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Interactive comment on "Can a bog drained for forestry be a stronger carbon sink than a natural bog forest?" *by* J. Hommeltenberg et al.

Anonymous Referee #1

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General:

The manuscript describes measurements performed at 2 bog sites close to each other with different land use history. Studies on bogs outside the boreal region are still rare and thus valuable for the scientific community even though 2 study years are not enough for comprehensive comparisons. Measurements should be continued to reflect climatic variability, and this should be mentioned in the outlook. In addition CO2 is not the sole relevant gas with respect to the carbon cycle of bogs. Adding methane fluxes either by eddy covariance or chamber measurements should be considered as well.

Most methods used within the manuscript are established procedures, related work is considered appropriate. Nevertheless some formulations have to be clarified as detailed below. Throughout the manuscript it is sometimes difficult to keep in mind which

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of the 2 sites is the natural one and which was drained and afforested. A consistent naming (natural – formerly drained) could help reading. In addition, the age of the spruce trees has to be mentioned at least in the site description. Productivity is clearly related to the age of a forest.

Methods:

-What about storage of CO2 in the layers below the eddy covariance level?

-A comparison that is performed with different measuring devices (open- and closed path gas analyzer) may be biased. I would expect this is part of the uncertainty analysis but not mentioned in the appendix nor elsewhere.

Specific:

P 2190, l 15 and elsewhere: higher productivity of spruce trees may also be attributed to age of the forest, which is about the most productive state in a forest life cycle (forest age should be mentioned in abstract already)

P 2191, l 18: carbon emissions instead of CO2 emissions

P 2192, l 12-14: formulation to be changed: methane should be considered in future/ by additional measurements

P 2192, l 16: '. . .measurements made over two years with the eddy covariance technique, from. . .'

P 2193, l 15: link to be activated or removed

P 2196, l 6-7: it should be noted over which period zero mean wind speed is ensured

P 2196, l 10: gaps do not occur due to the instrument diagnostics. The diagnostics deliver a measure for data quality on which the user decides whether to use the data or not. Causes for gaps might e.g. be rainy or foggy conditions.

P 2196, l 25: does that mean the area of interest is matched at any time? To clarify l

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suggest to add an estimate of the footprint area graphically in fig. 1

P 2197, l 27: '. . .a positive NEE dominant CO2 release by the ecosystem.'

P 2198, l 5-6: '. . .exponential relation between nighttime CO2-fluxes and temperature. . .'

P 2198, l 14: In Lloyd and Taylor (1994) E0 is kept constant and is not called K, but the unit is K. Please ensure which are the fitting parameters and clarify.

P 2198, l 15: '. . . and T (_C) the measured half-hourly temperatures providing the best fit.'

P 2198, l 21ff: For GPP, respiration determined with night-time relation and day-time temperatures was subtracted from measured NEE (I would suspect). Then the GPP relationship (alpha, GPPmax determined by regression) was determined with eq.2 and afterwards modelled? Please clarify. It has to be considered (at least mentioned) that day- and night-time respiration are different.

P 2199, l 9ff: with a linear regression usually also an offset is determined. Is the offset set to zero or close to zero? Otherwise it has to be taken into account and is not negligible.

P 2201, l 1ff: what about possible influences of the water table?

P 2202, l 23ff: '. . ., if only carbon dioxide is considered.'

P 2203, l 4ff: as was explained before, soil moisture did not have any influence. It can be expected that despite low water tables, trees are never water limited. This may be reflected by still high soil moisture content.

P 2204, l 21: '. . .different land uses requires a longer-term perspective and the determination of methane fluxes.'

P 2207, l 7: '. . .carbon loss of +550 gCm−2 a−1 for previous years.'

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Table 1: ‘Long-term yearly averages of meteorological parameters. . .’

Fig. 1: What exactly are the target areas? Green triangles are difficult to find. What is the main wind direction? A graphical footprint area could help to clarify the text as well.

Fig. 6: do the error bars include the uncertainty determined from bootstrapping as well as random error?

Language: Usage of commata to be checked.

Interactive comment on Biogeosciences Discuss., 11, 2189, 2014.