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Morphology reveals deglaciation patterns of the Laurentide Ice Sheet in the Clyde Inlet fjord-cross-shelf trough system, eastern Baffin Island (Arctic Canada)

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The maximal extent and subsequent deglaciation of the Laurentide Ice Sheet (LIS) across eastern Baffin Island during the last glacial cycle (MIS-2) has been widely debated during the last decades as different palaeo-glaciological models have been proposed. Spatial and temporal variability of ice sheets extension during Quaternary glaciations complicate the establishment of a reliable reconstruction of the ice dynamics in the area. Furthermore, the lack of geophysical data in most of the fjords, and seaward, makes it difficult to reconcile the proposed terrestrial and marine glacial margins. High-resolution swath-bathymetric data, collected between 2003 and 2017, display a diversity of glacial bedforms in the Clyde Inlet fjord-cross-shelf-trough system (Eastern Baffin Island, Arctic Canada). These bedforms reveal a potential position of the LIS margin during the Last Glacial Maximum (LGM) near the shelf break. Early deglaciation of the Clyde Trough was marked by an initial break up of the ice sheet. This rapid retreat of the ice margin was punctuated by episodic stabilizations forming GZWs. This retreat was followed by a readvance and subsequent slow retreat of the LIS, as indicated by the presence of recessional moraines. Long-term stabilizations within the trough possibly coincided with major climatic cooling episodes, such as the end of Heinrich event 1 (H1) and the Younger Dryas. However, these stabilizations appear to have been influenced by topography, as GZWs can be found at pinning points in the trough. Deglaciation of the fjord occurred during the early Holocene and was faster, probably due to increased water depths. The presence of multiple moraine systems however indicate that deglaciation of Clyde Inlet was marked by stages of ice margin stabilization.