



## Anthropogenic impact on the carbon cycle of fen peatlands in NE-Germany

M. Giebels (1), J. Augustin (1), M. Minke (1), E. Halle (1), M. Beyer (1), B. Ehrig (1), E. Leitholdt (1), B. Chojnicki (2), R. Juszczak (2), and T. Serba (2)

(1) Leibniz-Centre of Agricultural Landscape Research (ZALF) e.V., Eberswalderstr. 84, D-15374 Müncheberg, Germany, giebels@zalf.de, jaug@zalf.de, mertenchristian@gmx.de, emma.halle@mailbox.tu-dresden.de, madlen.beyer@gmx.net, behrig@uni-potsdam.de, eva.leith, (2) University of Life Sciences in Poznan, Department of Agrometeorology, Piatkowska 94, 60-649 Poznan, Poland, chojnick@au.poznan.pl, radjusz@au.poznan.pl, tserba@wp.pl

Fen peatland ecosystems are strongly linked to the matters of carbon cycle dynamics as they are known to be former strong carbon and nutrient sinks and take part in the cycle of the common greenhouse gases carbon dioxide ( $\text{CO}_2$ ), methane ( $\text{CH}_4$ ) and dinitrousmonoxide ( $\text{N}_2\text{O}$ ). In Germany more than 99 % of fens have lost their 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). 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. Therefore we study carbon exchanges (i.e. fluxes) of varying 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 int. pasture) and of probably less forcing, alternative types (meadow and ext. 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 contrast to our expectations most land use sites in an area of deeply drained fens in NE-Germany, were flooded during summer 2007 due to exceptional heavy rain and water mismanagement. Thus, emissions of  $\text{CO}_2$  of the flooded sites were lower compared to the not flooded because of the anaerobic environment. But due to the abnormal high methane emissions their climate balance was even worse. Other first results show impressive differences in the total annual  $\text{CO}_2$  climate balance depending on the land use management. Reflooded fen sites show a significant increase of  $\text{CH}_4$  emissions in their first years of rewetting.

### References:

Augustin, J., Merbach, W., Käding, H., Schnidt, W. & Schalitz, G. 1996. Lachgas- und Methanemissionen aus degradierten Niedermoorstandorten Nordostdeutschlands unter dem Einfluß unterschiedlicher Bewirtschaftung. Alfred-Wegener-Stiftung (ed.): Von den Ressourcen zum Recycling: Geoanalytik-Geomanagement-Geoinformatik. Ernst & Sohn Verlag. Berlin

Charman, D. 2002: Peatland and environmental change. John Wiley & Sons, LTD, Chichester

Droesler, M. 2005. Trace Gas Exchange and climatic relevance of bog ecosystems, Southern Germany, PhD-thesis, TU München, München

Joosten, H. & Clarke, D. 2002: Wise use of mires and peatlands-background and principles including a framework for decision-making. International Mire Conservation Group and International Peat Society (eds.), Finland

Kuntze 1993: Moore als Senken und Quellen für C und N, Mitt. Deutsche Bodenkundliche Gesellschaft 69, 277-280

Succow, M. & Joosten, H. 2001: Landschaftsökologische Moorkunde, 2nd edition, Schweizerbart'sche Verlagsbuchhandlung, Stuttgart.