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Title Data of the methane content in permafrost - as a result of the geocryological monitoring in the Western Yamal (Russia)

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Poster title (brief) Data of the methane content in permafrost - result of the monitoring in the Western Yamal (Russia)

Abstract - text box

Due to climate change scientists pay a great attention to degradation of permafrost in the Arctic zone. The large amount of methane (CH₄) is preserved in permafrost. The importance of CH₄ content analysis has been increasing as CH₄ significantly impacts the climate affecting the greenhouse effect. CH₄ is released into the atmosphere during the permafrost degradation on the shelf, on the continent and due to the melting of the subsurface ice.

A new data of CH₄ content in the ground ice and permafrost is exposed in a coastal cliff near the Marre-Sale polar station (69°43'N/66°49'E), the western coast of Yamal peninsula, has been collected.

Outcrop section contains a complex of various generation syngenetic ice wedges and two types of massive ice. Long-term regular observations of the seacoast retreat since 1978 showed a speed of coast retreat is about 1.75 meters per year. More than 750 samples of gas from frozen sediments and ground ice were collected. For degassing of samples we used a headspace-equilibration, CH₄ measurements were carried out on a chromatograph with flame ionization detector (FID) Shimadzu GC-2014 (Japan) in the laboratory of Federal State Institution "VNII Okeangeologiya" (Saint-Petersburg, Russia). CH₄ concentration in massive ice was exceeded by an order of magnitude the concentration found for other sediments composing the coastal section. Given the coastal retreat rate, we assessed the annual released CH₄. The destruction of 100 m of the seacoast in the research area causes 10300 g of CH₄ to be released into the atmosphere each year and around 463500 g is released around a 4.5 km-long coastline.

The comparison between the amount of CH₄ released into the atmosphere from the surface of tundra wetland ecosystems of the north of Western Siberia and the amount of CH₄ released as a result of the destruction of the seacoast was made. The content of CH₄ coming from the 1 m² section of the coast is amounted to 5.01 g per year. Average CH₄ emission from tundra wetland ecosystems is about 1-2 g/a per 100 m².

The amount of methane released due to the destruction of frozen seacoasts with underground ice is high enough and comparable to the emission of methane from wetland ecosystems.