INVESTIGATION BOTTOM SEDIMENTS STRUCTURE IN LAKES WITH THE USE OF THE ACOUSTIC METHOD

Krylov P.S., Nurgaliev D.K. , Yassonov P.G.

Kazan (Volga region) Federal University, Kazan, Russia

Lacustrine sediments contain a long, high-resolution record of sedimentation processes associated with changes in the environment. Paleomagnetic, paleobiological, geochemical studies of the properties of these sediments provide a detailed trace the changes in the paleoenvironment. However, there are factors such as landslides, earthquakes, and the presence of gas in the sediments affecting the disturbing sediment stratification. Seismic profiling allows investigating in detail the bottom relief and getting information about the thickness and structure of the deposits, which makes this method ideally suited for determining the configuration of the lake basin and the overlying lake sediment stratigraphy. Most seismic studies have concentrated on large and deep lakes containing a thick sedimentary sequence, but small and shallow lakes containing a thinner sedimentary column located in key geographic locations and geological settings can also provide a valuable record of Holocene history. Seismic data is crucial when choosing the optimal location of core sampling. Thus, continuous seismic profiling should be used regularly before coring lake sediments for the reconstruction of paleoclimate.

We have carried out seismic profiling on 20 lakes which are situated in the Volga region and the South Ural region. For example, Lake Turgoyak (Chelyabinsk region) is a unique object of research and the second cleanest lake in Russia after Lake Baikal (Figure 1).

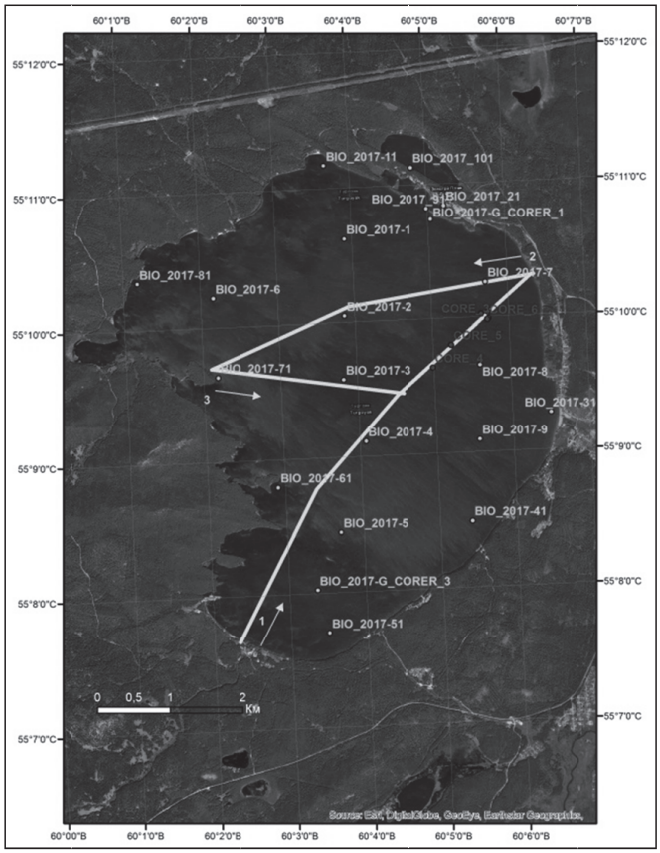

Fig. 1. Location of acoustic profiles, core sampling points and biological samples

Acoustic data showed uneven distribution of sediment, outcrops of bedrock into the water column and break in sedimentation (Fig. 1). The depth reaches 31 m. The largest thickness of sediments (up to 7 m) was found in the northeastern part of the lake basin. The upper 4 meters are represented by weakly consolidated organogenic sediments, below 3 meters of denser sand sediments.

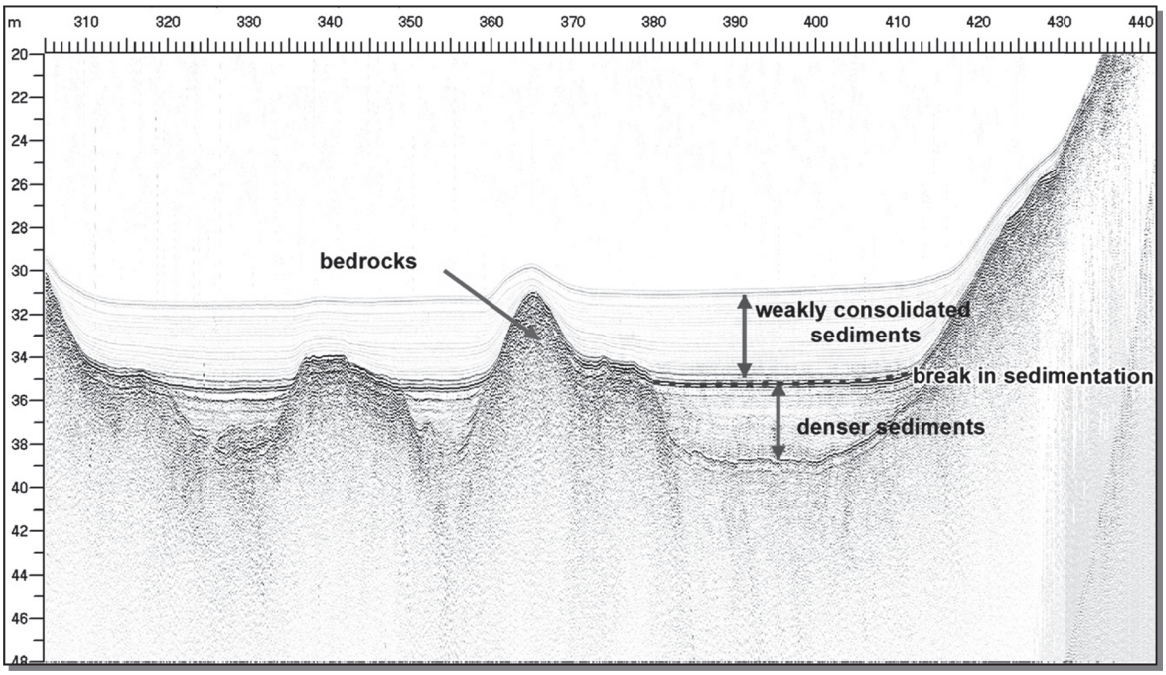

Fig. 2. Fragment of acoustic profile_1 with the most complete stratigraphic sequence

The study of the most complete column of bottom sediments will allow us to reconstruct the region climate over the past several thousand years. A comparison of the data set for several lakes in the region makes it possible to create a detailed model of climate change.

This work is supported by the subsidy allocated to Kazan (Volga region) Federal University for the state assignment in the sphere of scientific activities #5.3174.2017/46, by the Russian Science Foundation under grant #18-17-00251 and by RFBR #17-05-01246.

COSMIC DUST AND MICROMETEORITES IN LAKE SEDIMENTS

Kuzina D.M., Nurgaliev D.K., Yusupova A.R., Lemazina Yu.A., Kosareva L.R., Antonenko V.V., Vorobyev V.V.

Kazan (Volga region) Federal University, Kazan, Russia

Well known, that a lot of extraterrestrial matter rich the Earth surface every day. Such material can be find in different geological objects [1, 2]. Investigations of different types of sediments proofs the idea about quantity variations of cosmic dust in time. It can be caused by different reasons such us different concentrations of dust in universe, by impact events and etc. Seasonal sedimentation and possibility of precise age determination of sediments make lakes one of the best archives for studying Holocene. Sediments are composed of grains of different genesis: authigenic grains formed in the lake or brought into it by water flows and wind, grains of cosmic and volcanic origin, dust from the other continents, grains of biological and anthropogenic origin and so on. This study concentrates on investigations of cosmic dust. Many of these particles have the same composition as terrestrial matter; however, we can separate the cosmic components from the terrestrial components using their unique magnetic properties such as Curie temperature (Tc) and using scanning electron microscope (SEM) for determination elemental (mineralogical) composition and surface morphology. Several lakes were sampled during summer field works. Cores length usually 5-6 meters which cover last 11 Ka.

Differential thermomagnetic analysis was carried out for tracing magnetic minerals according their Curie temperature. Measurements were carried out on Curie express balance. the temperature dependence of induced magnetization in air at a heating rate of 100 °C/min up to a maximum temperature