

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

Anonymous Referee #1

Received and published: 7 March 2008

General issues

The topic of greenhouse gas impacts of restoration of peatlands in temperate Europe, also outside Germany, is important. Currently, rewetting of drained peatlands especially in eastern Europe countries could be increasing as Kyoto Joint Implementation projects start to take shape. Binding of atmospheric CO₂ in peat after rewetting may sound appealing, but the change in hydrology, vegetation and oxic status of the organic matter brings about fluxes of other greenhouse gases as well. This paper considers the fluxes of CH₄ and N₂O with respect to peat quality, level of water table, and vegetation patterns. Such information is still sparse in the temperate organic rich soils, and will help in evaluating the possible gains and losses net reduction of CO₂-equivalents due to restoration of peatlands by rewetting. I therefore strongly support the publication

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of this discussion paper in Biogeosciences, but after the commented issues are dealt with.

I agree with Referee #2 in that this paper should more clearly make a note on the application of restoration measures in temperate peatlands. Consequently, the Conclusions should be tightened around this topic. A list of issues to consider when rewetting is attempted as a remedy for climatic warming would be welcome there.

Methodical comments

Hypotheses presented in page 216: 23-26 require tests to be validated. However, no tests are outlined in the Site and Methods section. The authors need to indicate how they assess each of the hypotheses

i) Drought decreases CH₄ and N₂O ii) Decomposition of peat controls CH₄ and N₂O release iii) Atmospheric N deposition accelerates the decomposition of peat surface layers

These hypotheses when properly assessed can be used to focus the Conclusions. I suspect that in many cases, no quantitative tests are possible. Please explain your criteria.

217: 16-25 There is no indication on the use of boardwalks in order to prevent disturbances of peat pore space gas content during the chamber measurements. Please describe the measurement routines more accurately, including the number of samples and sample volumes taken from the chamber headspace. Was the headspace temperature measured?

219: 20 Only the results from day 42 are shown. Please explain what was the message from the earlier days.

219-220: 25-6 It is not clear what the n really is. Are the consecutive measurements considered as independent observations increasing n? If so, how was the temporal pseudoreplication dealt with?

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223: 9 Calluna hummock or Sphagnum hollow are not sensu stricto peat types. Please describe the peat samples more accurately.

224: 9-29 A rather simple view of WT and peat quality control of CH₄ emission is presented. In the presence of aerenchymatic vasculars such as *E. vaginatum*, was it possible that CH₄ was conducted directly from the water saturated rhizosphere to the atmosphere?

227: 12-13 The term anaerobic is used for the (biological) process operating in an anoxic environment, and is not a synonym for anoxic or hypoxic.

238: Fig 2 label Please check if n is correct (with respect to the repeated measurements) in the calculation of sd.

Editorial comments

Page 219: line 23 Tuittila, not Tuitilla

219: 20 1, 3, 6, 11, 17, 28 and 42 days?

220: 3-4 Normally distributed

223: 25 Tuittila, not Tuitilla

226: 10 Add space after NO₃

235: 18 Tuittila, not Tuitilla

Interactive comment on Biogeosciences Discuss., 5, 213, 2008.

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