

GC31B-0459 Evolution of permafrost landscapes under technogenic impacts[Back to:](#) [Session: Environmental, Socioeconomic, ...](#)

Wednesday, December 17, 2014 08:00 AM - 12:20 PM
*Moscone West
Poster Hall*

Economic development of Russian Northern Regions on permafrost resulted in a new pattern of geocryological conditions, different from natural environment. This pattern is characterized by drastic landscape transformations; changes of heat and mass transfer in the permafrost/atmosphere system; and by engineering and technical pressure upon the permafrost, leading to alteration of its physical, thermal and mechanical properties. In the northern cities this causes increase of ground temperature and intensification of hazardous cryogenic processes in areas under engineering development, reducing stability of geotechnical environment. For example, facility deformations in Norilsk in the last 15 years, became much more abundant than these revealed throughout the previous 50 years. Increase in accident risk for facilities (pipelines, industrial enterprises, etc.) enhances the technogenic pressure on permafrost of the territories under development, leading to the new milestone of changes in permafrost, i.e. to creation of a new set of geocryological conditions. Cryogenic processes within the urban cryolithozone are seldom similar with these under the natural conditions: they either occur more intensively or, vice versa, attenuate under technogenic impacts, new cryogenic processes and phenomena occur, which have not been typical for a given region hitherto. A geographical distribution, evolution and other features of cryogenic processes differ considerably from natural conditions or are unprecedented at all. Peculiar natural-technogenic geocryological complices (NTGC) are formed in the urban centers, which are remarkable by the vector of permafrost evolution, by the set of cryogenic processes, by temperature trends and the other characteristics. NTGC types depend on initial natural settings and on kinds, intensity and duration of technogenic pressure. Our field surveys of permafrost and geological conditions resulted in mapping of 17 NTGC types in Norilsk, 11 types in Yamburg gas field, and 32 types along gas and oil pipelines in the north of Western Siberia. NTGC dynamics, depending on climate change, the scale of urban system, on the set of its elements and on duration of impact upon nature, and on degree of stability of natural permafrost, attracts the particular interest.

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