Geophysical Research Abstracts
Vol. 14, EGU2012-1630-2, 2012
EGU General Assembly 2012

Effect of drainage and restoration on soil CO_2, CH4 and N2O fluxes from a lowland raised peatbog in Scotland

S. Yamulki (1), R. Anderson (2), A. Peace (2), and J.I.L. Morison (1)

(1) Forest Research, Centre for Forestry and Climate Change, Farnham, United Kingdom (sirwan.yamulki@forestry.gsi.gov.uk), (2) Forest Research, Northern Research Station, Midlothian, UK, EH25 9SY

The effect of drainage and restoration on soil fluxes of CO_2, CH4 and N2O were investigated from a raised peatbog in West Flanders Moss, central Scotland. Fluxes were monitored over a 2-year period using the static opaque chamber method in a randomised experimental block trial with the following treatments: drained and planted (with lodgepole pine age 45 year, DP), undrained and planted (uDP), undrained and unplanted (uDuP), and for reference also from an adjoining near-pristine area of bog at East Flanders Moss (n-pris). Our hypothesis was that differences between the fluxes measured from DP and uDP treatments will give an indication of the effect of peatbog drainage on GHG fluxes and the differences between DP and n-pris sites will give an indication of the effect of peatbog restoration. Fluxes of N2O were low and no significant differences were observed between the treatments. Both CO_2 and CH4 effluxes followed a strong seasonal pattern with significantly higher fluxes in late spring and summer months, reflecting temperature changes. Annual CH4 emissions increased with increasing water table across all treatments with highest flux of 226.3 kg CH4 ha-1 yr-1 from the near pristine site. Soil CO_2 fluxes dominated the calculated global warming potential (GWP) of the net fluxes for each treatment (76-98%), and only in the n-pris site was CH4 a substantial contribution (23%). Our study emphasises that draining pristine peatbog areas increases net GWP substantially, even including carbon uptake by the trees, because of the increased soil CO_2 loss, and that restoration of already drained and afforested peatbogs increases the CH4 emissions, increasing the net GWP above that of an afforested peatbog.