

## **23. Present post-disturbance dynamics of permafrost in Central Yakutia**

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### **Abstract**

We studied main destruction and restoration patterns of disturbed landscapes through modeling successions.

Permafrost landscapes dynamics effect on the cycles of climatic features development. Post-disturbance dynamics of landscape depends on what phase of its evolution the landscape is now. For example, whether anthropogenic disturbances will cause destructive processes in the landscape structure, or the original conditions will restore. We found that cryoecological stress of landscapes in Central Yakutia lasts for 10-12 years.

Special attention has been pointed to the study of protective layer of permafrost landscapes. Decreasing and destruction this layer is very important for dynamics of permafrost.

Process activation in thermokarst depression and especially at the flat areas of woodless territories in inter-alases that had no thermokarst earlier has been noted. In central portions of the young water-filled thermokarst depressions with a relative depth of 2-2.5 m, an average rate of surface subsidence has been 5-10 cm/yr. No or little subsidence of the ground surface has been observed in dry thaw depressions with depths less than 1 m. However, most interesting are the data obtained for the relatively stable, flat surfaces of inter-alas meadows that were not previously subject to thermokarst. At many observation points, the ground surface has settled 20-30 cm between 1992 and 2004. Subsidence of the flat surfaces occurs because nearly each year the depth of thaw reaches the top of ground ice bodies causing them to melt. The dynamics of subsidence is also of interest. Short periods of active subsidence are normally followed by relatively stable years.

The activation of subsidence on the existing thermokarst depressions and directional subsidence of the well-drained, flat surfaces in inter-alas meadows are one of vivid indicators of present-day climate change in Central Yakutia.

Forest cutting leads to strong disturbance after thawing of ground ice. However process can stop on depending from climatic condition on first years. This result was obtained in Neleger-Site near Yakutsk on the cutting areas on 2002-2005 (out of cryoecological stress period).

In present time in Central Yakutia we can observe the increase of permafrost temperature, as well as its decrease. Temperature decrease, alone with some other factors, connected with vegetation regeneration – antropogenic successions. Such areas are rather big due to forest fires and cuttings. The rules of permafrost successions evolution in Central Yakutia has been found out. Their total duration is 130 years. Spatial model of permafrost landscapes, which helps to estimate the succession influence on thermal regime of permafrost, has been worked out. It also allows creating retrospective and prediction models of permafrost.