

## ***Interactive comment on “High net CO<sub>2</sub> and CH<sub>4</sub> release at a eutrophic shallow lake on a formerly drained fen” by D. Franz et al.***

### **Anonymous Referee #1**

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General This manuscript describes the effects of rewetting a fen in order to restore the function of fen as a carbon sink. The study site was monitored for a year with eddy covariance measurements of both CO<sub>2</sub> and CH<sub>4</sub> and subsequent calculations of CH<sub>4</sub> and CO<sub>2</sub> budgets, gross primary production, respiration, net ecosystem exchange and global warming potential of the gas fluxes. The study site showed a considerable carbon loss and global warming impact even after 9 years of rewetting. The study is well planned and the results presented mainly clearly. The scientific quality is good and the manuscript is well written. I think this is an important contribution to the scientific discussion, because the rewetting projects are widely planned and implemented. However, I have few suggestions for improvement of the manuscript.

1) In the manuscript there are lengthy descriptions of gap-filling of the eddy covariance data, and the coverage of the actual data is presented in Table 1. However, there is

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very little information about the timing of these gaps, I was hoping for a bit more open policy about the shortcomings of the data. In row 310 there is a remark that data from April and May are missing from Figure 3 because the sensor was dismantled. Are there other similar longer gaps in the data? Where?

2) The term “polytrophic” is not very commonly used in the lake science, I suppose it means a shallow, polymictic and eutrophic lake. However, as the term is not very commonly known, I think the paper would draw more interest if the title was “. . . polymictic and eutrophic lake. . .” or “. . . a shallow eutrophic lake. . .”.

3) The writers stated that summer 2013 was exceptionally hot and dry and as a consequence the water level dropped considerably rising again the next winter. As the lake is very shallow, I was wondering how much the fluctuation of the water level affected the lake area (i.e. area covered with water). Was the water area considerably larger in winter than in summer? One of the main findings of this study is that open water and vegetated areas had very different gas fluxes. How much did the fluctuating water level (or dry land versus water covered land) effect the results?

4) One of the findings of this study is that convection brought about a diurnal fluctuation of CH<sub>4</sub> flux. If this is true, most likely convection contributed also on the diurnal fluctuation of CO<sub>2</sub> flux. Have you considered this when calculating e.g. NEE?

Detailed comments:

Page 11, row 310: Please add 2014 to avoid misunderstandings (April and May 2014 not shown . . .)

Page 15, row 432: Extra bracket at the end of the sentence.

Figure 2. It is not quite clear here is the fluxes are for the whole EC area or for the AOI.

Figure 6. It is not quite clear what does the density describe. Please clarify.

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