EGU21-13882
https://doi.org/10.5194/egusphere-egu21-13882
EGU General Assembly 2021
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

Effects of Warming and Permafrost Thaw on Carbon Dioxide Fluxes from Boreal Peatlands in northwestern Canada

Christopher Schulze[1,2], David Olefeldt[2], Natascha Kljun[3], Laura Chasmer[4], Chris Hopkinson[4], Manuel Helbig[1,5], Gabriel Hould Gosselin[1], and Oliver Sonnentag[1]

[1]Département de géographie & Centre d'études nordiques, Université de Montréal, Montréal, Canada (christopher.schulze@umontreal.ca)

[2]Department of Renewable Resources, University of Alberta, Edmonton, Canada

[3]Centre for Environmental and Climate Science, Lund University, Lund, Sweden

[4]Department of Geography and Environment, University of Lethbridge, Lethbridge, Canada

[5]Department of Physics and Atmospheric Science, Dalhousie University, Halifax, Canada

The Taiga Plains ecozone in northwestern Canada is warming rapidly which alters the carbon dioxide (CO_2) fluxes of the boreal peat landscape in two ways: 1) directly by increasing temperatures going along with increasing fluxes and 2) indirectly via permafrost thaw and resulting wetland expansion. However, we still lack an understanding of how direct and indirect effects vary across a latitudinal climate gradient covering different extents of permafrost. In this study, we will compare two years of concurrent eddy covariance measurements made over forested permafrost peat plateaus at Smith Creek (discontinuous permafrost) and Scotty Creek (sporadic permafrost) to assess differences in net CO_2 exchange and its two component fluxes, gross primary productivity (GPP) and ecosystem respiration (ER). Footprint analysis will be used to assess the net CO_2 balance of peat plateaus and thermokarst wetlands at both sites. We hypothesize that GPP and ER will be higher at the warmer Scotty Creek site, due to both, more abundant thermokarst wetlands and higher GPP and ER of peat plateaus at this southern site. We also hypothesize that the effects of warming on GPP are greater than on ER and thus that the warmer Scotty Creek site is a greater net CO_2 sink. Our study will conclude on the carbon feedback of warming peat landscapes near the southern limit of permafrost in northwestern Canada in response to Climate Change.