Geophysical Research Abstracts
Vol. 21, EGU2019-8468, 2019
EGU General Assembly 2019

The deglaciation of the NW Barents Sea – new insights from swath-bathymetry and sub-bottom profiler data from east of the Svalbard archipelago

Tom Arne Rydningen (1), Vårin Trælvik Eilertsen (1), Matthias Forwick (1), Katrine Husum (2), Amando Lasabuda (3), Jan Sverre Laberg (1), and Ulysses Silas Ninnemann (4)

(1) Department of Geosciences, UiT The Arctic University of Norway, Tromsø, Norway , (2) Norwegian Polar Institute, Tromsø, Norway, (3) Research Centre for Arctic Petroleum Exploration (ARCEx); Department of Geosciences, UiT The Arctic University of Norway, Tromsø, Norway, (4) Department of Earth Science, University of Bergen, Bergen, Norway

With the decay of marine-based ice sheets observed today, e.g. in Antarctica and Greenland, there is a pressing need also for an improved understanding of marine paleo-ice sheets and their decay, as they provide critical constraints for a better understanding of the dynamics of modern ice sheets and their future behavior.

Here we present new multi-beam swath-bathymetry and high-resolution Topas seismic data from the NW Barents Sea acquired during the Nansen Legacy (https://arvenetternansen.com/) Paleo-cruise in 2018, which provide new insights on the deglaciation history of the marine based Svalbard-Barents Sea Ice Sheet. Previous multi-beam data from the straits and troughs east of the Svalbard archipelago provided unclear or even conflicting evidence of full-glacial flow; i) eastwards, through the Erik Eriksen Strait and its eastward continuation, terminating in the Franz Victoria Trough, and ii) northwards through the Kvitøya Trough (Dowdeswell et al., 2010; Hogan et al., 2010).

The new data provide evidence of a dynamic ice-sheet retreat during the deglaciation of the Erik Eriksen Strait and its eastern extension. A succession of superposing transverse ridges with a zig-zag like morphology characterize the eastern part of the mapped area. These ridges are interpreted to be recessional push-moraines, resulting from several smaller re-advances of the ice front during overall retreat through this part of the strait. To the west, ridges are buried by a ∼40 m high and 20 km long sedimentary wedge, characterized by a smooth surface. The internal seismic configuration of the wedge is transparent. This sediment accumulation is interpreted to be a grounding zone wedge that likely formed during a major eastward oriented re-advance of the Svalbard-Barents Sea Ice Sheet during the deglaciation, burying some of the older recessional push-moraines. Thus, the eastward flow previously identified may be due to a major re-advance during the deglaciation rather than formed during full-glacial conditions.

A ∼3 msec thick layer of acoustically transparent sediments covering the grounding zone wedge and the recessional push-moraines, has been ground-truthed by gravity cores, both in front (east) of, and on top of the wedge. Radiocarbon dating will provide a minimum age for the formation of the glacial landforms, and thus add to our knowledge on the timing and dynamics of the retreat of this marine-based sector of the Svalbard-Barents Sea Ice Sheet following the Last Glacial Maximum, and this will enable improved modelling of this marine-based ice sheet.

References:
Dowdeswell, J.A., Hogan, K.A., Evans, J., Noormets, R., Ó Cofaigh, C., and Ottesen, D. (2010). Past ice-sheet flow east of Svalbard inferred from streamlined subglacial landforms. Geology, 38(2), 163-166.
Hogan, K.A., Dowdeswell, J.A., Noormets, R., Evans, J., Cofaigh, C.Ó., and Jakobsson, M. (2010). Submarine landforms and ice-sheet flow in the Kvitøya Trough, northwestern Barents Sea. Quaternary Science Reviews, 29(25), 3545-3562.