Geophysical Research Abstracts
Vol. 14, EGU2012-12315, 2012
EGU General Assembly 2012

Separation of soil CO_2 flux into autotrophic/heterotrophic sources and their dependence on environmental factors, from a drained boreal spruce forest.

A. Nousratpour (1), M. Ernfors (), M. Nordgren (), P. Weslien (), A. Ekblad (), and L. Klemedtsson ()

(1) University of Gothenburg, Gothenburg, Sweden (azad.nousratpour@dpes.gu.se), (2) University of Gothenburg, Gothenburg, Sweden (maria.ernfors@slu.se), (3) La Paz, Bolivia (mnordgren@cipca.org.bo), (4) University of Gothenburg, Gothenburg, Sweden (per.weslien@dpes.gu.se), (5) Örebro University, Örebro(alf.ekblad@oru.se), (6) University of Gothenburg, Gothenburg, Sweden keif.llemedtsson@dpes.gu.se)

Forest soil CO_2 emission is the sum of contribution from autotrophic and heterotrophic organisms. The autotrophic component is driven by photosynthates delivered to roots, mycorrhizal mycelium and rhizospheric organisms, while the heterotrophic component is derived from litter and old soil organic matter. The regulation of autotrophic and heterotrophic respiration act according to mechanisms that are still not fully understood. Soil temperature and water availability in particular have been used to explain the magnitude of CO_2 release from soils.
In this experiment soil CO_2 emission from a drained spruce forest in southern Sweden was measured from 3 control plots and 3 root excluded experiment plots (trenching). CO_2 emission rates were collected during 5 campaigns throughout the growing season along with continuous above ground and below ground temperature and water measurements. The resulting matrix was analyzed using multivariate statistical model PLSr (Partial Least Squares regression). In addition a time series analysis was applied to the dataset to address the time lag between below ground temperature and water properties to the above ground weather conditions such as VPD (vapor pressure deficit) and air temperature.
Mean carbon emission from the control plots (428 mg C m-2 hr-1) was dominated by autotrophic respiration by the vegetation, indicated by the flux from the root excluded plots (124 mg C m-2 hr-1). Hence during the growing season 70% of soil respiration was estimated to be autotrophic.