

## ***Interactive comment on “High methane emissions dominate annual greenhouse gas balances 30 years after bog rewetting” by M. Vanselow-Algan et al.***

**Anonymous Referee #1**

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An interesting examination which deserves to be published. However, some shortcomings must be addressed before the manuscript can be accepted.

The main problem is that much to far reaching conclusions are drawn from the results of this one-year investigation. Since some new studies demonstrate a strong influence of interannual variability on GHG fluxes and climate impact of similar peatlands (e.g. Beetz et al. 2013: Effects of land effects of land use intensity on the full greenhouse gas balance in an Atlantic peat bog, Günther et al. 2013: Scale-dependent temporal variation in determining the methane balance of a temperate fen, Günther et al. 2014: The effect of biomass harvesting on greenhouse gas emissions from a rewetted temperate fen). Therefore, an accurate assessment of the generalizability of the results is

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must be an essential part of the discussion. A comprehensive analysis of long term plant, groundwater level, and precipitation data from the investigated area should play a central role. Particular attention should be paid to differences in the dynamics of these and other factors controlling gas fluxes during the vegetation period. The currently practiced comparison of annual mean values (section 2.1) is not sufficient. For example, there are big differences in the ground water level at the restored site during summer between 2010 and 2011, which may have significant consequences at least for CH<sub>4</sub> fluxes. In order to get an idea about the risk of high CH<sub>4</sub> fluxes it would be useful to determine the probability of high groundwater tables during the vegetation period. As a result of this type of actions, it may be also necessary to modify the title and the conclusions.

Other recommendations

- Flux modelling: please clarify, in which way you used the model parameter: independently for every single measuring campaign or as average values for seasonal modelling?
- Flux modelling: Please describe the procedure which was used for the determination of the precision of the modelled cumulative gas fluxes.
- Results: Please show the measured CH<sub>4</sub> and N<sub>2</sub>O fluxes of all sites for the whole measuring period.
- Results: Please show the precision of the cumulative flux rates independently of its spatial variability.
- Results, Fig. 4: Why is some CO<sub>2</sub> uptake (GPP flux) in case of the extraction site too? Did there also grow some plants? Please clarify.