



Project acronym: VPTaw

Project title: Vegetation - permafrost interactions in a lowland tundra ecosystem: shrub decline due to abrupt thaw triggered by wet summers?

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Discipline: Earth Sciences & Environment: Ecosystems & Biodiversity

Station(s): Chokurdakh Scientific Tundra Station (Russia)

The lowland tundra at the Chokurdakh Scientific Tundra Station appears highly dynamic. Over the past decade, we have observed an increasing number of thaw ponds and other thermokarst features related to small-scale collapse of ice-rich permafrost, which is also visible on very high-resolution satellite images obtained for the area. In the new open water bodies the pre-existing dwarf shrub vegetation drowns, suggesting an alternative for the widely assumed shrub expansion in Arctic ecosystems. However, thermokarst ponds can also disappear due to vegetation succession and permafrost aggradation. Facilitated by previous INTERACT support, we have set up a novel irrigation experiment to test the hypothesis that abrupt permafrost thaw can be triggered by extreme wet summers. In summer 2019 we will 1) monitor changes in vegetation composition, thaw depth, and moisture conditions in: a) the novel irrigation experiment, b) newly established transects over thaw ponds differing in succession stage, and c) the long-term shrub removal experiment; and 2) add high-precision positioning and surface height recording using RTK-GPS to follow soil subsidence but also recovery through establishment of Sphagnum moss carpets. In the recent Nature paper on tundra vegetation changes, our data on plant community composition was the only dataset from Siberian tundra, highlighting the importance of monitoring at the Chokurdakh Scientific Tundra Station. This project at an understudied Arctic region is expected to provide a novel perspective on Arctic landscape changes, which is required to improve predictions of the future of Arctic permafrost and its carbon storage.