Andrey DARIN, Ivan KALUGIN, Natalya MAKSIMOVA, Tatiana MARKOVICH, Yakov RAKSHUN, Dmitryi SOROKOLETOV, Fedor DARIN and Denis RAGOZIN. 2014. Lake Shira Level Changes in Late Holocene. *Acta Geologica Sinica* (English Edition), 88(supp. 1): 3-4.

Lake Shira Level Changes in Late Holocene

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1 Introduction

Meromictic Shira Lake is a good representative object for detail climate modeling due to its local hydroclimatic information and annually laminated bottom sediments. A sediment column of 155 cm in length was retrieved by hammer corer in the deepest (24 m) central part of the lake in 2009.

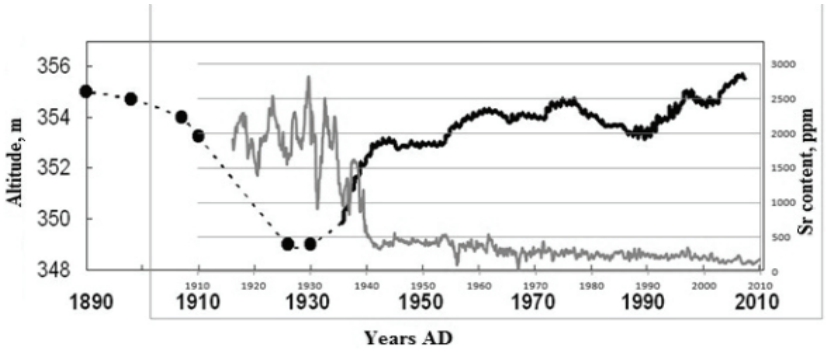

Fig. 1. The level of Lake Shira and strontium content in the core of bottom sediments.

2 Sample Preparations and Measuring

Solid samples were prepared from the wet cores by freeze drying and impregnating with polymer for further investigations. We developed a method for preparing solid samples from wet cores that includes three stages: placing a box lined with aluminum foil over the sediment and

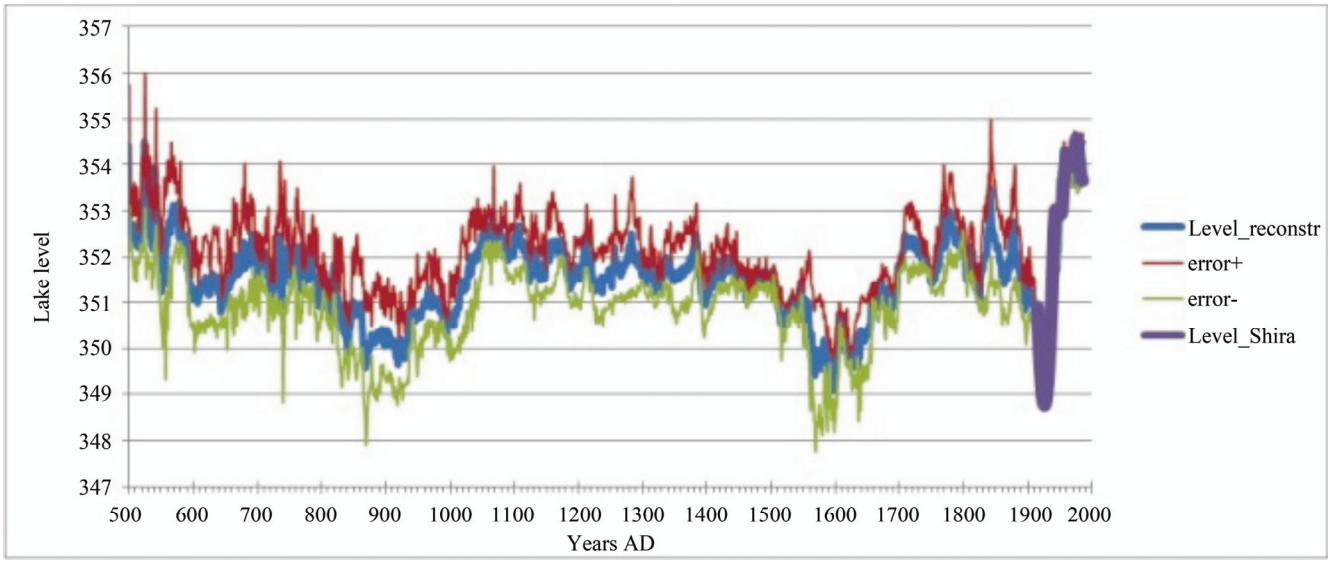

Fig. 2. Reconstruction the Lake Shira level using geochemical data.

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extracting it from the corer, freezing it in liquid nitrogen and drying it in a lyophilic chamber, and impregnating it with polymer (a mixture of epoxy and acetone).

For geochemical research was used method of scanning microanalysis with synchrotron radiation. We used a one dimensional scanner and a system for collimating and focusing the beam that allowed us to perform measurements of more than 20 minor elements with detection limits of ~1–5 ppm in cores of bottom sediments with a spatial resolution of 100 μm along one coordinate at excitation energy of 15–30 keV. The applied experimental apparatus allowed us to reach a new quality of paleoclimatic reconstructions with annual time resolution (Dar'in et al., 2013a).

3 Results and Discussion

In papers (Tret'yakov et al., 2012; Dar'in et al., 2013b) we have shown that the core areas with higher contents of Ca and Sr correspond to the high salinity waters of the lake. Such conditions occur when the lake level is lowered. Last time lowering the lake level and the sharp increase in salinity observed in the early 20th century (Parnachev et al., 2003). Precise dating of the core made it possible to establish a connection of sediment geochemical composition and lake level (Fig.1).

To construct the transfer function has been used set of geochemical indicators having the highest correlation with the level of the lake: LOI, XRD, Br, Zn, Sr, Ti/Mo.

Transfer function was approximated for the whole studied core and was built reconstruction the levels of Lake Shira changes in the last 1500 years with an annual time resolution (Fig.2).

Key words: Lake Shira, varve,. synchrotron radiation, scanning X_ray fluorescence microanalysis.

Acknowledgements

This work was performed on equipment of the Common Use Center at the Siberian Synchrotron and Teraherz Radiation Center (Novosibirsk). It was supported by the RFBR projects 13-05-00871, 14-02-00631.

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