Geophysical Research Abstracts
Vol. 16, EGU2014-2319-1, 2014
EGU General Assembly 2014

The preglacial sediment record of Lake Ladoga, Russia - first results from a seismic survey and sediment coring in 2013

Martin Melles (1), Sebastian Krastel (2), Grigory Fedorov (3,5), Dmitry A. Subetto (4), Larisa A. Savelieva (5), Andrej Andreev (1), and Bernd Wagner (1)

(1) University of Cologne, Institute of Geology and Mineralogy, Cologne, Germany (mmelles@uni-koeln.de), (2) University of Kiel, Institute of Geosciences, Kiel, Germany (skrastel@geophysik.uni-kiel.de), (3) Arctic and Antarctic Research Institute, St. Petersburg, Russia (fedorov@aari.ru), (4) Northern Water Problems Institute, Russian Academy of Sciences, Petrozavodsk, Russia (subetto@mail.ru), (5) St. Petersburg State University, St. Petersburg, Russia (savelieval@mail.ru)

The new German-Russian project PLOT (Paleolimnological Transect) aims at investigating the Late Quaternary climatic and environmental history along a more than 6000 km long longitudinal transect crossing northern Eurasia. Special emphasis is put on the preglacial history. For this purpose shallow and deep seismic surveys shall be carried out on five lakes, which potentially host preglacial sediment records, followed by sediment coring based on the results of the seismic campaigns. The well-studied Lake El′gygytgyn represents the eastern-most location of the transect and acts as reference site.

Within the scope of a pilot phase for the PLOT project, funded by the German Federal Ministry of Education and Research, we were able to investigate Lake Ladoga, which is located close to St. Petersburg at the western end of the transect. Lake Ladoga is the largest lake in Europe, covering an area of almost 18.000 km2. The modern sedimentation as well as the late glacial and Holocene history of the lake were already studied in detail over the past decades. The older, preglacial lake history, however, is only rudimentary known from a core transect drilled in the southern lake in the 1930th. The cores of up to about 60 m length were only briefly described and are not existing any more. The results from these cores, known from unpublished reports only, suggest the existence of marine sediments of presumably Eemian age, representing a time when Lake Lagoga was part of a precursor of the Baltic Sea, which had a connection via Ladoga and Onega Lakes to the White Sea and further to the Arctic Ocean.

In late August/early September 2013 we carried out a seismic survey on Lake Ladoga using a Mini-GI-Gun and a 32-channel seismic streamer. In total, 1500 km of seismic profiles were measured, covering most parts of the lake. The seismic lines typically show acoustically well stratified Holocene muds overlaying rather transparent postglacial varves. These sediment successions can reach more than 10 m in thickness. They usually are bordered by a hard reflector underneath that may represent coarse-grained sediments or a till, which in most areas is not penetrated by the acoustic waves. In particular in the western part of the lake, however, these sediment successions can be underlain by sedimentary strata of up to 60 m thickness that fill steeply sloped depressions or channels.

Sediment coring at two sites in western Ladoga Lake confirmed the seismic interpretation of the postglacial sediment succession. At one of these sites, the basal reflector at about 13 m depth was penetrated another ca. 10 m into preglacial sediments. According to initial pollen data, these sediments were formed during an interglacial with a slightly warmer climate than that of the Holocene. Further work is currently carried out, for instance, to identify which of the Quaternary interglacials is respresented by the sediments cored in 2013.