

Interactive comment on “Effects of land use intensity on the full greenhouse gas balance in an Atlantic peat bog” by S. Beetz et al.

Anonymous Referee #1

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General Comments

This paper presents useful data on GHG exchange for a relatively understudied temperate peatland system. The comparison of management regimes at the same site provides novelty, and potentially makes the paper of interest to policy/decision makers. With this in mind, I feel the authors should be careful not to overstate the generality of their findings. The last paragraph of the abstract concludes “Despite inter-annual variability, rewetting contributes considerably to mitigating GHG emission from formerly drained peatlands”. On its own this study does not provide the evidence required for such a general conclusion.

Generally the manuscript is well structured but the language lacks fluency in places and there are quite a few unnecessary words and minor errors. The methods are valid

C2147

though some important details are missing from the methods section.

Specific comments

Introduction:

p6796 lines 3-9. Refer here to net ecosystem exchange, rather than total CO₂ exchange of soils. The explanation of the drivers of GPP is unclear. I would say that plant abundance (i.e. the leaf area) is an equally, if not more important, driver of GPP than light use efficiency.

p6796 line 14. Sentence beginning “Thus the rewetting...” is ambiguous. Is the production of CO₂ and CH₄ highest at -5cm, or just CH₄?

Methods: p 6798 line 22. How many CO₂ flux measurements were taken over the course of the day? What was the measurement interval?

P 6799 line 10. What was the headspace volume of the N₂O/CH₄ chambers?

p 6799 line 13. Is there potential for underestimation of CH₄ and N₂O fluxes due to water vapour dilution in the chamber headspace?

P 6800 line 1. Was a linear or non-linear model used to calculate head space gas concentration change over time ($\Delta C/\Delta T$)? On what basis?

Results

P 6804 line 20. I disagree that fig4 shows high temporal variability in N₂O flux for all sites. NO₂ fluxes from the NW site are consistently close to zero.

Discussion

P6810 line 26.Paragraph beginning “Furthermore, all three sites...” There is no description of a statistical test of significance in the methods or results. Suggest deleting.

P6811 line 6 onwards. Regarding the NEE modelling exercise. Figure 6 shows very high R² values, above 0.9 for all sites. As I understand it however, with fitted param-

C2148

eters for three sites and 29 time periods, there are approx. 348 fitted parameters for 840 data points. The “high accuracy” is therefore unsurprising - the model has also not been tested against any independent measurements. The first sentences of section 4.5 and Fig. 6 are a therefore a little misleading. My feeling is that as an empirical exercise to quantify differences in GHG flux between sites, the analysis is valid, but I would like to see some summary information on the degree of model fit for individual site/time points, and a figure or table showing how the fitted parameters (and model errors) vary through time.

P6812 lines 16-19. I agree with the Editor here, this sentence is overly speculative - it could be interpreted as a value judgement.

Technical corrections

Define abbreviations in the first instance then use consistently.

Delete the use of “cf.” from references to figures/literature unless needed to highlight a specific contrast or similarity.

p 6797 line 12. replace “were” with “are”

p 6797 line 19. Provide full reference for “DWD 2010”

p 6798 line 7. Keep units consistent with the following paragraph (g m⁻² or kg ha⁻¹)

p 6803 line 3 sentence beginning “During the study period...” is too long.

P6803 line 20. replace “neutrally” with “neutral”

P6803 line 21. Word missing in sentence beginning “In contrast...”

P6805 line 19. 441 ± 157g rather than 434 ± 157g is reported in results section.

P6806 line 3. Report statistical method and significance as p value in results section.

P6807 line 8. Replace “already huge” with “large”.

P6807 line 8. Reference to Fig 4 should be to fig. 3

C2149

P6807 line 21. Delete “all in all” and replace “approve” with “support”

P6810 line 6809. replace “is even” with “would be”. Delete “even” from sentence beginning “This would even...”

P6810 line 23. Sentence beginning “after all, our study...”. Delete “after all”, “very”, and “by others”.

P6811 line 4. Replace “bee” with “be”

Fig. 4. The dots symbolising manure applications look like data points, suggest changing to a different symbol.

Fig.3. explain in legend that cumulative NEE is reset to zero at end of year (July)

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