



800-kyrs history of paleogeographic changes in Asia imprinted in Lake Khubsugul bottom sediments and reconstructed from their geochemistry with resolution of <50 years

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Some basic and trace elements were measured in bottom sediments from Lake Khubsugul (Mongolia). The goal of the investigation is to 1) reconstruct paleovariations of geological and geochemical processes in lake and in catchment basin during Holocene and Pleistocene and 2) to estimate paleoclimatic parameters of the region. The method for analysis of the sediments was X-ray fluorescence using synchrotron radiation (SR-XRF). Wet and non-destructed fragments of the core were scanned under sharp monochromatic synchrotron beam, excited fluorescent spectra were measured. The records obtained cover 42 meters of the core (800 kyrs) with 1 mm resolution (ca. 20 years). From the initial XRF data the concentrations of 20 chemical elements from range K-Mo were determined employing modified fundamental parameters procedure.

Results obtained prove that the records of some biogenic and abiogenic elements (and some ratios) are synchronous with planetary climate changes. The detailed correlation with global climatic records (SPECMAP, Vostok) is not perfect, but 100-kyrs alteration of glacial/interglacial events is evident. Spectral analysis of the records reveals basic orbitally-modulated cycles (100-, 41-, 23- è 19 kyrs). Such kind of a response determines connection with global climate processes. The cyclic response is observed only in upper part of the core, onset appeared at ca. 430-470 kyrs bp and is attributed to significant reorganization of lake ecosystem.

Abrupt and significant oscillations are also found at the millennial timescale. There detailed correlation with Dansgaard-Oeschger events during OIS 2-4 is also premature, but climate instability is evident at this timescale. The Central Asian region as relatively isolated ecosystem could have altered global climatic patterns in complicated way. The geochemical records from Khubsugul are the evidences of “switching” geochemical sources (provinces) of terrigenous supply to the lake and of changing biogeochemical processes in the lake. The major mechanism for these changes we see in significant lake-level variations during Pleistocene due to regional moistening changes (also marked in autigenic minerals formed).

In this presentation we will discuss some important problems, which ought to be solved to more wholly understand the observed geochemistry and mineralogy of Lake Khubsugul sediments and to make quantitative reconstruction of changing parameters in lake and its catchment basin in response to global climate mechanisms. Current investigation was supported by the Siberian Branch of Russian Academy of Science, grant 121, and by RFBR grant 05-05-64627.