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Influence of Plant Communities on Active Layer Depth in Unburned and Post-fire Forest

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Vegetation plays a crucial role in determining active layer depth and is thought to be an important control for permafrost persistence in areas where the mean annual air temperature is as high as +2oC.
However this critical component of the interface between the soil and atmosphere is often poorly represented in models, and the relative importance of contrasting vegetation communities is not understood. In particular the role of certain vegetation types such as mosses is completely neglected, in spite of their potential to exhibit contrasting thermal properties depending on their moisture content.
Furthermore, most models assume steady states and so ignore important dynamic disturbance events such as fires. Given that the frequency of forest fires is predicted to increase due to climate change in boreal regions, the influence of these ecologically important events on active layer thickness must be established. Contrasting rates of vegetation recovery within and between burn sites may strongly impact on the rate of increase of active layer thickness.
Using a combination of targeted and cyclic sampling in boreal forests within a discontinuous permafrost zone in Southern Yukon, Canada we have aimed to further our understanding of how key characteristics of the understory and canopy vegetation influence soil physical conditions including soil moisture, temperature and thaw depth throughout the growing season. By undertaking these surveys in sites with contrasting hydrological conditions in both burned and unburned areas we have been able to determine which features of the vegetation control frost table thawing and how this relationship changes after a fire event and on different soil types.