

## Pathways of permafrost thawing, fires, and decomposition processes recorded in the boreal peatlands on NW Siberia - "PathThaw"

This proposal revolves around a single key issue: the relationship between climate variability, degradation of permafrost and feedbacks of changes during the last 3000 years in NW Siberia. Why it is so important (?). Permafrost thaw in Boreal and Arctic regions is causing widespread changes to ecosystems and the services they provide on local, regional, and global scales. Recent observations and prediction studies have shown that rates of permafrost thaw initiation and spread are increasing with rising air temperatures and changes in wildfire severity and extent. The previously mentioned models forecasted changes in air temperature and the amount of precipitation directly modifying permafrost conditions affecting deeper and deeper thawing from year to year and this has a cascading effect on the transformation of the natural environment and the global carbon cycle. Namely, thawing permafrost will lower the groundwater table, and change the structure of vegetation, which in conjunction will increase the effect of increasing the active layer. All this will cause drought, which with the emergence of new vegetation will change the fire regime. These dependencies are currently described in Boreal and Arctic areas. However, we still do not have data about the responses of this crucial ecosystem in terms of carbon accumulation during past climate changes. In this part of Siberia peatlands are the only relevant archives which can provide a long-term perspective of paleo records and give us the opportunity to test ecosystem feedbacks in the past during climatic shifts. This will be possible when we apply multi-proxy palaeoecological approaches with high-resolution sampling supported by high-resolution depth-age modelling. Therefore, we use peat archives to test hypotheses about changes caused by past climate variability in the active layer depth affecting dryness, the transformation of vegetation cover and increasing fire activity. We would like to focus on the last 3000 years which are an important part of Holocene climate variability, which is characterized by a sudden shift in global climate temperatures that triggered environmental regime shifts and human populations, e.g. 2.8 ka BP LIA or MWP events. The main aim of this project is to trace in detail the succession of climatic conditions and environmental feedbacks in NW Siberia in order to examine the history of thawing permafrost, and relationships occurring during these processes.