Geophysical Research Abstracts
Vol. 12, EGU2010-13809, 2010
EGU General Assembly 2010

Seasonal Trace Gas Dynamics on Minerotrophic Fen Peatlands in NE-Germany

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In Germany more than 99 % of fens have lost their carbon and nutrient sink function due to heavy drainage and agricultural land use especially during the last decades and thus resulted in compression and heavy peat loss (CHARMAN 2002; JOOSTEN & CLARKE 2002; SUCCOW & JOOSTEN 2001; AUGUSTIN et al. 1996; KUNTZE 1993). Therefore fen peatlands play an important part (4-5 %) in the national anthropogenic trace gas budget.

But only a small part of drained and agricultural used fens in NE Germany can be restored. Knowledge of the influence of land use to trace gas exchange is important for mitigation of the climate impact of the anthropogenic peatland use. We study carbon exchanges of several fen peatland use areas between soil and atmosphere at different sites in NE-Germany. Our research covers peatlands of supposed strongly climate forcing land use (cornfield and intensive pasture) and of probably less forcing, alternative types (meadow and extensive pasture) as well as rewetted (formerly drained) areas and near-natural sites like a low-degraded fen and a wetted alder woodland. We measured trace gas fluxes with manual and automatic chambers in periodic routines since spring 2007. The used chamber technique bases on DROESLER (2005). In total we now do research at 22 sites situated in 5 different locations covering agricultural, varying states of rewetted and near-natural treatments.

We present results of at least 2 years of measurements and show significant differences in their annual trace gas balances depending on the genesis of the observed sites and the seasonal dynamics. Crosswise comparison of different site treatments combined with the seasonal environmental observations give good hints for the identification of main flux driving parameters. That is that a reduced intensity in land use as a supposed mitigating treatment did not show the expected effect, though a normal meadow treatment surprisingly resulted in the lowest balances in both years. For implementing a further trace gas flux model observations will proceed at least until the end of year 2011. Regarding restoration sites we present newly installed locations of observing especially methane fluxes. To assure our results (presented at last years EGU conference, GIEBELS et al. 2009) from our in 2005 rewetted site we started observations at sites with advanced states of rewetting and alternative management respectively. I.e. one alternative aim to mitigate the heavy methane efflux after rewetting is observed at a site with removed canopy. Other experiments are conducted by freshly reforested alders and reed grass.

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