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A 340 ka oxygen isotope record from diatoms at Lake El'gygytgyn, NE Russia

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Continuous paleo-climate records in the arctic region are rare. In 2003, a sediment core was drilled at Lake El'gygytgyn, NE Siberia in an area of the Northern Hemisphere which has not been glaciated at least during the past five glacial/interglacial cycles. Due to the lack of carbonates in the lake, biogenic silica was used for analysing δ^{18}O values. The usefulness of diatoms as a proxy for reconstructing air temperature and the isotope composition of precipitation is underlined in several studies.

The drilled core Lz1024 is 16.50 m long and dates back to app. 340 ka. Preliminary studies have shown that mainly two diatom species are present in the lake: *Cyclotella ocellata* which occurs throughout the whole core and *Pliocaenicus costatus* mainly existing in the Holocene.

Various preparation steps (H_2O_2/HCl treatment, sieving, heavy liquid separation) have been performed in order to gain a clean diatom sample from the original sediment. As there was not enough material in the >10 μm fraction the <10 μm fraction was chosen for further analysis. The degree of purity was verified under light microscope and by Energy Dispersive X-ray Spectroscopy (EDS) under the Scanning Electron Microscope (SEM). Over 90% of the samples showed SiO_2 >96 % and Al_2O_3 <3 %.

For the dehydration and dehydroxylation of amorphous silica a new method under consideration was applied namely Helium Flow Dehydration (HFD) which removes the "hydrous layer" by exposing the sample to an increased temperature (maximum 1050˚C) within app. 7 hours in an oven with a continuous Helium stream leading away all exchangeable oxygen. The analysis was performed with a MS-2020 mass spectrometer. The oxygen was liberated from the sample by laser-fluorination under BrF_5 atmosphere.

At the time of abstract submission around 50 different samples were measured (N=2-4) with a special emphasis on the time periods between 0-20 ka BP (resolution $\sim$1 k) and 120-250 ka BP (resolution $\sim$3 k). The mean standard deviation between the repetitions was 1σ <0.3 ‰ . The downcore variation of the δ^{18}O values show that glacial/interglacial cycles are present throughout the whole core. The δ^{18}O values are ranging from δ^{18}O = 18.6 ‰ to δ^{18}O = 23.0 ‰ and reflect the Holocene Thermal Maximum (HTM; δ^{18}O = 21.5 ‰), the Last Glacial Maximum (LGM; δ^{18}O = 18.6 ‰), the Eemian interglacial period (δ^{18}O = 23.0 ‰) and the interglacial period corresponding to MIS 7 (δ^{18}O = 22.9 ‰).

By the time of the conference, the whole core will presumably be analysed and the results will be presented for the first time. This is the first proxy from arctic lake sediment cores directly responding to paleo-precipitation dating back more than 300 ka. This work can be expanded to the long lake sediment core (dating back to about 3.6 Ma), which was drilled within the ICDP program at Lake El'gygytgyn in early 2009.