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Seismic stratigraphic architecture of the Disko Bay trough-mouth fan system, West Greenland

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Spatial and temporal changes of the Greenland Ice Sheet on the continental shelf bordering Baffin Bay remain poorly constrained. Then as now, fast-flowing ice streams and outlet glaciers have played a key role for the mass balance and stability of polar ice sheets. Despite their significance for Greenland Ice Sheet dynamics and evolution, our understanding of their long-term behaviour is limited. The central West Greenland margin is characterized by a broad continental shelf where a series of troughs extend from fjords to the shelf margin, acting as focal points for trough-mouth fan (TMF) accummulations. The sea-ward bulging morphology and abrupt shelf-break of these major depositional systems is generated by prograding depocentres that formed during glacial maxima when ice streams reached the shelf edge, delivering large amounts of subglacial sediment onto the continental slope (Ó Cofaigh et al., 2013). The aim of this study is to unravel the seismic stratigraphic architecture and depositional processes of the Disko Bay TMF, aerially the largest single sedimentary system in West Greenland, using 2D and 3D seismic reflection data, seabed bathymetry and stratigraphic information from exploration well Hellefisk-1. The south-west Disko Bay is intersected by a deep, narrow trough, Egedesminde Dyb, which extends towards the southwest and links to the shallower and broader cross-shelf Disko Trough (maximum water depths of > 1000 m and a trough length of c. 370 km). Another trough-like depression (trough length of c. 120 km) in the northern part of the TMF, indicating a previous position of the ice stream, can be distinguished on the seabed topographic map and the seismic images. The Disko Bay TMF itself extends from the shelf edge down to the abyssal plain (abyssal floor depths of 2000 m) of the southern Baffin Bay. Based on seismic stratigraphic configurations relating to reflection terminations, erosive patterns and seismic facies (Mitchum et al., 1977), the TMF succession has been divided into five seismic units, each representing different stages in the progradational accumulation of the TMF system. This poster and ongoing study will discuss how the ice-stream flow switching is linked to changes in depocentres of sedimentary sequences and further investigate the major controls, e.g. ice-sheet dynamics, ocean-climate changes, tectonic forcing and subglacial geology, that determined the evolution of the Disko Bay TMF.

Essencial bibliography

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