

Interactive comment on “Environmental controls of greenhouse gas release in a restoring peatbog in NW Germany” by S. Glatzel et al.

Anonymous Referee #2

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The major strength of the manuscript is the presentation of small scale (both temporal as spatial) controls of GHG from bog that alter the main control which is water table position. Additionally the site is representative for temperate industrialized regions trying to restore peatlands under elevated nitrogen depositions. Such data is rarely presented in peer reviewed literature and we need the gained knowledge for these relevant and specific conditions that most likely differ significantly from natural conditions or from other climatic conditions. The weakness of the manuscript is that it is not consequently focusing on these points. However, after considering some changes I highly recommend this manuscript for publication.

The focus on the specific conditions should start with the title. The authors should find a more site specific substitute for environmental e.g., small scale, modifying control,

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under elevated N deposition, and take the experiments into account. Maybe something like Experiments on small scale controls of GHG release from a restoring bog in NW Germany under elevated N-depositions.

The first two sentences of the abstract demonstrate the focus that should be emphasized more all over the manuscript. Is sentence line 16 Ó 18 really needed?

The introduction could be condensed a little by stating GHG from peat is important therefore it received considerable interest (some citations needed here), but mainly knowledge from boreal ecosystems and water table (vegetation) was gained (please add some citations to Blodau et al. 2002). Then the statement on water table control may follow and state that this water table control may differ between the climatic regions (citation). And give details on the situation in Germany and the possible effect of N depositions. Maybe shorten it a bit, e.g. page 216 line 12 Ó 13 (Moore and..) is not really needed. Please do not use the term clarify in line 18 (p.216), this is too ambitious. Use something like: add to the understanding of ..

Site and methods: please add where the water table was measured. From Fig.1, I assume that you had one well in the center and one at the edge. Did you account for the difference in height between hummocks and hollows for the relative position of the water table? If not please do so and show the (new) results (preferable as Figure or just in the text) as a regression between water table position (for each date) and CH₄ and N₂O flux. If you do so, you can state in the beginning of your discussion that water table cannot explain everything and go directly to the experimental results. The authors measured at ten sites in the Pietzmoor that were 6 hummocks and 4 hollows. But you also differentiate between center and edge. How were hummocks and edges distributed between center and edge? Please account for this as from Fig. 2 it looks a little like if the center were mainly hollows and the edge mainly hummocks. For the experiment, it is highly interesting that you measured during drainage and rewetting. That is definitely a non-equilibrium state analyzes (usually a more steady state picture is presented) which represents dynamic conditions in the field. The authors should

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emphasize this point more as it is another modifying control to the steady water table position (e.g. rewetting did not elevate methane emissions from the start). Why was the water table set to 7 cm?

Additionally for results and discussion please use more cites from temperate regions particularly from Germany and less from boreal regions to compare with your data since the results from e.g. from Canada and Finland derive from totally different situations. Please use original and not reviews papers here (e.g. Jungkunst & Fiedler 2007 maybe useful for the introduction but the water control of methane can be derived elsewhere (Christensen et al. 2003; Nykänen et al. 1998, Roulet et al. 1992)). Try to condense a bit more – less speculations (e.g. page 224 lines20–29 are confusing and DOC is not relevant in this context). Do not use clarify in the conclusion

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