Thermoerosion process on Tazovskiy peninsula. Factors and dynamics.

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Cryogenic processes, especially “warm” significantly affect the reliability of the northern infrastructure. Thermoerosion is the process of destruction of the banks or ground massives constructed by the permafrost and ground ice, by thermal and mechanical influence of the running water. Tazovskiy peninsula, where the largest gas production facilities are located, is referred in Russia as “The kingdom of the thermoerosion”.

The geodetical level of the surface on Tazovskiy peninsula varies between 15–20 m. and 60–80 m., but the thermoerosion processes are very active. The area exposed to thermoerosion was 10–15% of the territory in the beginning of 1980th and actively enlarges.

The period of the maximum active layer thaw depth is August, when the precipitation amount is the highest, which coupled with the raising trend of the air temperature (0.8°C per decade) (IPCC, 2014) and growing temperature (up to 1.5-2°C warmer) of the upper permafrost layers, results in the ground destruction. The appearance of the thermoerosion process we clarify by the highly blurred sediments at the surface: the upper Quaternary silty iced (up to 40–60%) sands or sandy loams. The other auspicious factor is polygonal ice systems formed by iced peatlands (2–3 m of depth) serving as the positions of the future thermoerosion cuts. Our investigations showed that in the raising probability of the erosion occurrence, weak root systems of the shrubs and grasses can not cope with the process.

The factor that significantly intensify the speed of the thermoerosion is active snow melting in May–beginning of June. Together with increasing snowiness of the winters it additionally activies the processes of gullies formation. The conducted field works during the snowmelt revealed lumpy collapsing of the big ground blocks near the lateral sides of the watercourses which was the main reason of erosion speed boost. The blocks remained frozen, the rate of the lateral erosion was 15–20 cm/per day, the widths was up to 1.5–2 m.

We started to observe dynamics of the thermoerosion in early 2000's. The rate of the gullies growing on the right side of the r. Nyudya-Adlyurdypeoka was up to 10 m. per year. The length of the gully was 60 m. in 2006 and it was U-shaped. In 2016 the gully had length of 80 m.. The profile of the gully became V-shape everywhere, the gully was branched out and the steepness of the edges increased. More detailed characteristics of the other representative gullies development will
be consider in this research.

Our study showed that construction and exploitation of the road systems between the deposit fields entailed the formation of linear overmoistured zones near the roads and formed new thermoerosion systems.

Satellite data showed that territory occupied by thermoerosion processes raised by 15–20 % in the last 40 years. It is due to climatic changes, the active exploitation of the technogenic systems on iced and easily blurred soils.

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