

Reconstruction of early Holocene paleoclimate and environment in the SW Kola region, Russian Arctic

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In the current period of the global climate change it becomes necessary to have a clear understanding of not only the changes taking place in the components of the natural environment, but also to understand development of all interactions between those components. Quaternary terrigenous sediments and lakes of the Kola Peninsula store information about the development of the region in the Late Glacial and Holocene: movements of the glacier, neotectonic activity, post-glacial rebound, formation and development of natural environments after deglaciation. Multi-proxy study of landscapes evolution of the Kola Peninsula in the Late Quaternary will help to establish a detailed reconstruction of climatic and environmental changes of this poorly studied sector of the Arctic. Quaternary history on the Kola Peninsula is represented mainly by Late Pleistocene and Holocene sediments covering the Baltic Shield (Lavrova, 1960; Evzerov, 2015).

Several palaeolimnological investigations in the Baltic Shield area have been performed earlier (Donner et al., 1977; Anundsen, 1985; Berglund, 2004). Studies of the southern coast of the Kola Peninsula have shown that marine transgression took place in the Late Pleistocene that was then replaced by a regression with variable speed. The slowdown of the uplift of the area took place between 8800 - 6800 BP (cal. years) and corresponded to the time of the Tapes transgression of the Arctic Ocean (Evzerov et al. 2010; Kolka, et al., 2013).

Palaeoclimatic studies based on micro-paleontological analyzes indicate uneven development of the Kola Peninsula landscapes in the Late Glacial and Early Holocene. The northern coast of the Peninsula became free of ice first. In this area tundra-steppe vegetation was established for a short time and was later replaced by tundra (Snyder et al, 2000). Southern part of the Kola Peninsula was dependent on the conditions of deglaciation of the White Sea basin and cleared of ice much later (Evzerov et al., 2010; Kolka, et al., 2013). Reconstruction of the Early Holocene average July air temperatures based on chironomid analysis showed that in the middle of the Peninsula air T July were around + 10.3°C which is below the modern values. A sharp warming took place then during the Mid Holocene optimum (Ilyashuk, 2000; Ilyashuk, 2013). The reconstructed Early Holocene T July of the southern part of the Peninsula are similar to the modern T July + 12°C.

For a detailed reconstruction of paleogeographic environments of the south-western part of the Kola Peninsula in Holocene we studied the valley of Kolvica river and the southern shore of lake Kolvitsa (67.01-67.11 N; 33.17-33.48 E). Analysis of lithological sequences and radiocarbon dating of sediments of small lakes present a clear outline of the development of the studied region from 9.3 14C ka (10.5 cal. ka BP) to the present day. Based on micro-paleontological analyzes we performed a qualitative reconstruction of climatic conditions during the Holocene, which shows a clear change of cooling and warming in the studied area, as well as the dynamics of the White Sea coastal zone and the development of the studied lake basins.

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