

## **3D-seismic observations of Late Pleistocene glacial dynamics on the central West Greenland margin**

Julia Hofmann (1), Paul Knutz (2), and Colm Ó Cofaigh (3)

(1) Geophysics Department, Geological Survey of Denmark and Greenland (GEUS), Copenhagen, Denmark (juh@geus.dk),  
(2) Geophysics Department, Geological Survey of Denmark and Greenland (GEUS), Copenhagen, Denmark (pkn@geus.dk),  
(3) Department of Geography, Durham University, Durham, UK (colm.ocofaigh@durham.ac.uk)

Fast-flowing ice streams and outlet glaciers exert a major control on glacial discharge from contemporary and palaeo ice sheets. Improving our understanding of the extent and dynamic behaviour of these palaeo-ice streams is therefore crucial for predictions of the response of ice sheets to present and future climate warming and the associated implications for global sea level. This poster presents results from two 3D-seismic surveys located on the shelf adjoining the Disko Bay trough-mouth fan (TMF), one of the largest glacial outlet systems in Greenland. Located at the seaward terminus of the c. 370 km long cross-shelf Disko Trough, the Disko Bay TMF was generated by highly efficient subglacial sediment delivery onto the continental slopes during repeated ice-stream advances. A variety of submarine glacial landform assemblages are recognised on the seabed reflecting past ice-stream activity presumably related to glacial–interglacial cycles. The 3D-seismic volumes cover the shallow banks located north and south of the Disko Trough. The focus of this study is the seabed and the uppermost stratigraphic interval associated with the Late Stage of TMF development, presumably covering the late Pleistocene (Hofmann et al., submitted). Seabed morphologies include multiple sets of ridges up to 20 m high that extend in NW-SE direction for c. 30 km, and cross-cutting curvilinear furrows with maximum lengths of c. 9 km and average depths of c. 4.5 m. Back-stepping, arcuate scarps facing NW define the shelf break on the northern survey, comprising average widths of c. 4.5 km and incision depths of c. 27.5 m. The large transverse ridge features on the southern survey are likely ice-marginal and are interpreted as terminal moraine ridges recording the existence of a shelf-edge terminating, grounded Late Weichselian ice sheet. The furrows, most prominent on the outer shelf adjoining the shallow banks and partly incising the moraine ridges, are interpreted as iceberg ploughmarks suggesting the transition between grounded ice and a glacial marine setting. The back-stepping scarps are suggestive of slide scars that were created as a result of mass movement induced by instabilities along the NW slope. The buried section contains morphologies indicating an asymmetric feature with a steeper side facing south. It comprises a thickness of c. 100 m and a length of c. 28 km. The detailed surface observations and seismic geometries suggest that the northern area represents a relict grounding-zone wedge (GZW). The wedge is covered by stratified deposits suggesting that it was at least occasionally submarine after its formation and may have served as pinning-point for floating ice shelves during periods of the Late TMF Stage. Important implications of the study are the intermittent development of floating ice shelves during the course of the Late Stage of TMF development and the presence of shelf-edge terminating grounded Late Weichselian ice outside of the troughs.

Hofmann, J.C., Knutz, P.C., Nielsen, T., Kuijpers, A., submitted. Seismic architecture and evolution of the Disko Bay trough-mouth fan, central West Greenland margin. *Quaternary Science Reviews*.