

Geoenvironmental Consequences of Current and Expected in XXI Century Global Climatic Changes in North Eurasia

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An environmental hazard of land use in the permafrost depends not only on an anthropogenic impact, but also on climatic changes. Since mid of 1960s the climate of the Earth has been becoming warmer. During the recent 30-35 years the warming in the north of Russia reached 0.2 to 2.3 °C with an average value of 1 °C. It is expected that in the first half of XXI century the climate will develop by a scenario of moderate warming, namely by 2025 it will become warmer by 0.9-1.8 °C, by 2050 - by 1.5-3.5 °C.

The data of in-situ measurements and numeric modeling point to a present-day degradation of the permafrost. The highest warming of 0.06 °C per year at a depth of 5 to 10 m is typical of continuous permafrost. It is predicted that by mid of XXI century the continuous permafrost may retreat (from the surface) northwards by 150-200 km due to a lowering of the MPS roof by a few meters. Moreover, in the Extreme North the soil temperature will rise on the average by 1.5-2 °C. The period after 2050 is predicted to have high-temperature frozen soils in the Arctic regions.

The climate warming combined with an anthropogenic impact activates cryogenic geological processes (thermokarst, solifluction, thermal erosion, ice formation) that are hazardous for man's activity. An intensified moisture circulation of shallow groundwater, displacement of landscape zones boundaries, disturbance of surface stability, deformations of buildings and geotechnical complexes - such is the list of deep geoenvironmental consequences of anthropogenic loading and expected climatic changes in the North.