

THE APPLICATION OF SRXFA FOR STUDY OF CLIMATE CHANGE OF EURASIAN CONTINENT DURING LAST ONE MILLION YEARS FROM BOTTOM SEDIMENTS OF LAKES BAIKAL AND TELETSKOYE.

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X-ray fluorescent analysis with synchrotron radiation (SRXFA) was used to study the distribution of elements in sediments of Lake Baikal over the time interval of Brunhes Epoch (0-780 ky BP). The concentrations of some elements and their ratios respond to changes of the climate. Sr/Ba, Sr/Rb, Sr/Cs, U/Th, Zn/Nb, Mo, Br positively correlate with the content of biogenic silica (BiSi), which is high at intervals belonging to interglacials and small in those belonging to glacials. On the contrary, to warm records Ba, Rb, Cs, Th, La, Ce, and Nd anticorrelate with BiSi. These two series of geochemical signals, along with BiSi, reflect oscillations of the climate between glacials and interglacials. Spectral analysis of the records revealed that they are modulated by orbital forcing. All Earth's orbital periods: eccentricity -96ky, tilt-41 and 54ky,

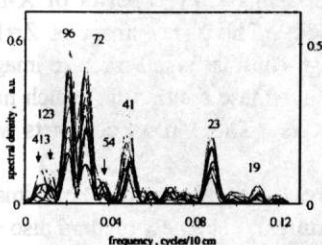


Figure 1: Fourier spectra of Baikalian records

precession-23 and 19ky are present in records, see figure 1. This proves that the climates of East Siberia depend on orbital forcing to the similar extent, as does the global climate. Comparison of the climate records found in the sediments of Lake Baikal with the pattern of orbital parameters made it possible to estimate the mean rates of sediment accumulation over different time intervals and to refine the age-depth model for Lake Baikal. The scanning SRXFA station was created for a most detailed research of sedimentary records. The interval of Baikalian core representing Karga warming (20-50 ky BP) was scanned with a resolution 20 y. Such study is highest-resolution from Baikal and ocean investigation. It has been found that not less than five cycles of glacial-interglacial took place during this period. Duration of a cycle is about 2ky. It coincides with last data on CO₂ content in atmosphere obtained recently from ice cores Vostok and Greenland [1,2].

High-resolution records of changing climate during last millennium have been received from the sediments of Lake Teletskoye (Altai Mountain). It has been found that trends of Rb, Sr, Y, Zr, Nb coincide with the mean year trends of reconstructed temperature in Northern hemisphere over last 600 y [3]. The spectral analysis of the records Ar, K, Ca, Ti, V, Cr reveals the strong cycle with period near 11y, which coincides with cycle of solar activity change. Few other cycles have been found, too.

This investigation was supported by RFBR grants 99-02-17118 and 99-05-64743.

[1] J.R.Petit et al, Nature, 1999, v. 399, pp. 429-436

[2] T.Blunier et al, Nature, 1998, v.394, pp. 734-739

[3] M.E. Mann et al, Nature, 1998, v.392, pp.779-787

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