

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

**S. Glatzel et al.**

Received and published: 31 March 2008

We also appreciate the comments by referee#2 and hope that we are able to properly address all the raised issues as well. We found a title that focuses on the specific issues addressed in the manuscript, but we did not employ the word experiment as the methods used are based on experiments and monitoring. We prefer to retain the sentence on decomposition and nitrogen fertilization in the abstract, as decomposition releases greenhouse gases. So, this sentence addresses the core issue of the manuscript. We condensed the introduction, as suggested, deleting a few sentences and adding other sentences suggested by referee#2 on the role of the water table. We also added additional appropriate references. We did not give more details on the situation in Germany, as we believe that this issue is already well taken care of in chapter 1, paragraphs 2-4. We deleted some passages that disturbed what this contribution

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should be focused on according to the wishes of both referees. Most importantly, we deleted the last paragraph of the conclusion and inserted the following passage instead: Another goal of peatland restoration is the net reduction of the release of CO<sub>2</sub> equivalents. This contribution shows that under conditions of high rates of atmospheric N deposition it is important to avoid frequent water table fluctuations that may increase N<sub>2</sub>O release. Especially in periods when NO<sub>3</sub> uptake by vegetation is not strong (late autumn to early spring), a high water table must be maintained. At this point, we are not able to judge for how long a water table drawdown with subsequent restoration of high water table will decrease CH<sub>4</sub> release. A very low water table may decrease CH<sub>4</sub> and CO<sub>2</sub> efflux, but likely damages peat forming vegetation (Glatzel et al., 2006) and may favor growth of species adapted to a fluctuating water table as *Molinia caerulea*. For this reason, our present state of knowledge suggests that the reduction of the net release of CO<sub>2</sub> equivalents in N loaded temperate peatlands depends on maintain a high water table. This passage addresses the most important issues to consider (water table management and feedbacks between water table fluctuations and vegetation). At this point, we are not (yet) able to present a recipe for climate friendly bog restoration. We replaced clarify by add understanding on. We now describe more clearly where the water table was measured in chapter 2.5. We added figures (Figure 7 and 8) on CH<sub>4</sub> and N<sub>2</sub>O flux against water table following the proposed correction for hummock elevation and refer to them in the text. We are very grateful for the suggestion. It greatly improves our manuscript. The figures and our statistical analyses show that no linear or nonlinear model describes the relation between water table and gas flux well. Also, keeping in mind the comment of referee#1 on temporal pseudoreplication, we chose not to present regressions. We added a more thorough description of the location of our collars and hope that their setup is now easier to understand. We inserted a passage on the relevance of the non-equilibrium conditions. We explain why we set the water table to 7cm in chapter 2.3. The reason is a compromise between flooded conditions that were found in the hollows and much drier conditions in the hummocks. We added an extended passage on data from temperate regions and deleted several pas-

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sages that were outside the main focus of our contribution. For example, we deleted a large section on DOC quality in chapter 4.1. We deleted the passage with the word clarify in the conclusion and revamped the entire conclusion in order to gain the necessary focus. We also corrected some additional editorial comments that had, up to now, not been noticed by anyone. The most important improvement is the correction of the faulty unit milligram by the correct unit microgram in Figure 7.

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

**BGD**

5, S281–S283, 2008

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