

Carbon outflow from the active layer of thermokarst lake catchments in the Lena River delta

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Nowadays due to climate change the interest to the hydrological processes in the permafrost affected regions is growing. Permafrost soil is important carbon pool and thawing can cause the increase of carbon outflow from Arctic river basins.

During Russian-German expeditions Lena-2012 and 2013 some measurements were carried out on the catchment of the Fish Lake on Samoylovsky Island in the Lena River delta. Fish Lake is a thermokarst-polygonal lake, and the landscape of its catchment is typical for the Arctic polygonal tundra. These measurements were done in order to study the DOC income to the lake from an active layer of the catchment.

Measurements of the DOC concentration in the pore water and the depth of seasonal thawing were made at 21 points in the 1,52 sq km catchment. The points were selected in different parts of the polygons to consider the heterogeneity of the landscape. Samples for DOC were analyzed in the field using a Spectro::lyser probe and in the lab with a Shimadzu TOC-L probe.

In August the depth of the active layer was between 20 and 60 cm: 20-30 cm on the polygon rims, 30-60

cm in the polygon centers and near the lake. During the month when the measurements were made the depth increased by 10-15

For August the DOC concentration in the pore water of the active layer was 8-51 mg/l, for July – 5-30 mg/l, which correlates with the results of other researches in Arctic region. The changes in DOC concentration in pore water for the different thaw depth were examined. Maximum was observed on the depth 35-40 cm for July and 45-55 cm for August. So, for the same depth the variance in the concentration was the most significant.

The DOC flux to the Fish Lake was calculated using the mean measured concentration and water runoff from the catchment (Ogorodnikova, 2011). The DOC daily flux to the lake is evaluated as about 0,8 kg per day and the flow rate is 0,5 kg/ km²*day, which is in ten time less than for the lake catchment of southern areas (Moore, 2003).

Prolongation of field measurements is necessary for reasons clarifying and for better understanding of DOC flux formation processes under different conditions including thawing increase.