Spatial-temporal coherence of different scale hydrological processes in the Lena River delta

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The Lena River delta is one of the hydrologically entertaining objects. Hundreds channels and thousands lakes as well as thawing ice complex and permafrost active layer dynamic allow to investigate spatial-temporal coherence of different scale hydrological processes. During 15 years Russian-German scientific collaboration on hydrological, hydrochemical and hydrobiological studies have been operated on different water objects for cause-effect relation of large and specific micro processes indication.

Transient liquid-frozen water phase change is significant not only for active layer runoff forming but also for hydrochemical and biological specific. Thus, maximum of DOC is in the overlaying soil layer than permafrost border [Bobrova et al., 2013]. It could be used for modeling of runoff forming and biological activity estimation. Measured temperature of lacustrine bottom sediment of one thermokarst lake on Samoylov Island shows maximal volume 3,7 °C on 1,75 cm beneath water-sediment border [Skorospekhova, 2015]. It is also can be interpreted as biological processes activity, for example, organic material destruction with additional heating. It could be observed more detail and can be used for modeling of a lake thermic regime.

Hydrobiological specificity shows similarity of species in the channels and lakes, poorness of biodiversity, especially in big channel; only stagnant in summer season Bulkurskaya channel has more zooplankton species in four times than the main river channel [Nigamatzyanova et al., 2015]. Decline of water turbidity from the delta top to channel edges is about 5-8 times [Charkin et al., 2009]. Considerable turbidity increase is formed according to permafrost thawing and can reach 500 g l-1 including high concentration of carbon and biogenic elements. Thermokarst lake degradation [Morgenstern et al., 2011] plays also an important role for permafrost hydrology in the delta. Outflow from an ice complex forms a high local suspended supply in adjacent river branches and influences on biological processes consequently [Dubinenkov et al., 2015].

Underestimated effect of water and sediment discharge increase in the middle part of river branches had been marked [Fedorova et al., 2015]. Head flux of the large Lena River forms taliks under channels with more sophisticated affect in the shoreline zone of the Laptev Sea due to aquifer dynamic and mixing of fresh and salt water. Talik effect on hydrology and sedimentation (and suspended material transformation) in the central part of the delta is currently carried out according to geophysical and hydrogeological methods. First field measurements are planned to be done in April 2016 and results will be presented in the ICOP 2016.

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