Gorodizhchenskoye. As the ice melted, a single proglacial lake developed in the upper part of the paleovalley, northwest of the Lake Malskoye, its level not exceeding 75 m abs. (the elevation of the terrace II surface). Then the proglacial lake was rapidly drained, the spillway traces are recognizable by preserved meltwater channel (now occupied by the Obdekh R.) and structures of sediments studied in cores.

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FIRST RADIOCARBON RESULTS OF ONEGA LAKE BOTTOM SEDIMENTS BASED ON CONVENTIONAL AND AMS METHODS

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The Lake Onega is a huge important polygon for palaeoreconstruction due to its location, history development and specific features. The most particular studies are belonged to Pleistocene-Holocene transition when Fennoscandia deglaciation was occurred [Saarnisto, Saarinen, 2001] Huge amount of data was obtained in 20th century during Finnish-Russian collaboration when geological, biostratigraphical, neotectonical, glaciological and geomorphological studies were conducted [Saarnisto, 1995; Saarnisto, 2016]. Most part of palaeoevent reconstructions for Onega Lake are based on stratigraphic approach using varve clay consequence, pink horizon [Demidov, 2006] and other markers, while absolute ages are almost absent [Filimonova, Lavrova, 2017]. Such situation can be explained by specifics of Onega Lake sediments. Big and especially postglacial lakes tend to form the sediments with extremely low organic carbon content that makes such objects a quite complicated for radiocarbon dating. According to published data there are no absolute ages for bottom sediments of Onega Lake. Samples for radiocarbon measurements were taken mostly from surrounding lakes and bogs.

Current work represents the first radiocarbon results of Onega Lake bottom sediments obtained by measurements with applying of liquid scintillation spectrometer (conventional method) and Accelerator mass spectrometer (AMS). Pollen analysis was also carried out to establish stratigraphy of bottom sediments and verify absolute age by non-absolute dating approach.

Classic radiometric measurements were conducted in "Geomorphology and Palaeogeography of Polar Regions and the World Ocean" Laboratory (Köppen-Lab) in Saint Petersburg State University, Russia. AMS measurements were carried out by CologneAMS laboratory in University of Cologne, Germany.

During the expedition that was headed by Prof. Aleksandr Rybalko in 2016 the seismoacoistic profiling was conducted and 7 sediment cores were collected. The different core location is supposed to represent the complete record of Onega Lake bottom sediments deposition in case of complicated morphology of lake basin and different rate of sedimentation. Two sediment cores ONG-2 and ONG-5 were chosen for complex studies, that also includes radiocarbon and pollen analysis, due to its maximum thickness of deposits. Sampling intervals for radiocarbon dating were chosen according to results of loss-on-ignition method that represents distribution of organic carbon (OC) content throughout cores.

In ONG-5 core OC distribution is irregular that points out complicated character of sediment deposition. Also it could mention some important palaeoevents connected with changes of lake water level, neotectonics or climate changing. Samples for radiocarbon dating were taken from the intervals with the highest amount of OC to conduct precise measurements. Sampling intervals for ONG-2 core: 45-50 cm, 165-170 cm and 230-235 cm for both conventional method and AMS; ONG-5 core: 49-51 cm, 80-85 cm for liquid scintillation counting and 50-53 cm, 84-88 for AMS. Unfortunately, the date for interval 80-85 of ONG-5 core could not be obtained by liquid scintillation counting due to extremely low organic carbon content.

Table 1

Radiocarbon results for ONG-2 and ONG-5 cores

Core	Depth, cm	Lithology	Radiocarbon age, yr BP (scintillator spectrometer)	Yr Cal BP, (scintillator spectrometer)	Radiocarbon age, yr BP (AMS) 95,4% probability	Yr Cal BP, (AMS)
ONG-2	45-50	Clayey silt	1420±100	1340±100	2346±48	2685-2182
ONG-2	165-170	Clayey silt	2420±100	2510±130	2447±56	2711-2357
ONG-2	230-235	Clayey silt	4910±150	5660±180	4881±61	5747-5472
ONG-5	49-51	Sandy silt	4150±180	4680±260		
ONG-5	50-53	Sandy silt			5795±76	6775-6413
ONG-5	80-85	Clayey silt	could not be measured due to low organic carbon content			
ONG-5	84-88	Clayey silt			12168±117	14600-13746

The table above (Table 1) represents radiocarbon ages obtained by liquid scintillation counting and AMS measurements. It is supposed to accept two dates for ONG-2 core from 165-170 cm and 230-235 cm intervals due to high results repeatability. Samples from interval 45-50 cm dated by 1420±100 BP (AMS: 2346±48 BP) seems to be contaminated by older radiocarbon isotopes due to complexity of sampling technique. These results are still under discussion.

For ONG-5 core only 3 dates were obtained. Received ages for intervals 49-51 cm and 50-53 cm are in chronostratigraphical sequence. Moreover, these results are confirmed by palynological data. The ages 4150±180 BP and 5795±76 BP for interval 165-170 cm are accepted. This interval is belonged to Atlantic-Subboreal transition according to our biostratigraphical results and published data. Probably, the age (12168±117 BP) for 84-88 cm interval obtained by AMS is not convenient. In this core interruption in sediment deposition was observed. According to our pollen results, the Boreal period and beginning of Atlantic period are absent. This gap could be referred to the abrupt fall of lake water level, that was being occurred exactly in the Boreal period [Filimonova, Lavrova, 2017], that is confirmed by lithology of core ONG-5.

The first radiocarbon dates obtained for Onega Lake bottom sediments by both conventional radiocarbon and AMS dating are mostly in a good agreement. These results confirm possibility of convenient 14C method application to lake sediments with extremely low organic carbon content. Further investigations are required to prolong and clarify the absolute scale for this important region.

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PALEOHYDROLOGY OF LAKE SELIGER (VALDAI UPLAND, RUSSIA)

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Lake Seliger is located on the Valdai Upland, the main watershed of the East European Plain, which divides the river runoff between the basins of the Caspian and Baltic Seas. The Valdai Upland is in the margin zone of the last glaciation. This area has a typical post-glacial landscape with marginal moraines, kamas, eskers and kettle holes. The Valdai Upland gave the name to the last glacial epoch in the Russian geological systematic - the Valdai glaciation. Traditionally, the Lake Seliger is considered relict lake (Kvasov, 1976), which remained after degradation of a huge proglacial lake.

Lake Seliger is a system of 24 semi-isolated bays (so-called Ples), which stretch for 60 km from north to south. The lake has an area of 212 sq km (The State Water Register.., 2008), an average depth of 5 m, and a maximum of 24 m. The length of its very winding coastline is 528 km. In the lake there are more than 160 islands, the largest of which is the island Khachin. In Lake Seliger, there are 110 inflows. The largest inflows are the rivers Krapivenka, Soroga and Seremuha. The catchment area is 2310 sq km. The river Selizharovka flows out from Lake Seliger. It is the left inflow of the Volga River.

Sediments of the lake Seliger were studied in the 1930s in the exploration of deposits of sapropel (Soloviev, 1934), which was used as an organic fertilizer. In 1960s a lot of boreholes were drilled in the bottom sediments of the lake in search of sand and gravel, which was supposed to be used for construction needs (Savary, 1963). As a paleoarchive, the bottom sediments of Lake Seliger have not been studied before.

In winter of 2018, the bottom sediments of Lake Seliger were drilled from ice. Drilling was carried out on 5 profiles in the southern part of the lake. A modified piston corer of Livingston (Wright, 1967) was used. In total, 14 borehols were drilled. Received and delivered to the laboratory 43 m of cores. For samples from reference cores, the loss on ignition and the particle size distribution were determined. 15 samples of organic matter were submitted to the radiocarbon laboratory of the Institute of Geography of the Russian Academy of Sciences.

In all boreholes at the bottom of the lake, 2-3-meter, and in some cases 6-meter lake mud, have been discovered. The upper part of the mud has a dark gray color due to enrichment with organic matter (30-60%). This is the Holocene sapropel (gyttja). The lower layers of mud in many boreholes have a light gray or blue-gray color, because they contain little organic matter (3-10%). This is a sign of formation in a cold climate - at the end of the last glacial epoch. Everywhere under the mud coarse sands occur. It is deposits of a fairly fast water flow.

There is reason to believe that the sands lying in the lower part of the sections are deposits of river flows, but not glacial melt-water deposits. Firstly, on a narrow and sinuous Selizharovo Ples, a transverse profile along top of sands has triangular shape. It is typical for a meandering river: at the concave