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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***

**C. Beyer and H. Höper**

coljabeyer@t-online.de

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Title: I suggest renaming the contribution in a way that reflects the fact that the uptake of CO<sub>2</sub>, even its NET uptake is one of its main issues. Why not “Greenhouse gas turnover: . . .” is changed accordingly General language comment: Check tenses. On quite a few occasions, “was” is given when “has been” or even “had been” might be a better choice. is changed accordingly Abstract: 4494, 4-5: Please try to avoid expressions as “available data is scarce”, which is too unspecific. is changed accordingly 4494, 13-14: delete “using automatically monitored climate data” is deleted 4494, 21 and throughout the text: Check the use of “yearly” against “annual”,

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Interactive Discussion

Discussion Paper



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Comment

which is much more adequate. It is changed accordingly Intro: 4495, 20: “Tremendous” is inadequate in this context. How much? It is changed accordingly 4495, 23: What do you mean by “increasing tendency?” It is changed accordingly 4496, 3-7: Delete this paragraph It is changed accordingly 4496, 8-9: Please rephrase the two awkward lines. It is rephrased accordingly 4496, 12: “Climate relevant” is a literal translation from the German language that should be avoided. It is rephrased accordingly 4496, 13: Which data is scarce? There are quite a few GHG papers from bogs. It Sentence is deleted 4496, 24-25: Who is “examination area” defined? If it is defined locally, any data paper will be sorely needed. It Is changed accordingly Even in the in General comment on the intro chapter: I suggest some restructuring. You are presenting GHG fluxes from differently evolved, previously cutover sites as well as a recent Sphagnum farming one. I suggest starting out by saying the different afteruses following peat extraction are being considered and that long-term GHG data from rewetted cutover sites is scarce AND a new alternative could be Sphagnum farming. It Is changed accordingly

Please explain Sphagnum farming more closely, large parts of the audience might not know how it is supposed to work. It Is corrected, one sentence was added. Nevertheless, to save space, this aspect was not discussed more in detail. And please don't ignore GHG papers from cutover sites in Canada, Ireland, Finland, even when from boreal sites. It Boreal peatlands were included, with some cutover peatlands. This study should be more on temperate sites. 4497, 12: Is 2005 recent? Has there been no progress since? It “recently” is removed Please delete between “The advantages: : : to : : :appropriate estimates (Drösler, 2005)”, which belongs to the methods section. It is deleted Material and methods: 4498, 6-17: Please italicize plant species, give the name f the first descriptor at their first mention, and only use scientific names (no mushrooms) It is already italicized. The other issues are changed accordingly 4498, 23 and elsewhere: “Decomposition status” sounds much better than “decay degree”. The von-Post scale is well known internationally, so it might be a good idea to say how it relates to the humification index in the German soil classification. It is

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changed accordingly 4499, 4: Probably samples were not analyzed for C and N following 550\_C thermal treatment. Please clarify. → is corrected

4500, 9: Drösler (2005) and Beetz et al. (2013) didn't use exactly the same flux calculation procedure. Neither one employed the general technique for the first time. Are you referring to a general principle or a specific procedure? → to a specific procedure. We used similar chambers and the same equations. Otherwise differences are mentioned. 4500, 28 to 4501, 5: I can't quite follow you. Please explain a little more thoroughly. → is explained more clearly 4501, 10: I don't see how CH<sub>4</sub> or N<sub>2</sub>O exchange was modeled and I think you should have modeled CH<sub>4</sub> exchange, as you noticed a dependency of CH<sub>4</sub> exchange on water table and temperature. → it was not modeled and we rephrased it. The relation between CH<sub>4</sub> and parameter is too weak. That is why we did not model the methane exchange but only interpolated between the measurement dates 2.5: In this subchapter, language quality corrupts content. Please rephrase in a longer paragraph. → is rephrased accordingly Results: 3.1: How about "Environmental controls" instead of "site factors"? → is changed into "Site factors" and "Environmental controls" I suggest general restructuring of the subchapter. → is divided into two subchapters 4503, 6-7: Better: "Peat at LM was highly decomposed (h 10, on the von post scale): : : → is changed accordingly 4503, 16-17: Is the C stock of the site important? If yes, why is it not given for the other sites, if no, why not omit it? → yes, in order to compare the C stock with the calculated C accumulation. 4504, 12: Are you sure that that result is going to be accurate? Please rephrase. → is rephrased accordingly 4505, 13: What is "not satisfactory"? Please give more specific reason. → is rephrased accordingly 4505, 21-14: I don't understand. As I understand it, there are no independent datasets. So how can you compare measured with modelled data? What sense does Fig. 2 make? → the coefficient of determination and the figure shows the fit of the models 4505, 13: "CO<sub>2</sub>" instead of "gas" → is rephrased accordingly 4506, first paragraph: Repeatedly mentioning "net" shouldn't be required here. → is rephrased accordingly 4506, 18-19: Again: If there is a relation between CH<sub>4</sub> fluxes and these parameters, why don't you use them for a better

C3629

BGD

11, C3627–C3631, 2014

Interactive  
Comment

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Interactive Discussion

Discussion Paper



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Comment

depiction of annual CH<sub>4</sub> flux? The relation is too weak. That is why we did not model the methane exchange but only interpolated between the measurement dates

Discussion: This chapter required the most additional work, therefore my comments are not as specific: I don't agree with the idea of a meta-analysis for several reasons: 1) It is not a meta-analysis, but a collation of publications from the "region". We used the term "meta-analysis", because we included values from other studies to identify explaining parameters. I don't see which criteria were used to include work from Bavaria, but not Ireland, not Southern Sweden and not the UK. Even if one agrees that boreal sites shouldn't be part of that "meta-analysis", they might still be useful for a more general discussion. Only own data and published data from rewetted bogs in the temperate zone were used, because gas exchange depends on peatland type as well as on climate zone. The way the discussion is currently structured doesn't do the valuable data any justice. is structured differently Most importantly, it is necessary compare your data with data on more recently restored sites. Another issue to be discussed is the dominance of time passed since restoration over vegetation cover. See page 4509, line 23 – page 4510, line 3; and page 4510, line 10-12; and page 4511, line 1-4; and page 4511, line 24-26; page 4512, line 13-16. We compared our data with data on more recently restored sites, and we could not find a relationship between gas fluxes and time passed since rewetting.

4511, 9-10: Does the content of these lines imply that a) your sites were not representative or b) that you have no idea about spatial variability. This would be a grave problem; so please give the reader some confidence why you believe that this is not the case. We examined three sites in the Leegmoor which were representative for the area. However, small-scale information about water level and vegetation of the whole area is not available. Thus, an exact estimate for the whole Leegmoor cannot be given, but the results show that the Leegmoor is a small carbon sink and has a near-neutral GWP100-balance (see manuscript).

Fig. 5: Not required. In our opinion the figure is necessary to show the results of

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the meta-analysis.

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11, C3627–C3631, 2014

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C3631

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