

Project acronym: ARCTICFIRE

Project title: Short and long term effects of forest fires on the stability of carbon pools in the arctic permafrost and subarctic forests

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Discipline: Earth Sciences & Environment

Station(s): Western Arctic Research Station, Canada

In 2015 we conducted a field measurement campaign in Canada in Northwest Territories (close to Inuvik) and Yukon (close to Eagle Plains) for measuring the effect of forest fires on permafrost thawing, soil carbon dynamics and greenhouse gas (GHG) fluxes from the soil (financed by Academy of Finland). We established 4 fire chronosequences in Canada, where the forest stands were burnt in 2012, 1990, 1969, and 1900 (for sample plot locations see Research plan). We established 36 measurement plots where soil samples were collected and tree biomass and vegetation biomasses were measured. We also measured GHG fluxes (CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O) at the plots.

The results from previous campaign showed significant differences in the GHG fluxes between the sites (Köster et al. 2017). In each measurement plot, we excavated soil pits down to permafrost and collected soil samples from the soil profile. In summer of 2018 the plan is to take new measurements from our established plots, to better describe the mechanisms behind GHG fluxes (two weeks of field works in NW Territories). We will measure GHG fluxes from soil with chamber measurements. Also other reactive gases like BVOC and HONO will be measured. Set of soil samples will be collected from the active layer on top the permafrost for soil microbial analysis (biomass and composition) and soil pyrogenic carbon (PyC) and nitrogen (PyN) measurements (concentration and molecular composition of pyrogenic compounds). The depth of permafrost, temperature profiles and soil water content from active layer will be measured.