Geophysical Research Abstracts
Vol. 12, EGU2010-1689-2, 2010
EGU General Assembly 2010

Artificial drainage and associated carbon fluxes (CO2/CH4) in a tundra ecosystem

Lutz Merbold (1), Werner Leo Kutsch (2), Chiara Corradi (3), Olaf Kolle (4), Corinna Rebmann (4), Paul C. Stoy (5), Sergej A. Zimov (6), and Ernst-Detlef Schulze (4)

(1) Swiss Federal Institute of Technology, Institute of Plant Sciences, Zurich, Switzerland (Lutz.Merbold@gmail.com), (2) Johann Heinrich von Thünen Institut (vTI), Institut für Agrarrelevante Klimaforschung, Braunschweig, Germany (werner.kutsch@vti.bund.de), (3) UNITUS, Forest Ecology, University of Tuscia, 01100 Viterbo, Italy, (4) Max-Planck Institute for Biogeochemistry, Jena, Germany, (5) School of Geosciences, University of Edinburgh, Edinburgh EH9 3JN, UK,, (6) Northeast Scientific Station, Pacific Institute for Geography, Far-East Branch of RAS, Republic of Sakha, Yakutia, 678830 Cherskii, Russia

Ecosystem flux measurements using the eddy covariance (EC) technique were undertaken in 4 subsequent years during summer for a total of 562 days in an arctic wet tundra ecosystem, located near Cherskii, Far-Eastern Federal District, Russia. Methane (CH_4) emissions were measured using permanent chambers. The experimental field is characterized by late thawing of permafrost soils in June and periodic spring floods. A stagnant water table below the grass canopy is fed by melting of the active layer of permafrost and by flood water. Following 3 years of EC measurements, the site was drained by building a 3m wide drainage channel surrounding the EC tower to examine possible future effects of global change on the tundra tussock ecosystem. Cumulative summertime net carbon fluxes before experimental alteration were estimated to be about +115 gCm^{-2} (i.e. an ecosystem C loss) and +18 gCm^{-2} after draining the study site. When taking CH_4 as another important greenhouse gas into account and considering the global warming potential (GWP) of CH_4 vs. CO_2, the ecosystem had a positive GWP during all summers. However CH_4 emissions after drainage decreased significantly and therefore the carbon related greenhouse gas flux was much smaller than beforehand (475 $\pm$ 253 gC-CO_2-em^{-2} before drainage in 2003 vs. 23 $\pm$ 26 g C-CO_2-em^{-2} after drainage in 2005).