

Short communication

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Climate changes at the LGM-Holocene in the south of East Siberia (Russia) inferred from lake diatom records

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ABSTRACT. In this study, we analysed a 54 cm long sediment record from small lake located closely to Lake Baikal for microfossil diatom to provide an improved reconstruction of the environmental changes in the area for the past 12.4 ka. Significant changes in diatom records occurred at 10 and 4.8-4.2 ca. ka BP. The pattern of studied diatom records was close to ones from Lakes Baikal and Khubsugul.

Keywords: diatoms, reconstruction, lake, bottom sediments, East Siberia

1. Introduction

Diatom records are a good proxy of paleoclimate changes. Diatoms are well-known to depend on water temperature, duration of open and close water, insolation and supply of nutrients into the water. Main focus in this study was on climate changes occurred in the south part of East Siberia at transition from glacial to warm condition and the Middle Holocene.

2. Material and Methods

Lake Okunevoe is located in the south part of East Siberia (Russia) closely to Lake Baikal. Lake Okunevoe (51°26'N, 104°50'E) is a small freshwater lake located at 510 m above sea level, with an area of approximately 0.02 km².

In 2017, a sediment core was taken from the central part of Lake Okunevoe (54 cm long) using a Uwitec Corer sampler. The water depth was 6 m at the core sampling site.

The cores were sampled with 1 cm intervals. Diatom frustules (from 400 to 800 frustules per sample) were identified using keys, atlases and a reference collection (Round et al., 1990; Glezer et al., 1992).

The total radiocarbon content in the graphitized samples was quantified by AMS engineered at Budker Institute of Nuclear Physics (Novosibirsk, Russia). Calendar date was evaluated from the radiocarbon one by CalPal ver.1.5.

3. Results and Discussion

Age estimation shows that the sediment records began to form from ca. 12.5 cal. ka BP. Twenty four diatom taxa were found in the sediment records. Amount of plankton diatoms changed from 0.01 to

15.8x10⁶ frustules/g. *Aulacoseira pfaffiana* (Reinsch) Krammer (up to 15.8x10⁶ fr./g) and *Tabellaria flocculosa* (Roth) Kützing (до 0.54x10⁶ fr./g) were dominant in plankton assemblage. *Aulacoseira* sp., *A. subarctica* (O. Müller) Haworth, *Cyclotella* sp. and *C. minuta* (Skv.) Antipova, *Stephanodiscus meyeri* (Genkal et Popovsk.) were in minor amounts.

Aulacoseira pfaffiana and *Tabellaria flocculosa* are cold freshwater cosmopolitans that prefer reduced pH and mineralization water. Benthos diatoms are presented by 17 taxa with amount from 0.28 to 10.13x10⁶ fr./g. *Neidium* (up to 6.2x10⁶ fr./g) and *Frustulia* (up to 5.7x10⁶ fr./g) were dominant. The ratio of *Eunotia* was up to 29% in some layers. Cysts of Chrysophyta were 0.6 to 35x10⁶ cysts/g.

Amount of plankton diatoms began increasing from ca. 11 cal. ka BP and its maximum occurred at 10 and 4.8-4.2 ca. ka BP, while it was one maximum of benthic diatoms at 4.8-4.2 ca. ka BP (Fig. 1). In the largest Lakes Baikal and Khubsugul (Northern Mongolia) the first diatom maximum also occurred at 10 ca. ka BP (Fig. 1). It is notable that plankton diatoms occupied the first Lake Okunevoe. It likely evidences that the increasing of lake level rapidly happened after the Last Glacial Maximum (LGM). Thus, it can assume that the regional increasing of moisture was very strong and fast at the transition from the LGM to Holocene.

Regional climate changes reflected in diatoms records also were very significant, when changes in diatom assemblages were occurred not only in small Lake Okunevoe also in Lakes Baikal and Khubsugul (Fig. 1). Thus, diatoms strongly reduced in Lake Baikal and Khubsugul at ca.5 ka BP, and was increase in benthic diatom in Lake Okunevoe when *Cymbella* sp. was replaced by *Neidium*. In Lake Khubsugul *Cyclotella bodanica* disappeared from diatom records after ca.5 ka BP (Fedotov et al., 2004).

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4. Conclusions

We studied diatom record from small Lake Okunevoe is closely located to the Lake Baikal. The diatom records formed for the past 12.4 ka. The distribution of the diatom record closely related with ones for Lakes Baikal and Khubsugul. There were two period in to increase of amount of diatoms at 10 and 4.8-4.2 ca. ka BP.

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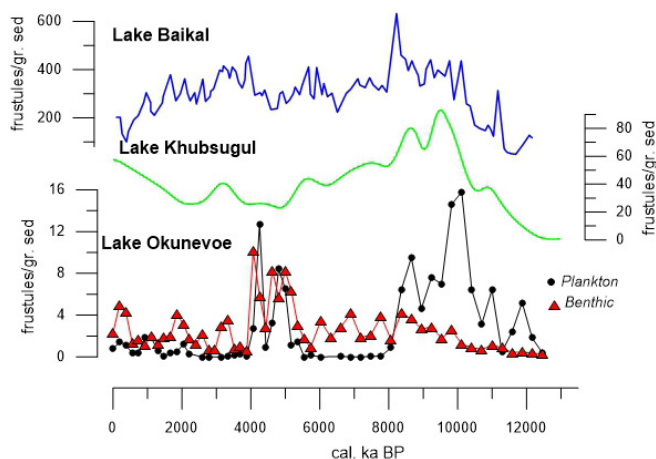


Fig.1. Distribution of diatoms in studied lake (Okunevoe), Lakes Baikal and Khubsugul (Northern Mongolia)