Biogeosciences
Discussions

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Interactive comment on "Greenhouse gas emissions from rewetted bog peat extraction sites and a *Sphagnum* cultivation site in Northwest Germany" *by* C. Beyer and H. Höper

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Intro: - Focus train of thought more clearly and more logically on the topic of the investigation. âĂć is changed accordingly + Attune questions and hypotheses better to each other. Why do you not formulate all this only in the form of hypotheses? âĂć is changed accordingly + Please give reasons why it makes sense to investigate the variants presented here together. What do they have in common? âĂć use of abandoned cut-over sites. Is mentioned in the text. + Indicate exact figures gas about gas exchange rates and C losses of drained bogs. âĂć This should be in discussion section. + Please clarify the connection between plants and bog rewetting (p. 4497, lines

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14-16). âĂć This was removed. Materials and methods: - Please specify the name of Drosera and "mushrooms" (p. 4498, line 17). âĂć Drosera and fungi were not closer specified. - What was the purpose of the biomass determination and its separation? Please check and clarify. âĂć It was used to determine the amount of Sphagnum and grass as well as how much carbon was accumulated since the establishment of the Sphagnum test site. This was also used to validate the gas flux measurements. Beside, in the Leegmoor we were not allowed to take biomass samples. - Did the mentioned authors really employ the same approach for modeling ecosystem respiration and GPP (p. 4500, lines 18-25)? Please clarify. âĂć We used similar chambers and the same equations. Otherwise differences are mentioned. - Please clarify what shall be achieved with the reduction of the measured PAR values (p. 4500, lines 25-26). âĂć PAR was measured outside the chamber. Thus, model calibration with these values would lead to underestimated negative values of alpha. - Please explain in greater detail how the monthly and annual balances were calculated (p. 4501, line 9). âĂć is explained. - Remove the DOC literature value from your C balance calculation since you don't check if it also applies to your ecosystems. âĂć is removed. Results: - In general, numbers which can be found in tables or figures are exceptionally represented once again in the text. âĂć In general, we deliberately did not repeated numbers in the text, if they are already included in tables, in order to save space. In some cases, however, numbers are represented in the text, in order to assist the reader to understand the statements. - In order to promote clarity you should present the results in the following sequence: + site factors + control factors like weather and water table + nitrous oxide and methane + carbon dioxide + carbon and climate budget + Statistical analysis of the relations between control factors and gas exchange. This also applies to figures and tables. âĂć is changed accordingly - Instead of current table 1 create a new table which contains an overview of the most important site and control factors of all sites. âĂć We created a new table with soil properties, vegetation and water level. - Figure 3 must be revised so that the variants could be clearly distinguished. âĂć colors are changed. - Remove the water tables from figure 4, since this is already shown

in Figure 1. Instead of this, add the CH4 fluxes of variant LM. âĂć It is necessary for comparison of fluxes with temperatures and water level. CH4 fluxes of LM are not interesting. Discussion: - In order to promote clarity you should subdivide the discussion in the following sections: + Reliability of the research methods + Importance of site and control factors + Evaluation of the effectiveness of the methods for bog revitalization (This also includes an direct comparison between drained and rewetted bogs) + Can the results be generalized? (This also includes a comparison with other studies and a discussion about the long-term gas flux dynamics after reflooding). âĂć is changed accordingly, but 5 sections (the 4 suggested sections + Sphagnum cultivation). - A meta analysis of own data and information's from literature is mentioned several times in the discussion (p. 4509, line 23, p. 4510, lines 16-17, p. 4512, line 13). However, it remains unclear what is meant since the results of this analysis are referred to nowhere. Please clarify. âĂć Results are presented in Fig.5. - Why do you mention as controlling factor of GPP since it was not measured (p. 4508, lines 13-14)? Please clarify. âĂć This was mentioned in order to point out that, on the one hand, there are also other influencing factors, and, on the other hand, in our examination the PAR was an appropriate explaining parameter. Importance of autotrophic and heterotrophic respiration during the year: On which facts based your statements (p. 4509, lines 1-8). Please clarify. âĂć Our statements were based on the facts that the autotrophic respiration and the GPP depends not only on temperature and PAR but also vegetation (in spring the vegetation is not fully developed and in autumn senescence occurs; both leads to a smaller LAI, both leads less respiration), while the heterotrophic respiration depends on temperature. This explains that the annual courses of Reco and GPP follow basically the courses of temperature and PAR, but not always. - The strong impact of the dry period on GPP at the LS variant: Does this really show the efficiency of the model since PAR was the only independent variable (p. 4508, lines 15-22)? On the contrary, does this not reflect the correct choice of the measuring campaigns? Please clarify. âĂć Temperature and PAR were the short-term variables, while other factors, e.g. wl were long-term variables. The models were calibrated about every four weeks

to account for the long-term variables. Therefore, the dry period led to lower GPmax and alpha values. Of course, it also reflect the correct choice of the measurement campaign, which is coincidently, since the measurement campaigns were usually held exactly every four weeks. - Statement, that the own results fit more to natural bogs than of rewetted bogs (p. 4509, lines 27-29. P. 4510, lines 1-4). There are no real differences between the presented values. Therefore the statement must be checked. âĂć natural bogs in Germany: -157 to -8 g CO2-C m-2 a-1. rewetted bogs in Germany: -148 to 192 g CO2-C m-2 a-1. Our values: -201.7 +/- 126.8 to 29.7 +/- 112.7 g CO2-C m-2 a-1. Thus, our values are closer to natural bogs. - Statements about methane emissions from natural and rewetted bogs. Have you considered that AUGUSTIN and JOOSTEN (2007) only dealt with newly reflooded peatlands, whereas you investigated mostly sites with a long-term rewetting history (p. 4511, lines 1-4)? Please check your statement again. âĂć Beside bogs with a long-term rewetting history we also considered recently rewetted bogs. There was no time-dependant relation visible. Conclusions: Please formulate real conclusions instead of a summary. âĂć Is changed accordingly

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