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Geochemistry records from laminated sediments of Shira Lake (Russian Asia)

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We measured downcore elements distributions in five cores collected across the Shira Lake situated in Central part of Asia (E90o12', N54o30'). The lake is small (32km2), saline (ca.20g/l SO4-, Cl-, Na+, Mg+, K+), being filled with regional precipitation of about 300mm/year (mainly through one major tributary, river Son) and has no surface outflow. The aim of our study was to reconstruct history of changes in the regime of the lake that happened both before and during period of instrumental meteorological observations. In particular, we were interested in lake-level changes due to evaporation, water supply from surface and from underground sources, and in changes of bioproduction in the lake as well.

To construct depth-age model for the cores, we measured Cs-137 and unsupported Pb-210 in top layers of the cores. The sedimentation rate thus identified varied in the range of 1-2 mm/year for different cores. We visually observed fine sedimentation 'rhythms' having thickness of about 0.x-2.x mm: these layers may now be reliably identified as annual lamination.

We also determined concentrations of elements in the sediments by recording x-ray fluorescence (XRF) spectra when continuously scanning the halves of the cores under sharp synchrotron radiation (SR) beam, using an instrument described in (Zolotarev et al., 2001). The resolution of the scanning was 0.1 mm. After processing of the measured XRF-SR data as in (Phedorin and Goldberg, 2005) we obtained downcore records of 20 elements. We correlated all five cores employing elements patterns. We qualitatively identified variations in surface-water supply treating markers of 'clastic' material (Ti, Rb, Zr). We identified downcore variations in authgenic mineralization, which appeared to have different kinds: Ca-related, Sr-related, Ba-related, Fe-related. We tried to assess biogenic production changes from Br distribution, admitting analogy of Br in Shira sediments to Br in Lake Baikal sediments (Phedorin et al., 2000) and in Lake Khubsugul sediments (Phedorin et al., 2008).

The cores we studied provide us with high-resolution geochemical records of last century for further meteorological correlations and regressions back to the past. We plan to reconstruct regional trends proceeding with the investigation of this kind and studying sediments of some other Khakas lakes.

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Phedorin M.A., Goldberg E.L., Grachev M.A., Levina O.L., Khlystov O.M., Dolbnya I.P. The Comparison of Biogenic Silica, Br and Nd Distributions in the Sediments of Lake Baikal as Proxies of Changing Paleoclimates of the Last 480 ky. // Nuclear Instruments and Methods in Physics Research, 2000, V. A448, № 1-2, pp. 400-406.

Phedorin M.A., Goldberg E.L. Prediction of absolute concentrations of elements from SR XRF scan measurements of natural wet sediments. Nuclear Instruments and Methods in Physics Research A 543 (2005), p. 274-279.

Phedorin M.A., Fedotov A.P., Vorobieva S.S., Ziborova G.A.. Signature of long supercycles in the Pleis-

tocene history of Asian limnic systems. J Paleolimnol, 2008, 40/1, pp. 445-452.

Zolotarev K.V., Goldberg E.L., Kondratyev V.I., Kulipanov G.N., Miginsky E.G., Tsukanov V.M., Phedorin M.A., Kolmogorov Y.P. Scanning SR-XRF beamline for analysis of bottom sediments. // Nuclear Instruments and Methods in Physics Research, 2001, V. A470, N 1-2, pp. 376-379.