Variety, State and Origin of Drained Thaw Lake Basins in West-Siberian North

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Drained thaw lake basins in Western Siberia have a local name "khasyreis" [1]. Khasyreis as well as lakes, ponds and frozen mounds are invariable element of sub-arctic frozen peat bogs – palsas and tundra landscapes. In some areas of West-Siberian sub-arctic khasyreis occupy up to 40-50% of total lake area. Sometimes their concentration is so high that we call such places 'khasyrei's fields". Khasyreis are part of the natural cycle of palsa complex development [1], but their origin is not continuous and uniform in time and, according to our opinion, there were periods of more intensive lake drainage and khasyrei development accordingly. These times were corresponding with epochs of climatic warming and today we have faced with one of them. So, last years this process was sufficiently activated in the south part of West-Siberian sub-arctic [2].

It was discovered that in the zone of continuous permafrost thermokarst lakes have expanded their areas by about 10-12%, but in the zone of discontinuous permafrost the process of their drainage prevails. These features are connected with the thickness of peat layers which gradually decreases to the North, and thus have reduced the opportunity for lake drainage in northern areas.

The most typical way of khasyrei origin is their drainage to the bigger lakes which are always situated on the lower levels and works as a collecting funnels providing drainage of smaller lakes. The lower level of the big lake appeared when the lake takes a critical mass of water enough for subsidence of the lake bottom due to the melting of underlaying rocks [2]. Another one way of lake drainage is the lake intercept by any river. Lake drainage to the subsurface (underlaying rocks) as some authors think [3, 4] is not possible in Western Siberia, because the thickness of permafrost is at list 500 m here being safe confining bed.

We mark out few stages of khasyrei development: freshly drained, young, mature and old. This row reflects stages of repeated permafrost heaving from small declustered frozen mounds to recovery of palsa plateaus due to growing and merging of isolated mounds.

It was shown that satellite altimetry, which was applied for the first time in permafrost zone in the framework of Russian-French project CAR-WET-SIB, is a prospective method to study lakes and khasyreis state and dynamic.

References

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