

RECONSTRUCTION OF PALEOBASINS OF LARGE LAKE SYSTEMS OF THE SOUTHEASTERN PERIPHERY OF THE CANDINAVIAN ICE SHEET IN THE LATE PLEISTOCENE

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Abstract. The work is based on GIS-technology includes the systematization of spatio-temporal data and studies transformation of the paleogeographic situation within Ladoga and Onega lakes basins; reconstruction of the changes in the boundaries of large periglacial water bodies as a result of deglaciation, glacioisostatic and neotectonic movements and, in a result changes in the direction of river flow systems.

Material and methods. GIS-modeling was accomplished using ArcGIS software on the base of original digital elevation model of the lakebed and its watershed. A digital relief model (DEM) of the research area was developed and based on open sources. The reconstructions for all periods were unified, had spatial resolution 90 m and a strict geographic conjunction. Paleo-levels of reservoirs were constructed in different historical periods, taking into account isostatic and peat deposits. Reconstructions were originated from the ideas of the deglaciation model proposed by A. Hughes and the data of M. Eckman concerning Lake Ladoga depression isostatic uplift in the Holocene. The work is focused on the crucial moments in the history of the territory development which is associated with the change in the direction of the watercourses: the runoff from Onega Lake to Ladoga Lake on the Oyat River, from Onega Lake to Ladoga Lake on the Svir River, from Ladoga Lake to the Baltic sea along the Vuoksa River and the formation of the Neva River and catching area was analyzed. Ten paleogeographic maps were developed as a result.

Results. As a result of the reconstruction we identified 3 main stages of the Ladoga-Onega lake system: deglaciation, drainage and modern state.

The main factor of the first stage(Fig.1) is the contact between the boundaries of the lake and the glacier and its rapid retreat which had an impact on formation Lake Onega (16ka) and Lake Ladoga (12 ka). Initially Lake Onega was connected with The Caspian Basin. 15ka was occurred the formation of the southern shore of Lake Onega. At that time river runoff was carried out through the Onega River or Oyat River. 14ka - The breakthrough of Lake Onega across the Svir River into the Ladoga Lake.

Factor unites the second stage(Fig.2) is a decrease of lake levels. Preboreal and the Boreal the level of Lake Ladoga rosed to 18-25 m and for a long time there was a strait in northern part of the Karelian Isthmus, connecting Lake Ladoga and the Baltic Sea. In Atlantic period the level of Lake Ladoga fell below the current level.

Stage 3 (Fig.3) shows the recent changes in the level of lakes, Neva River formation and the direction of the runoff which leads to the current state.

Conclusions. GIS-based reconstructions of Onego Lake and Ladoga Lake development in the Holocene and the Late Pleistocene are presented on the poster. During the development of the lakes systems, the main stages were identified, showing either a change in the flow direction occurred, or a sharp change in the water levels at the reservoirs. The next step in this research will be calculating of the main morphometric characteristics of lakes - volume and the average depth for each of the considered historical periods. The results of the work will be used in the paleolandscapes reconstruction and development modeling of natural processes in Northern Europe.

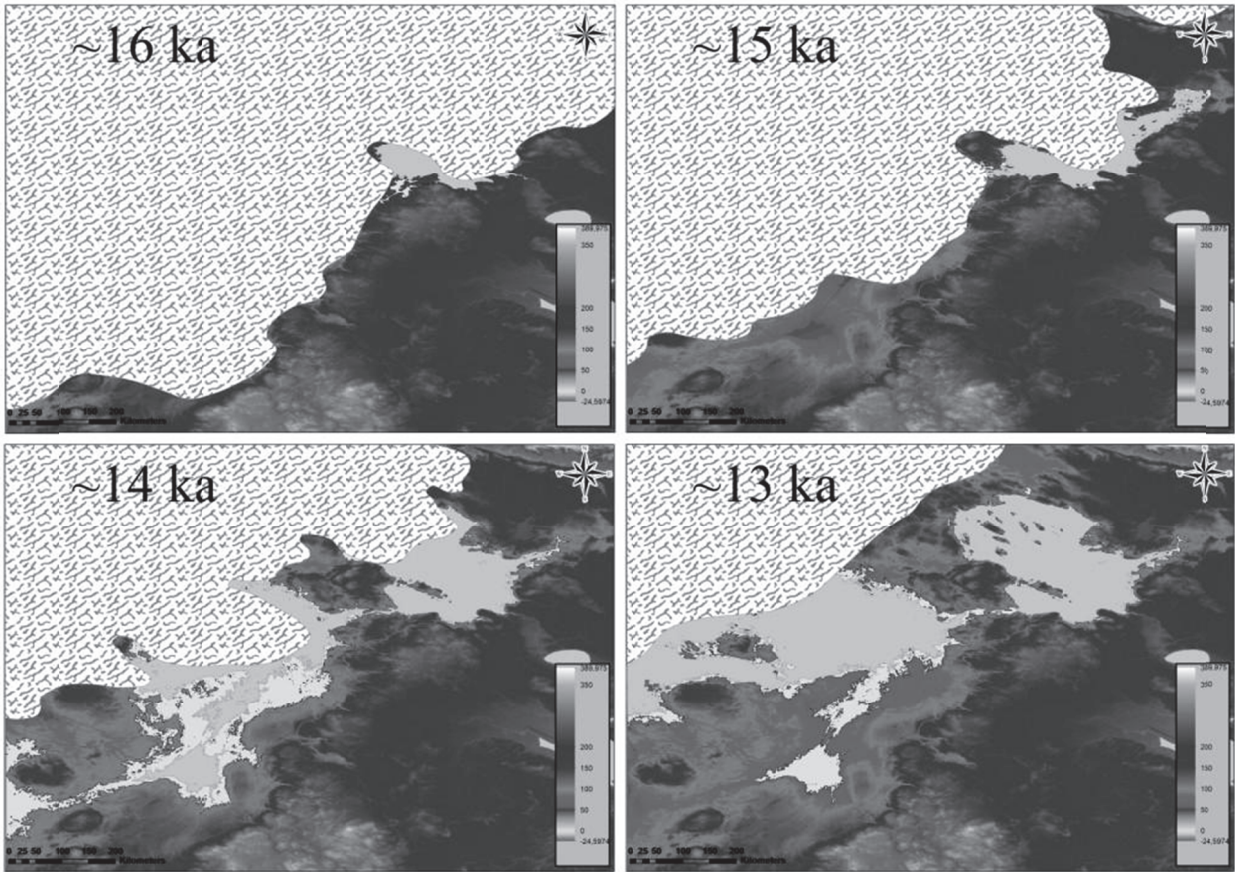


Fig. 1. Stage 1 The deglaciation of lakes

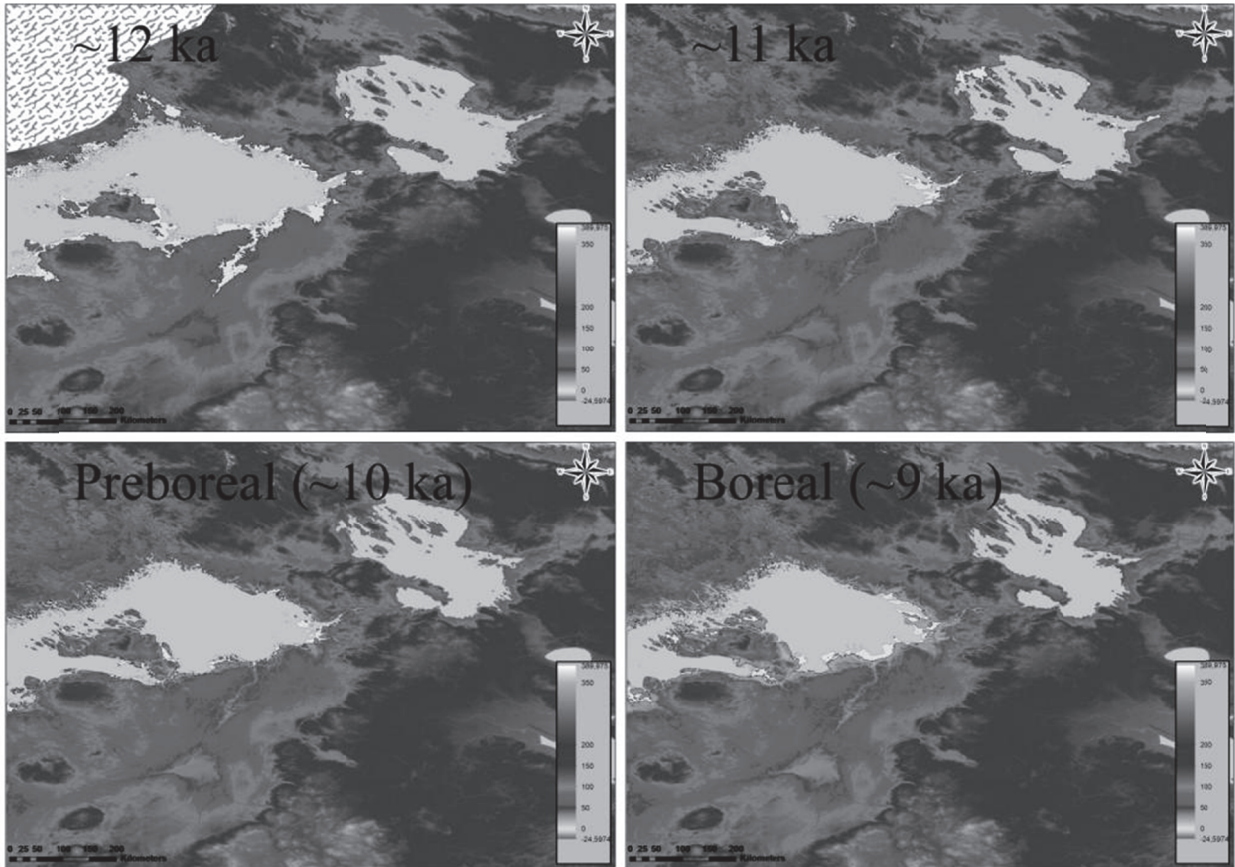


Fig. 2. Stage 2 Drainage

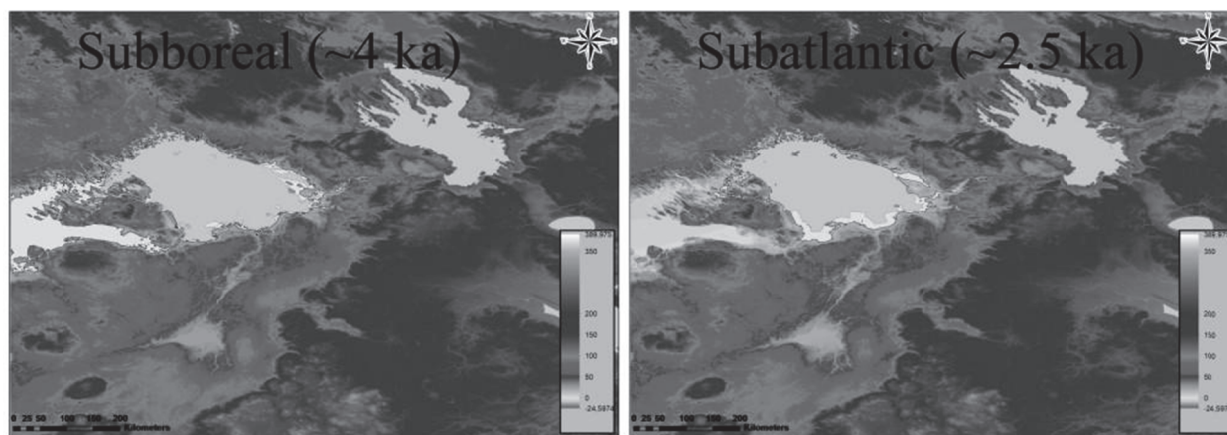


Fig. 3. Stage 3 Modern condition

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