Short communication

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Lithostratigraphy of the bottom sediments of Pskovsko-Chudskoe Lake in the proposed site of the Ice battle

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ABSTRACT. The Ice battle is one of the most famous battles in Russian history. However, there is still no clearly answer as to where the Ice battle took place. Paleogeographic reconstructions can help in finding the place of the battle. The study area is a section of the southern part of Pskovsko-Chudskoe Lake. The works were carried out in the vicinity of Samolva and Kobylie Gorodishche villages of Gdov district of Pskov region, in the Zhelchensky Bay of Pskovsko-Chudskoe Lake. The key methods in this work are bathymetric survey, bottom sediment sampling, and lithological analysis. Three main types of bottom sediments are distinguished: sands at the bottom part of core section, upper it overlain by a thick layer of peat, which covered by gyttja.

Keywords: Pskovsko-Chudskoe Lake, Ice battle, stratigraphy, bottom sediments, lithology

1. Introduction

The Ice battle took place on the ice of Pskovsko-Chudskoe Lake, one of the most famous battles in Russian history on April 5 (12), 1242, but the exact location of this event has not yet been established (Subetto et al., 2021).

"The last line" in the search for the place of the Ice battle was summed up by an expedition led by G. N. Karaev, who began work in 1958 (Karaev et al., 1976). In recent years, in connection with the anniversary of A. Nevsky, interest in the subject of the battle of the Ice has intensified: in 2020 works were conducted under the aegis of the Russian Military Historical Society (a bathymetric survey of the supposed site of the battle was carried out), and in 2021 the Underwater Research Center of the Russian Geographical Society organized the expedition "In the footsteps of the G.N. Karayev expedition", within which a detailed survey of underwater relief with multibeam echo sounder was performed, and the bottom sediment was taken for reconstruction of the lake coastline position at the time of the battle. This article will describe the lithological composition of these columns of bottom sediments.

2. Materials and methods

The field work was carried out in May 2021, together with the expedition of the Underwater Research Center of the Russian Geographical Society. Bottom sediments were sampled from the platform at several points near the Gorodets Island. A Russian peat corer with a sampler diameter of 5 cm and a length of 100 cm was used for sampling bottom sediments. The sampled columns were described, photographed and delivered to the laboratory.

3. Results and discussion

The works were carried out in the vicinity of the villages Samolva and Kobylie Gorodishche, Gdov district, Pskov region, in the Zhelchensky Bay of Lake Peipsi, to the south of the island of Gorodets. Core section 1 (2.6 m depth at the sampling point) and 17 (2.1 m depth at the sampling point) are the most informative of all the sampled material.

Columns of bottom sediments extracted from Pskovsko-Chudskoe Lake are a lithological sequence of medium-fine-grained sands (sometimes with rare inclusions of organics), on which a thick layer of dark brown woody lowland medium-decomposed peat lies, overlain by gyttja (the uppermost layer of gyttja is sandy). In some cases, the peat is overlain by sand with inclusions of organic admixtures.

Using the results of radiocarbon dating, the age of each of the stages of the lake's development will be established and it will be possible to calculate the speed at which the water level in the lake could hypothetically rise. Diatom and pollen analyses will also be performed, which will help to better understand both the nature of changes in the lake level and the evolution of the surrounding landscapes.

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4. Conclusions

Based on the lithological description it is possible to assume the stages of the lake development: (1) post-glacial period when there was a glacial lake and medium-fine-grained sand was deposited; (2) descent of the glacial lake and formation of a 2.7 m peatland - presumably, the climatic optimum of the Holocene. During the period of peatland formation, the water level in Pskovsko-Chudskoe Lake in the study area was much lower than the modern one. The duration of the subaerial stage (peatland) was prolonged; (3) the lacustrine period - water level rise and peat flooding occur, as evidenced by lake sediments deposited on top of peats. The change of sedimentation type from subaerial (peat) to aquatic (gyttja) indicates a change in the lake level regime, its rise; (4) the upper relatively thin layer of sediment - sandy gyttja - indicates a decrease in the lake level and its shallowing in the study area in relatively recent times (horizon thickness is low).

The results of the research complemented by radiocarbon, diatom, and pollen analyses will allow a new perspective on the problem of finding the supposed battle site.

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Conflict of interest

The authors declare no conflict of interest.

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