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CENTRAL YAKUTIA AS ONE OF KEY AREAS FOR STUDYING RAPID PERMAFROST CHANGES UNDER CURRENT CLIMATIC CONDITIONS

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Current climatic changes have greatly affected the state of permafrost worldwide. The response of permafrost landscapes in Central Yakutia to climatic changes in recent decades is quite rapid affecting the socio-economic conditions of population and this requires serious study. In addition, Central Yakutia is one of the most populated and best studied permafrost regions for which a good collection of research papers and reports in all areas of old and current investigations is available. This makes it one of key areas for studying permafrost response to anthropogenic impacts and climatic changes.

Most interesting is the study of thermokarst development. Historical periods of warmer climate in the Late Pleistocene and Holocene left as their imprints alasses, or thermokarst basins, which were formed by the degradation of the Ice Complex and are used by local residents as agricultural lands. Rapid, widespread thermokarst activity is observed at present. In open and anthropogenic landscapes, high-centered polygons have developed almost everywhere; thermokarst depressions and lakes are forming and growing rapidly in depth and size. This and flooding of the alasses have caused a burst of emission of greenhouse gases, primarily methane.

The process of thermal erosion has become more active during the last two or three decades. Gullying, shore erosion of thermokarst lakes, active fluvial erosion are rapidly modifying the permafrost landscapes. Landslides, solifluction and thermal suffosion have recently become common.

The enhanced activity of cryogenic processes is due to the 0.5°C temperature shift in permafrost in the early 1980s and the rapid, short-term ground warming in 2005-2007. The disturbed areas on the Ice Complex with a thin shielding ground layer have been primarily affected. In forest landscapes, cryogenic processes develop locally and are limited to burned and deforested areas. Forest and the underlying shielding ground layer of the cryogenic landscapes fairly securely protect the Ice Complex from thermokarst under current, fairly strong changes in climatic conditions.