Geophysical Research Abstracts
Vol. 19, EGU2017-10927, 2017
EGU General Assembly 2017

Hotsotpots and hot moments; the control of structural heterogeneity on the thermal regime of the peatland soil-atmosphere interface.

Rhoswen Leonard (1), Paul Moore (2), Nicholas Kettridge (1), Stefan Krause (1), Kevin Devito (3), and James Michael Waddington (2)

(1) School of Geography, Earth and Environmental Sciences University of Birmingham Edgbaston Birmingham B15 2TT UK, (2) Department of Geography and Environmental Management, University of Waterloo, Waterloo, ON, Canada, N2L 3G1., (3) Department of Biological Sciences, University of Alberta, Edmonton, AB, Canada, T6G 2E9.

Peat surface temperature acts as a master variable driving non-linear terrestrial biogeochemical, ecohydrological, and micrometeorological processes, inducing short-lived extremes or spatially isolated events across heterogeneous peatland surfaces. Changes to ecosystem structure such as canopy removal may change the temperature extremes and spatio-temporal location of these non-linear processes. In order to understand the impact of structural disturbances on peat surface thermal regimes, we simulate how different ecosystem structural layers (i.e. tree layer, lower vascular layer, bryophyte layer, micro topography) influence the spatial and temporal variability of peatland surface temperatures on a carbon rich forested peatland system. Simulations of peat temperatures are validated using more than 1.9 million peat surface temperature measurements across a 10 m2 area of peatland under un-disturbed, trees removed, and lower vascular vegetation removed conditions (through the use of Fibre Optic Distributed Temperature Sensing Technology). The simulations of peat temperature using different structural complexity allows us to determine how ecosystem layers may simplify or complicate surface thermal patterns and promote or dampen temperature extremes. Our study provides important insight into spatial and temporal variability in peatland biogeochemical functioning and the production of hot spots or hot moments in peatland carbon storage or export.