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Theme -Theme 2: Observing in Support of Adaptation and Mitigation

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Poster title (brief) Assessment of the infrastructure sustainability in the Arctic Regions of Russia under the changes in natural and technogenic conditions

Abstract - text box

Permafrost soils in the Russian Arctic are characterized by great variability and complexity. There is a certain equilibrium in natural environments in the system: “atmosphere — ground surface — active layer — permafrost”. Investigations of recent decades show that, due to climate warming, multidirectional and often asynchronous oscillations are growing in this system.

The situation becomes much more complicated and less balanced in the economically developed territories, since significant thermal, mechanical and physico-chemical effects on permafrost occur through the surface and in depth. Research in the largest industrial centre in permafrost zone (Norilsk city) showed that with the development of the area and over time the operation of the infrastructure, a “new reality” is formed in the permafrost stability.

Main directions of the changes are: a) decrease in the bearing capacity of frozen ground incorporated foundations; b) technogenic-cryogenic weathering of underground structures; c) activation of engineering-cryogenic processes. Our data have shown that these dangerous trends (for the stability of infrastructure in the Arctic), depending on: 1) natural conditions; 2) anthropogenic factors (population of settlements, type of environmental activity, duration of anthropogenic impact, operation of infrastructure, primarily from the conditions of mechanized redistribution of snow deposits and water disposal conditions). An analysis of regional characteristics made it possible to rank more than 50 cities and settlements of the Russian Arctic according to the degree of potential threat to infrastructure while activating dangerous engineering-cryogenic processes.

Sustainability of the infrastructure reliable by high-quality forecasts and the implementation of the necessary engineering-geocryological mitigation methods

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