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ABSTRACTS
ТЕЗИСЫ ДОКЛАДОВ И СТЕНДОВЫХ СООБЩЕНИЙ

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ence of the thermal expansion coefficient on temperature. This mixing mechanism is highly sensitive to variations in the mean salinity of the lake and as a result to the regional water budget. The fact that anthropogenic alteration of the regional water budget may change completely the mixing regime of lakes is demonstrated by the notorious example of the previously dimictic Aral Sea, which partially changed to meromictic regime in some of residual basins. The newly formed meromictic regime implies consequences at the regional scales, in the biogeochemical regime, as the monimolimnion of the lake accumulates continuously increasing amount of methane during the last years, as well as in the regional climate, as lake represents in winter a warm spot on the surface, slowly releasing the accumulated heat onto the atmosphere. For *dimictic lakes of temperate climate of Europe*, existing future climate scenarios predict that, if the warming trend persists for next several decades, water temperatures will never cool below the maximum density temperature, changing thus their mixing regime to *warm monomictic*, without a winter stratification period. The mixing regime transition will take place first in deeper lakes, while the shallower ones will possess the winter stratification for longer, i.e. the capacity to store heat throughout wintertime depends directly on the mean depth. The consequences of the physical regime change for biogeochemistry of lakes may appear manifold, including higher near-bottom temperatures in summer and a longer summer stratification period. Both factors favor bacterial activity in lake sediments, accelerate biodegradation of organic matter and, as a result, increase oxygen consumption and methane production. Deep anoxia in previously well-oxygenated lakes and a stronger contribution of these lakes to methane release may be hypothesized as possible global outcomes. However, many lakes do not demonstrate any appreciable warming despite significant positive trends in local air temperatures (O'Reilly et al., 2015). One reason for decoupled temperature trends in lakes and in the atmosphere was recently revealed from the analysis of temperature variations in *lakes on Tibetan Plateau*. Analysis of the modeling results demonstrated that the effect of the increased air temperatures on the lakes was compensated by decrease in the incoming solar radiation The radiation decrease can be hypothetically related to the direct effect of anthropogenic aerosols at high altitudes. Another possible reason for the decrease of solar radiation over the Tibetan Plateau might be an increased evaporation and the resulting higher air humidity, which is also supported by positive trends in the humidity and cloud amounts present in the reanalysis data. The lake system of Tibet reveals the non-linearity of the lake-atmosphere interaction and demonstrates the decisive role of solar radiation as a major physical driver of lake dynamics, especially in alpine regions with the high transparency of the atmosphere. Among other major threats to the seemingly stable seasonal mixing patterns of Eurasian lakes are anthropogenic salinization of arid lakes, trend to warmer winters in temperate regions, and deepening of Arctic lakes due to permafrost thaw.

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POSTGLACIAL HISTORY OF LAKE LADOGA DOCUMENTED BY DIATOM OXYGEN ISOTOPES

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Last decade studies have demonstrated the high potential of oxygen isotope composition in diatoms derived from lacustrine sediments in reconstructing past climate, environment and hydrology changes (e.g. Kostrova et al., 2013; Meyer et al., 2015; Chapligin et al., 2016).

As part of the German-Russian 'Paleolimnological Transect' (PLOT) project aimed at investigation the Late Quaternary climate and environment history along a transect crossing Northern Eurasia, Lake Ladoga, the largest freshwater body in Europe (18.329 km^2) located close to St. Petersburg, has been investigated. Sediment samples with sufficient amount of biogenic silica from the 10.5 cal. ka part of the sediment core (Co1309) were processed for diatom oxygen isotope ($\delta^{18}O_{diatom}$) analysis.

Our inferences are guided by a comprehensive survey of both the modern hydrological system and diatom species analyses. The fractionation factor (mean α = 1.0409) between recent Lake Ladoga water (mean $\delta^{18}O_{lake}$ = -9.8‰) and the most recent diatom sample (0.2 cal. ka BP; $\delta^{18}O_{diatom}$ = +30.7‰) reflect the known silica-water fractionation in sediments and demonstrate that $\delta^{18}O_{diatom}$ is generally applicable for palaeoreconstructions for the lake. However, regarding potential controls for $\delta^{18}O_{diatom}$ from Lake Ladoga, water temperature (T_{lake}) plays only a negligible role. Lake-internal changes are documented in $\delta^{18}O_{lake}$ and comprise a combination of variations in evaporation, air temperature, atmospheric circulation patterns as well as hydrological changes that affect $\delta^{18}O_{diatom}$ of Lake Ladoga.

Data indicate that Lake Ladoga existed as a freshwater reservoir from at least ~10.5 cal. ka 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 $\delta^{18}O_{diatom}$ values 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 after the Holocene Optimum. Lake level rise is accompanied by a depletion of ^{18}O in diatoms and thus, results in lower $\delta^{18}O_{diatom}$ values from Lake Ladoga, whereas the lowering of the lake level causes higher $\delta^{18}O_{diatom}$ values. Generally, overall high $\delta^{18}O_{diatom}$ values around of +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. In general, overall trend in the $\delta^{18}O_{diatom}$ record corresponds to regional variation in atmospheric circulation, rather influenced by maritime Atlantic air-masses in mid-Holocene, whereas Arctic-derived moisture is intensified in late Holocene.

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ICE COVER OF EURASIAN LAKES FROM SATELLITE AND IN SITU OBSERVATIONS

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Eurasian lakes and internal seas are an integrator of climate processes and an indicator of existing or potential climate changes. Variability of ice and snow regime is important for their physical, chemical and biological properties, and for human activity (navigation, transport, fisheries, tourism etc).

We present studies of ice and snow cover of the lakes Baikal, Ladoga, Onega and Hovsgol using synergy of simultaneous active and passive satellite microwave radar altimetry observations (TOPEX/Poseidon, GFO, Jason-1, -2 and -3, ENVISAT, SARAL/Altika). An ice discrimination approach is presented and evolution of ice conditions from historical data and satellite observations is analysed. We present results of our field studies on lakes Ladoga, Onega, Baikal (Russia) and Hovsgol (Mongolia) and their relation with radar altimetry observations, optical satellite imagery and hyperspectral UAV imagery. We also address the formation of giant (diameter 5-7 km) ice rings in lakes Baikal and Hovsgol. We analyse the timing of and duration of their existence as well as associated ice and water column structure.

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PROCESSES OF DIATOMS DIVERSITY FORMATION IN LAKES BAIKAL AND HOVSGOL

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Lakes Baikal and Hubsugul are unique water ecosystems that evolve for a long time. Lake Baikal is the oldest lake on the Earth. Diatoms are integral component of the biota of these lakes and they play important role in these ecosystems. At the present time there is a noticeable change in the diversity of diatoms, dominant taxa. The diatom flora of lakes Baikal and Khubsugul includes a large number of endemic taxa, diversity of which has been studied, in many ways, by our works and the work of our colleagues. All these allow us to consider the mechanisms of formation of the diatom diversity in the studied lakes, to carry out a comparative analysis of floras. The work of the team is based on the morphological and molecular genetic analysis of organisms, the cultivation of a large number of algae (more than 1000 strains) and the study of morphological variability in natural and cultural conditions. During the presentation, we will highlight our data on peculiarities of the formation of the diatom diversity.

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