Does biomass harvesting alter the GHG balance of a rewetted fen?

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Introduction

Peatlands are important parts of global greenhouse gas (GHG) cycles through their potential to emit methane (CH₄) while storing significant amounts of carbon dioxide (CO₂).

The influence of vegetation on CO₂ and CH₄ balances of these systems is complex (own figure below). Consequently, the GHG balances of peat ecosystems may change significantly if vegetation is removed for agricultural purposes.

Common reed (Phragmites australis) is an attractive substrate for bioenergy and insulation material. It also seems to be a key species with a particularly large impact on peatland gas balances due to high rates of active gas transport (Bux et al. 1992) and peat formation (Richert et al. 2003).

The influence of repeated harvesting on GHG emissions from common reed or plants such as cattail or sedges is unknown. We therefore currently investigate the impact of biomass harvesting on greenhouse gas emissions (CH₄, N₂O, and CO₂) of dominance stands of these species in a rewetted fen.

Results and Discussion

Preliminary results indicate a net uptake of CO₂ in both years irrespective of dominant vegetation or treatment. The GHG balances differed significantly between the study years probably due to large differences in environmental conditions (i.e., extraordinary wet and one dry summer, see figure on the left). CH₄ emissions were larger during the wet year. The highest emissions were found in both years in the Carex stand. Fluxes of N₂O during both years lay below the detection limit.

Harvesting seems to have no significant effect on CH₄ emissions of all vegetation stands. However, the harvested sites of Phragmites and Carex sequenced with significantly more carbon than the controls. It has to be noted that indirect emissions resulting from the harvested biomass were not included in the balances.

Conclusion

Biomass harvesting seems to have no direct effect on the GHG balance of a rewetted fen. Due to the positive effects of rewetting in terms of GHG balances, agriculture on wet organic soils may provide a good alternative to traditional usage of drained peatlands.

References


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