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## Methane in frozen and thawed soils of the western sector of Russian Arctic

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Many researchers study the Earth's climate change and the impact of the greenhouse effect on this process. The large amount of methane (CH<sub>4</sub>) is preserved in permafrost. In this regard, scientists recently pay a great attention to the problem of methane emission during the permafrost degradation in the Arctic zone. Until now, the methane content in underground ice, frozen Quaternary sediments has been studied insufficiently. The methane content in the active layer is especially poorly studied.

The authors researched methane content in frozen grounds of the upper permafrost horizon (transition zone) and in thawed sediments of the active layer for different tundra landscapes near the Marre-Sale polar station on the western coast of the Yamal peninsula and for landscapes of the Pechora river estuary area (Russia).

More than 420 samples of gas from sediments in active and transient layer were collected in Marre-Sale and 36 samples in Pechora area. To determine the methane content, the samples were placed in syringes and degassed using the "head space" technique. CH<sub>4</sub> measurements were carried out on a chromatograph with flame ionization detector (FID) Shimadzu GC-2014 (Japan) in the laboratory of Federal State Institution "VNIIOkeangeologiya" (Saint-Petersburg, Russia).

Methane content in the frozen and thawed sediments of different dominant landscapes of typical tundra on Yamal peninsula and landscapes of southern tundra on Pechora area is extremely variable. The greatest amount of methane is typical for the most wet landscapes with primarily of silt loam soils. In dry primarily sandy well-drained landscapes, the methane content is low. The highest methane content is measured within the low floodplain of river, water tracks, swampy depressions of polygonal relief, and lake basins landscapes (mean varied from 0.8 to 2.5 ml [CH<sub>4</sub>] / kg, with a maximum of 9.0 ml [CH<sub>4</sub>] / kg). For landscapes of the moist surface of typical tundra, the average values of methane content were approximately 0.4 ml [CH<sub>4</sub>] / kg (with a maximum of 3.4 ml [CH<sub>4</sub>] / kg). The lowest methane contents in soils were characteristic of the landscapes of well-drained tundra, and sand fields where the average values do not exceed 0.2 ml [CH<sub>4</sub>] / kg. Mean methane content in soils of Pechora river mouth landscapes varied from 0.05 to 4.5 ml [CH<sub>4</sub>] / kg, with a maximum of 15.8 ml [CH<sub>4</sub>] / kg.

Determined that methane contents in the frozen soils of the transition zone is 2 to 5 times higher than in the soils of the active layer. High content of methane in upper layers of permafrost should be considered as a significant source of methane, which can be involved in emission of greenhouse gases into the atmosphere during permafrost degradation.