Reviewer comments to Eugster et al. "Eddy covariance flux measurements..." in BGD

The paper reports the first direct eddy covariance measurements of CH4 from a freshwater ecosystem, and as such it is very valuable and important contribution, to be publiched in BGD. Technically the paper is in quite good shape but the following points should be concerned before the publication.

More Major:

1. p. 5026, l. 20-21: In the case of lakes, could u* filtering approach still be used but it is not sufficient and some extra filtering criteria are required? Or is it so that u* is misleading, irrelevant or whatever and if yes, why?

2. I am not sure whether I understood correctly the point of mislocated chambers and posterior computations of footprints. I understand that footprints were calculated much afterwards and then realised that the best guess for chamber locations were in fact wrong. Well, nobody is perfect. However, I would like to ask few things on footprints. How are the footprints estimated for SW direction, along the shore? The footprint has always some cross-wind range including heterogeneity of water-land area and the model by Kljun et al. cannot take that account (only Andrey Sogachev's model if any).
   In addition, the footprints are weighted by the respective effluxes so they are not classical footprints by definition but show the footprint/flux climatology. This should be stressed.

3. p. 5037, l. 13-15: The relation to the surrounding ecosystems is discussed in Conclusions and not in Discussion, although lines 13-15 refer to Discussion. Indeed, it should be in Discussion and Conclusions should be totally rewritten. It should reflect the whole paper and not only the surrounding ecosystem analysis.

Minor:

1. Abstract: the accuracy of the values may be too big, for example, I would replace 3.76 +- 0.39 (line 11) by 3.8 +- 0.4.

2. Abstract: It would be good to explain what is meant by "larger terrestrial area". Mention that it is the European-scale compilation of grasslands, croplands and forests.

3. p. 5024, l. 12: explain how was the ebullition detected. As the sampling site was located on the shore, how well does it represent the reservoir overall?

4. It would be good to introduce/mention the sand box in Site description and define exactly its location. In my opinion, it would be good to have a map of the area showing the reservoir, some part of the land, EC location, chamber locations and the sand box. Instead of a new figure, this information could be implemented also to Fig. 6.

5. It would be good to stress in Introduction or in Flux data processing that not only wind directions representing the reservoir but all directions are analysed and included.

6. p. 5031, l. 9-12: the information given is important but I would not include under Section 3.2. This sentence could be put together with Fig. 4, maybe on Line 21 on the same page. In addition, when Fig. 4 is introduced, only Fig. 3a from Fig. 3 was introduced/explained. If the sentence is moved, as I am suggesting, maybe the order if Figs. 3 and 4 should changed.
7. The comparison of chambers and EC is interesting. I would mention something on that and on the result in Abstract.
8. Fig. 7 is difficult to follow. The location and meaning of each 3 arrows should be explained in the main text. Why is one arrow located to the residual (water level) curve? I was thinking that they should be associated with mean curves.
9. Fig 8 (e) is missing.

Other:

I noticed the comment from Gerilowski and the reply from Eugster. Some flux data from a landfill, as asked by Eugster, can be found in "Lohila, A., T. Laurila, J.-P. Tuovinen, M. Aurela, J. Hatakka, T. Thum, M. Pihlatie, J. Rinne and T. Vesala: Micrometeorological measurements of methane and carbon dioxide fluxes at a municipal landfill. Environ. Sci. and Technol. 41, 2717-2722, 2007".

In addition, the concentration footprints are typically much larger than flux footprints, as pointed out by Eugster, see e.g. "Vesala, T., N. Kljun, Ü. Rannik, J. Rinne, A. Sogachev, T. Markkanen, K. Sabelfeld, Th. Foken and M.Y. Leclerc: Flux and concentration footprint modelling: State of the art. Environmental Pollution 152, 653-666, 2008" for an explanation.