

EGU2020-1840

<https://doi.org/10.5194/egusphere-egu2020-1840>

EGU General Assembly 2020

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Permafrost Dynamics and Indigenous Land Use: Tracing Past and Current Landscape Conditions and Effects of Environmental Change in Sakha/Yakutia, Russia

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Arctic and Subarctic regions are currently experiencing a more rapid warming than other parts of the Earth. This trend is of particular salience for the Republic of Sakha/Yakutia (East Siberia, Russia) – a vast region where both permafrost research and social science research on animal husbandry have been conducted intensively but thus far separately. Here we are presenting a new project that will combine these disconnected strands and utilize an interdisciplinary approach for examining landscape and land use development under climatic change. Such an approach is topical because effects of past and imminent permafrost degradation on indigenous livelihoods have hitherto been described in rather simplistic terms. The project is designed as a comparative study of two regions in Central and Northeast Sakha/Yakutia. Both areas are susceptible to permafrost degradation, but under divergent zonal and socio-economic conditions (taiga vs. tundra; cattle and horse vs. reindeer husbandry).

A key element of landscape dynamics in both regions is thermokarst, i.e. the thawing of ice-rich deposits leading to soil subsidence and lake formation. Thaw lakes mark an early phase of thermokarst formation; they can serve as indicators for changes in climate, permafrost and vegetation. On the one hand, thermokarst processes have taken place in earlier millennia, notably in the Pleistocene/Holocene transition and during the mid-Holocene climate optimum; in the long run, this has led to the formation of grass-rich depressions (known as alas), creating the preconditions for cattle farming in Central Sakha/Yakutia which emerged at least 500 years ago. On the other hand, thermokarst processes occur at present in connection with global warming; the effects of the latter are likely to produce unprecedented rapid change, with very grave consequences for local land users.

In the analysis of landscape development and land use, we distinguish between two periods: before and after the start of pastoralism and farming. We test the hypothesis that landscape and land-use changes occurred at different scales and speeds in the two zonal settings (Central vs. Northeastern Sakha/Yakutia). Furthermore, we postulate that existing forms of land use are going to influence landscape development in different ways: They (i) correlate with, (ii) exacerbate or (iii) neutralize the effects of climate change (owing to different feedback mechanisms). Finally, taking into account the most important demographic, economic and socio-cultural influences, the project

will contribute to formulating parameters for modelling the future risks that permafrost degradation exerts on rural communities.