

## **Arctic ecosystem reaction on permafrost melting as a result of 40 years anthropogenic impact**

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Arctic ecosystems are sensitive indicators of environmental change. The increasing of anthropogenic impact perturb the natural ecosystems balance, first of all significant changes happen in soil and vegetation. It is necessary to study the permafrost ecosystem response, as the permafrost covers the quarter of the world and more than a half of Russia.

Since 1960 the oil and gas industry grows in Russia. The hydrocarbons can be transferred by pipelines only in the heated state. The main effect of construction and operation of pipeline is the heating of soil and permafrost degradation.

The goal of this study was to estimate the response of landscapes and permafrost ecosystem of north of West Siberia to the cumulative action of pipelines.

The main objective was to investigate the warming impact on the properties and function of the soil along the pipelines in permafrost zone. The studied object was vegetation and soil cover of the north of Western Siberia ecosystems after the action of pipelines.

The areas with maximum effect of heat lines were selected by remote sensing. Ten transects of 50 meters in length with sampling points every 5 meters from pipeline to undisturbed background area were selected in three different natural zones.

The soil and vegetation cover was described, sampled, active layer of soil and the power of organic horizon were measured, the hydrothermal regime of soils in a layer of 0-10 cm was measured, the emission of greenhouse gas was studied. In the laboratory, the content of labile carbon, microbial biomass carbon, basal and substrate-induced respiration were measured.

The main effect of the pipelines impact is the active degradation of permafrost and changes in hydrothermal settings. From background to broken areas the following settings changing: the depth of thawing increase in 10 times; the soil temperature changes from 4 to 10,5 ° C in taiga, from 4.5 to 13,5 ° C in tundra, from 5.5 to 12 ° C in forest-tundra; the soil moisture reduces from 20% to 10% in the tundra and forest tundra and from 45.5% to 7.7% in taiga.

As a result, we established a significant transformation of ecosystems along pipelines, primarily due to a change in the hydrothermal regime of soils due to permafrost degradation. There is not only a change in the functioning and properties of soil, but also in the species composition of vegetation. There are the increasing of its biomass, expansion of woody vegetation along pipelines in the north.