

The modeling of the Lena River runoff temperature

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A large number of observations available for the Laptev Sea shelf zone suggests significant changes both in climatology and ecosystem over the last seventy years. The Lena River plays one of the key roles in these processes. The scientists from Melnikov Permafrost Institute have shown that increasing of the Lena water temperature in a flood period led to strong coastal erosion in the Lena Delta region and thus to changes in chemical water composition. Some shifts are observed in time of the onset of daily discharge peak. As a result the changes are also observed in food webs.

The large amount of observations in the considered area has been collected. On this stage somehow possible to get a complex picture about the dynamics in the region. However the output from any modeling efforts directly depends on the quality and detail of input data. For the models, especially ecosystem models, which do not resolve the Delta, one of the key points of success is accurate distribution of total freshwater runoff in the mouth area and also setting of precise temperature profiles.

The main goal of our work is modeling of mean daily temperature of the water in the main freshwater channels near the mouth area depending on atmospheric conditions. The necessary accuracy of desired values requires the bringing observational data in frame of hydrology and morphology for the Lena River delta and main stream area including data about permafrost conditions under the river bed.

The work includes analysis of temperature regimes for the lower reaches of the Lena River in the summer period, identification of its main factors and estimation of stratification in the main freshwater channels near the mouth. Also the work contains assessment of statistical and deterministic approaches to stream temperature modeling depending on atmospheric conditions in the region and considering the unique characteristics of the Lena River.