster Ground.

For this work, we used high-resolution 2D acoustic reflection data, acquired between 2022 and 2023 as part of the WALDO's* project surveys and lower-resolution 3D seismic datasets of the SNS MegaSurvey provided by Petroleum Geo-Services. The 2D and 3D data integration has permitted us to extensively map the main stratigraphic units and important geomorphological features preserved in the area. Complex glacial sequences and buried incised valley-like features dominate the regional stratigraphy. The features are variable in size with multi-phase infill, locally incising the older glacial deposits. Detectable at depths between 35-50 m and traceable to depths up to 80 m below MSL, the incisions illustrate diverse morphologies, including straight, meandering and braided patterns.

The processes that shape such features are crucial for paleolandscape reconstruction, yet they are often challenging to determine. According to our current hypothesis, their formation could be related to glacial processes (e.g., subglacial/proglacial meltwater channels), which were thereafter altered by fluvial processes. Ultimately, this study seeks to advance our understanding of (a) the main processes responsible for the genesis and age of the incisions, (b) their morphological characteristics, (c) the evolution of these features over time, and (d) the depositional environment and processes in the area. Findings derived from this study will contribute significantly to providing insights into the depositional history and geological processes that have influenced the southern North Sea during the Quaternary.

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