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DENDROCHRONOLOGICAL STUDIES OF THERMOKARST DEPRESSIONS DEVELOPMENT IN CENTRAL YAKUTIA (NOTRH-EASTERN RUSSIA)

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Studies concerning thermokarst influence on tree growth in Central Yakutia have been carried out. Study region is characterized by alas landscape and ground ice distribution presence. Forest disturbance due to fires, forest cut etc. can result thermokarst activation in Central Yakutia. In interfluvial area of Lena and Amga rivers where ground ice occurs in any landscape element these landforms prevail. Ice wedge width may reach 6 m, and ice complex thickness at interfluvial area may vary from 20 to 25 m. Dendrochronological research of dynamics in initial thermokarst forms in Central Yakutia has showed activation of these processes during last several decades. These processes are correlated with more significant temperature increase.

Temporality of thermokarst and its influence on tree growth varied depending on period's climatic conditions. The analysis showed that thermokarst borders extent varies in different periods that results in demise of forest species growing adjacent to thermokarst depression. Increase of mean summer air temperatures results in more significant thawing of ground ice and, consequently, deeper thermokarst depression occurrence. Thermokarst lake area in such seasons increases. Due to ice wedge thawing goes lakeside retreat as a result tree stems inclination towards the depression occurs. This moment is clearly fixed by tree-ring growth. At this time radial increment process changing. According to our analysis tree stems under the influence of thermokarst depression and wind heels and forms sway wood; further lake area increase leads to tree demise.

Periods of thermokarst activity at permafrost landscapes of Central Yakutia have been determined due to dendrochronological study results. Sample timing showed that studied trees growth has begun in the end of 18th – the beginning of 19th centuries and the middle of 19th century. Probably in the mid-to-late 19th century thermokarst processes most likely began at disturbed sites. They are now represented by thermokarst lakes (duede). The deepest pits formed in 1879-85, 1892-1897, 1909-1919, 1927-1937, 1942-1949, 1973-1977, 1987-1993 and at present time. In these periods tree growth is characterized by sway wood formation.