Geophysical Research Abstracts
Vol. 14, EGU2012-4183-1, 2012
EGU General Assembly 2012

The effect of wind turbine-induced microclimates and plant functional types on peatland greenhouse gas emissions and pore water dissolved organic carbon concentrations

A. Armstrong (1), S. Waldron (1), N. Ostle (2), and J. Whitaker (2)

(1) School of Geographical and Earth Sciences, University of Glasgow, Glasgow, United Kingdom (alona.armstrong@glasgow.ac.uk), (2) Centre for Ecology and Hydrology, Lancaster, United Kingdom

Wind turbines can affect the local climate by removing energy from the wind and increasing air turbulence with a recent study showing a cooling effect of 1.5C during the day (Baidya & Roy, 2010). Wind farms are commonly located on peatlands where both greenhouse gas carbon dioxide (CO_2) and methane (CH4) fluxes and dissolved organic carbon concentrations ([DOC]) are significantly influenced by temperature and water table depth. In this paper we present data from Black Law Wind Farm, Scotland, where we examined the effect of wind turbines on (1) Microclimate - peatland surface and subsurface temperatures, soil moisture and water table depth and (2) Carbon cycling - greenhouse gas fluxes and pore water dissolved organic carbon concentrations. Within our experimental framework we examined the impact of the three main peatland plant functional types (shrubs, mosses and sedges) and their interactions with wind microclimate changes on ecosystem CO_2 and CH4 fluxes and [DOC]. The sampling plots are divided into four sites along a hypothesized wind turbine-induced microclimatic gradient. At each site twelve sampling plots were established, four in areas dominated by mosses, four in areas dominated by sedges and four in areas dominated by shrubs. The results show that there are significant relationships between plot location on the hypothesized microclimatic gradient, plant functional type and their interactions and CO_2 and CH4 fluxes and [DOC]. Consequently, the long-term effects of wind farms on peatland microclimates may need to be taken into account when considering their life cycle carbon budget.