Preliminary GHG balances of different drained and rewetted peatland ecosystems in North-eastern Germany

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- Drained peatlands are responsible for roughly 5% of the global anthropogenic GHG emissions – while only covering less than 0.5% of the land area
- In North-eastern Germany more than 90% of all peatlands are heavily drained
- In Mecklenburg-Western-Pomerania GHG emissions from drained peatlands are responsible for roughly 30% of all anthropogenic GHG emissions

Main research question:
• How do GHG emissions differ between peatland types and peatland management depending on waterlevel dynamics?
Study sites and methods

- Three important peatland types (one drained and rewetted per peatland type) = 6 study sites
- > 2.5 years continuous measurements

Study design

- Closed chambers and online gas analysers to estimate CH₄ and CO₂ exchange between soil and atmosphere

Alder forest
- Percolation fens
- Coastal fen
- Upper: Netto ecosystem exchange (NEE) flux (CO₂) and ecosystem respiration (reco) flux (CO₂)
- Lower: Methane fluxes (CH₄)
Table: Annual GHG balances in g m$^{-2}$ of all sites (N$_2$O) still missing data

<table>
<thead>
<tr>
<th>Site</th>
<th>CO2</th>
<th>CH4</th>
<th>N2O</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Year 1</td>
<td>Year 2</td>
<td>Year 1</td>
</tr>
<tr>
<td>AD</td>
<td>2620 ± 730</td>
<td>2450 ± 520</td>
<td>0.1 ± 0.4</td>
</tr>
<tr>
<td>AW</td>
<td>2490 ± 750</td>
<td>2890 ± 880</td>
<td>96 ± 45</td>
</tr>
<tr>
<td>CD</td>
<td>2640 ± 690</td>
<td>1750 ± 510</td>
<td>0.0 ± 0.1</td>
</tr>
<tr>
<td>CW</td>
<td>2480 ± 720</td>
<td>1920 ± 570</td>
<td>1.8 ± 1.1</td>
</tr>
<tr>
<td>PD</td>
<td>1930 ± 870</td>
<td>1650 ± 830</td>
<td>-0.1 ± 0.1</td>
</tr>
<tr>
<td>PW</td>
<td>1350 ± 720</td>
<td>740 ± 390</td>
<td>40 ± 21</td>
</tr>
</tbody>
</table>

Annual GHG balances in g m$^{-2}$. Uncertainties of CO$_2$ = 1 SD, CH$_4$ and N$_2$O = 1 SE

Discussion / Feedback

- How do these balances compare to your experiences from drained and rewetted peatlands?
- Do you have experience in incorporating forests in your balances without eddy covariance?

Take home:

- Intensive droughts of 2018 and 2019 make all sites a CO$_2$ source
- Rewetted sites show a tendency of lower CO$_2$ emissions, especially higher uptake rates in summer
- CO$_2$ emissions are surprisingly high, while CH$_4$ emissions are characterized by shortlived emission peaks, and are otherwise low