Geophysical Research Abstracts
Vol. 20, EGU2018-11937, 2018
EGU General Assembly 2018

Millennial-scale changes in oceanic influence on the northern Barents Sea deglaciation and environments over the last termination

Elena Ivanova (1), Ivar Murdmaa (1), Anne de Vernal (2), Bjørg Risebrobakken (3), Sergey Pisarev (1), Camille Brice (2), and Alexander Peyve (4)

(1) Shirshov Institute of Oceanology, Russian Academy of Sciences, Moscow, Russian Federation (e_v_ivanova@ocean.ru), (2) GEOTOP, Université du Québec à Montréal, Canada , (3) Uni Research Climate, Bjerknes Centre for Climate Research, Bergen, Norway, (4) Geological Institute, Russian Academy of Sciences, Moscow, Russian Federation

The Barents Sea (BS) offers a suitable location for documenting changes in advection of warm and saline Atlantic Water (AW) into the Arctic and its impact on ice sheet decay and sea-ice cover during the postglacial. Here we investigate the timing, succession, and mechanisms of millennial environmental changes during the transition from proximal glaciomarine to marine conditions in the northern Barents Sea (BS) comparing to other locations on the route of subsurface AW flow from the Fram Strait to the Laptev Sea. The new high-resolution multi-proxy records from the northwestern BS troughs (cores S2528 and S2519) demonstrate that the glacio-eustatic sea-level rise led to AW penetration beneath the glacier ice in the northern (but not southern) part of the study area since the early deglaciation, notably during the Heinrich Stadial 1. This is in line with a built up of heat reservoir in subsurface-to-intermediate water layer in the North Atlantic with its further propagation to the Arctic. As a result, the glacier melting from below promoted the ice streams activity as well as the northward iceberg transport in newly formed freshened basins of the northern BS. During the Bølling-Allerød, atmospheric and oceanic warming and associated resumption of deep water formation in the North Atlantic fostered the ice sheet margin retreat to the land which led to cessation of iceberg calving and rafting and to formation of gravity driven melt-water suspension flows. Planktic and benthic foraminifers imply the AW influx to the northern BS in subsurface-to-bottom layer which is supported by the small difference in their oxygen isotope values as well as by high content of epifaunal benthic species. Dinocyst data suggest milder subarctic conditions in surface waters. On the contrary, a relatively light planktic and benthic oxygen isotope excursion reflects freshwater/meltwater discharge from the Arctic Ocean together with strong isotopically-light brine formation at the YD. The concurrent dynocyst data indicate dense seasonal sea-ice cover and low bioproductivity in the northern part of the study area whereas high foraminiferal abundance documents an occurrence of a high-productivity polynya in the southern part. The high content of the Atlantic-affiliated benthic fauna at B/A and YD and concurrent dominance of dense sea-ice indicators in dinocyst assemblages point to a decoupling between surface and subsurface conditions which persisted until ca. 8 cal ka BP. This conclusion indicating stronger oceanic influence in subsurface-to-bottom water layer in the BS is supported by the published data from several locations on the Atlantic water passage to the Arctic. Thus, the presented data suggest several millennial-scale events of increased Atlantic and/or Arctic impact on the BS environments during the last glacial termination. The study is partially supported by the Russian Science Foundation project 14-50-00095.