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Land use influence on GHG balances of minerotrophic fen peatlands in NE-Germany

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Fen peatland ecosystems are strongly linked to the matters of greenhouse gas 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 (CO_2), methane (CH_4) and dinitrousmonoxide (N_2O). 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 greenhouse gas exchanges (i.e. fluxes) of varying fen peatland use areas 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 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 CO_2 and N_2O 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 (Figure 1). Other first results show impressive differences in the total annual CO_2 climate balance depending on the land use management (Figure 2). Reflooded fen sites show a significant increase of CH_4 emissions in their first years of rewetting.

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