IPA-IAL 2018 | Joint Meeting

Unravelling the **Past** and **Future** of **Lakes**

ABSTRACT BOOK

June 18–21
STOCKHOLM UNIVERSITY

S09-P05 - Holocene hydrological variability of Lake Ladoga, NW Russia as inferred by diatom oxygen isotopes

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Lake Ladoga, the largest in Europe, was investigated as part of the German-Russian project 'Paleolimnological Transect' (PLOT) aiming at investigating the Late Quaternary climate and environment history along a transect crossing Northern Eurasia. Samples of sediment core (Co1309) which covers the past 10.5 cal ka BP contained sufficient diatoms to be analysed for oxygen isotope analysis. Our inferences are based on a comprehensive survey of both the modern hydrological system and diatom taxonomy.

The present-day lake water isotope composition (mean $\delta^{18}O_{lake}$ -9.8‰), corresponds with the most recent $\delta^{18}O_{diatom}$ of +30.7‰, indicating a water−silica isotope fractionation (α= 1.0414) in the right order of magnitude for local lake temperatures. However, the diatom isotopic variability is related to changes in $\delta 18O_{lake}$ rather than to lake temperature. Changes in $\delta^{18}O_{lake}$ are mainly driven by evaporation effects, and influenced as well by air temperature, hydrological and air-mass changes.

The data indicate that the lake existed as a freshwater reservoir at least since 10.5 ka cal. BP. Variations in $\delta^{18}O_{diatom}$ range from +30.7 to +35.1‰, and clearly reflect the Holocene Thermal Maximum as an interval of maximum $\delta^{18}O_{diatom}$ around +35‰ between 8 and 6.5 cal. ka BP. At 0.8–0.2 cal. ka BP, a prominent minimum around +31‰ is visible corresponding to the Little Ice Age. A continuous depletion in $\delta^{18}O_{diatom}$ since 6.6 cal. ka BP is in good agreement with late to mid-Holocene cooling. Lake level rise results in lower $\delta^{18}O_{diatom}$, whereas the lowering of the lake level causes higher $\delta^{18}O_{diatom}$ due to respective changes in the P/E ratio. Generally, overall high $\delta^{18}O_{diatom}$ around +33.9‰ characterise a persistent evaporative lake system throughout the Holocene. As the Lake Ladoga diatom isotope record is roughly in line with the 60°N summer insolation, a linkage to broader-scale climate change is likely.