Transformation of the Lake Ladoga–Baltic Sea water connection during the Holocene

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1. In this presentation we will present results of complex paleolimnological and archeological studies several lakes in the Karelian Isthmus, NW Russia, located along the former Ladoga-Baltic water-system connection. Complementary field expeditions were organized in 2007 and 2008 in order to core lakes Volojarvi, Makarovskoye, Lamskoye, Uzlovoye and a lake on the Isl.Puutsaari, Northern Ladoga.

2. The ancient water connection between Lake Ladoga and the Baltic in the northern lowland of the Karelian Isthmus has been originated after the ice retreating ca 14,000-12,000 cal BP. At that time, until the catastrophic dropping of the Baltic Ice Lake (BIL) water-level happened ca 11,500 cal BP, Lake Ladoga was a deep easternmost bay of the BIL. During the BIL stage the highest shoreline reached c. 50-60 m a.s.l. in the northern part of the Karelian Isthmus. All studied lakes were flooded the BIL waters. Varved-type clay sediments were formed at that time

3. Arctic climatic and environmental conditions with stagnant ice/permafrost and sparse shrub, herb and grass vegetation on barren soils characterized the central highland of the Karelian Isthmus prior to 12,650 cal yrs BP. Steppe-tundra and cold, dry conditions are inferred between 12,650-11,200/11,000 cal yrs BP.

4. After 11,500 cal BP a straight/river existed in the northern part of the Karelian Isthmus during ca 7000 years.

5. During the Yoldia Sea regression of the Baltic (11500-11 000 cal. BP) Lake Ladoga was re-connected with the Baltic. Water level of Lake Ladoga and lakes in its basin was dropped. The vegetation was arctic tundra with sparse vegetation, which made the soils susceptible to erosion as reflected by the silty clayey sediments in Lake Ladoga. Most of the studied lakes were isolated.

6. The earliest evidence of human settlement in north-eastern Baltic Area is attested at Antrea-Korpilahti (11,200-10,250 cal BP) where artifacts were found in the deposits of a channel between the Baltic and the Ladoga Lake.

7. Pinus-Betula forests with some Corylus became frequent in the region and show the transition into a boreal vegetation type starting at around 11 000 cal yrs BP.

8. Between 11,000-10,000 cal yrs BP favorable climatic conditions are indicated in the catchment, the last remnants of stagnant ice/permafrost may have melted and soils had probably become more stable. Warm conditions continued and a trend towards greater humidity/less evaporation can be observed at around 10,000 cal yrs BP, from when on boreal forests seem to have become wide spread.

9. The studied lakes were transgressed twice between 10,700 and 9000 cal. BP and later after a small regression between 8000 and 5000 cal. BP, corresponded with the Ancylus Lake and the Littorina Sea stages of the Baltic. Both the Ancylus Lake and the Littorina Sea transgressions in the Hejnioki area, to the east to Viborg (modern Ladoga-Baltic threshold, 15.4 m a.s.l.), reached their highest level between ca. 20 and 22 m a.s.l. respectively. The terrestrial vegetation was characterized by broad-leaved forests although spruce was expanding throughout the period.

10. Around 4000-3000 cal BP a new outflow - the River Neva, was formed due to the influx of fresh water from the Saima water-system and isostatic uplift caused a rise of the water level of the Ladoga Lake known as "Ladoga transgression", which afterwards completely reshaped the waterways of the entire area.

11. New results of the both paleolimnological and archeological studies which is carrying out in the area of the Ladoga-Baltica connection in the frame of RFBR project N07-05-01115-a "Lake Ladoga: Holocene history and human migration" will be presented during the Conference.