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Local, regional and global components of environmental variability of the Southern Urals in the Neopleistocene-Holocene on the basis of petromagnetic parameters of modern lakes sediments

Lina Kosareva[1] , Victor Kosarev[1] , Dilyara Kuzina[1] , Anastasia Yusupova[1] , Nuriia Nourgalieva[1] , Vadim Antonenko[1]

[1] Kazan (Volga region) Federal University, Russia

lina.kosareva@mail.ru

Paleogeographic reconstructions are particularly important for areas with extreme climatic conditions, such as high-altitude, polar, arid or borders between geographical zones. In these places the slightest climatic changes cause significant shifts in regional variations of various biological, geophysical, meteorological, litochemical and other parameters. One of these regions is the Southern Urals, which is a climatic zone between the Eastern European and Western Siberian plains.

The study of the magnetic minerals (and their properties) of lakes sediments considered more and more as one of the essential step in the reconstruction of lake sedimentation conditions. However, the magnetic properties of the Southern Urals lakes sediments are poorly studied and described only in several articles. Therefore, this paper shows the possibility of identifying regional and local components of environmental variability according to the variations of petromagnetic parameters and their components based on the data obtained by the team. Lake Turgoyak, Bolshoy Kisegach, Bolshoe and Maloe Miassovo, Bannoe and Sabacty, located on the eastern slope of the South Ural Mountains were selected for the study.

For each lake AMS-measurements of ^{14}C (7 - 10 dates) were carried out, which allowed to create fairly accurate age models. However, in some cases age models need to be refined with taking into account additional information based on lithological, mineralogical, geochemical, paleobiological and other data that may allow distinguish the boundaries of sharp paleoclimate changes. The sediments of these lakes are Neopleistocene and Holocene age.

Magnetic susceptibility (MS), natural remanent magnetization (NRM), dia/paramagnetic component of magnetic susceptibility (kp) have been selected as the main parameters for comparison. And also for the magnetic characterization of the Southern Urals lakes sediments the ratios of the main hysteresis parameters (Bcr/Bc and Mrs/Ms) are proposed. Magnetic properties have been measured in step of 2 cm along the entire length of the selected core column of each lake.

It should be noted that the Neopleistocene and Holocene differ significantly in the behaviour of the variations and values of magnetic parameters. Filtration of MS, NRM and kp curves were used to isolate regional components represented by long-period fluctuations in petromagnetic parameters. In the initial stage, a frequency analysis of the studied curves was performed. Wavelet transformation was used as a tool for analysis the frequency characteristics of data series. Morlet wavelet was chosen as the mother wavelet. The low-frequency component is represented by oscillations with periods of 6000-8000 and 3000-4500 years BP. This component is characteristic for all objects of research. Similar spectral characteristics may indicate regional climatic changes simultaneously affecting the selected group of lakes. For the long-period component (3000-8000 years) low-frequency filtration of the original curves was carried out.

Starting from the Old Drias, three periods of increasing in sediment input into the sedimentation basin and three periods of reduction in the demolition of terrigenous material were identified. Big incoming of allotigenic material occurred during the period of deglaciation, in the Atlantic stage and 4000-3000 years BP in the Subboreal stage. Reduced inputs of allotigenic material occur during the warming of the Boreal stage, the cold substage of Subboreal stage and the Subatlantic warming substage (~2000-1000 years BP).

Against the background of regional paleoclimatic trends, a number of lakes show local changes. A striking example of this is Lake Bolshoy Kisegach, where a sharp change in sedimentation conditions occurred 1800 cal

BP.

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