GC2024-PERM023

Holocene paleoclimate history of the lakes Bolshoe and Maloe Miassovo (Southern Urals) based on magnetic and geochemical investigations

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The main aim of the work is to identify the sedimentation conditions features in the Southern Urals. In these purpose lacustrine sediments of lakes Bolshoe and Maloe Miassovo were studied.

Core column No. 3 of Lake Bolshoe Miassovo (BM) was selected for detailed comprehensive investigations (N 55°09’51.1”; E 60°17’21.9”) [1] and core column No. 2 of Lake Maloe Miassovo (MM) (N 55°10’13.6”; E 60°21’04.6”) [2].

Radiocarbon dating of BM and MM samples was carried out at the National Taiwan University (NTUAMS Lab). The OxCal v4.2.4 software product was used to calibrate the age of the samples [3] and IntCal 20 calibration curve [4]. According to radiocarbon dating, the age of the studied sediments of BM is ~ 13.4 thousand years [5]. The age of MM sediment is ~20.1 thousand years.

The J_meter coercivity spectrometer [6] was used to determine the hysteresis parameters. It allows the separate measurements of remanent and induced magnetization in magnetic fields of up to 1.5 T at room temperature. On a base of obtained curves the contribution of various components of lake sediments to the magnetic component of the sediment was determined [7]. X-ray fluorescence (XRF) analysis was used to determine the elemental composition of lake sediments. To determine the factors of chemical composition, factor analysis by the method of principal components using the "Varimax normalized" method in the STATISTICA program was used.

It was found that the factor F1 of both lakes reflects allotigenic input into the sedimentation basin. Decrease in the values of F1 reflects an increased input of terrigenous detrital matter into the sedimentation basin. To establish the allotigenic nature of the magnetic parameters, a correlation matrix was calculated. This revealed a close relationship between the paramagnetic component and the input of an allotigenic material into the sedimentation basin.

In general, F1 shows a decreasing trend of the terrigenous elements from the first (youngest) sample to subsequent stages. It can indicate an increasing role of peneplenization of the relief, demolition sources and catchment areas and a decrease in the hydrodynamic slopes of drains.

This work was funded by the subsidy allocated to Kazan Federal University for the state assignment project № FZSM-2023-0023 in the sphere of scientific activities.

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