

Interactive comment on “Comparison of floating chamber and eddy covariance measurements of lake greenhouse gas fluxes” by E. Podgrajsek et al.

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The authors want to thank referee #1 for the comments. The comments from the referee together with our answers are provided below:

1. p. 18317 line 1, see Godwin et al 2013 for another example of convective mixing leading to emission events.

This reference will be added.

2. p. 18317 line 17, although the minimum and maximum FC data show some correspondence with the EC data during these time intervals, it should be noted by the

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authors that a small number of FCs is inadequate to describe the mean weighted areal flux, which is what the EC effectively does. Although this discrepancy between EC and FC is prevalent at this time and has been implicated by others, attempts to reconcile the two budgets by comparing their means persist. The authors identify this important issue, particularly in figure 4. However, they attribute this discrepancy to differences in the continuity of measurements. Clearly this is very important when considering the nighttime rates, but what about the influence of spatial variability and variability in the footprint?

This is a good point raised by the referee and we agree that it is not only the difference in the continuity of the measurements that is important but also the difference in the surface area. This is highlighted in the introduction p 18312 lines 5 to 8. As we believe that this is a highly important issue we will add a sentence about this in section 4: summary and conclusions.

3. Did the wind direction change at nightfall?

There is no pronounced change in wind direction between night and day in the periods studied in this ms.

4. p.18318 line 5, Do the authors mean that these comparisons are made infrequently or that such comparisons are made at all despite the shortcomings?

In this sentence we want to stress that these comparisons are made infrequently

5. p. 18319 line 8 'was not measured'

This will be changed in the revised ms.

6. p. 18320 line 20, is this the first example of convective mixing enhancing FCO₂?

Other studies have seen this relation with convection and enhanced fluxes. This is discussed in the introduction, p 18311 line 8, and references to the following papers are given: Eugster, 2003; Macintyre et al., 2001; Rutgersson and Smedman, 2010;

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Rutgersson et al., 2011.

7. p. 18321 line 1, It is not clear which comparison is referred to here? Is this the comparison of daytime FCO₂-FC to nighttime FCO₂-EC? If nighttime FC data are presented, this is not clear.

From the second measuring campaign nighttime FC measurements were made. This can be seen in figure 6b. In the section p. 18321 line 1 we are refereeing to the cases from the second campaign when FCO₂EC and FCO₂FC have large disagreement. These cases are mostly from nighttime.

8. p. 18321 line 26, Excellent point. Can this prescription be applied to the current work? What, if anything, do the FC capture that is not captured by the EC?

As we state in the section on line 19 to 25 p 18321 we believe that the EC method is preferable when studying short time flux changes over large areas while the FC methods will be preferable when studying horizontal flux variability in lakes.

9. Figure 2, it is difficult to resolve the individual data points and error bars, could some of the data be integrated over longer time intervals or the time range of the figure shortened?

This figure will be changed in the revised version of the ms.

10. Figure 3, Is there no uncertainty associated with the EC measurements?

Yes the EC measurements have uncertainties. However in this figure we do not show the uncertainties of either of the two methods. The bars do not show the variability of the FC measurements but the maximum and minimum flux measured by the individual FC's during each deployment

11. Figure 4, Is there an explanation for the emission peak beginning 9-Oct, as measured by the EC? Is the lake dimictic?

Tämnaren is a very shallow lake with a mean depth of only 1.3 m, thus we believe

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that the lake always mixes to the bottom when there is mixing. The main scope of this article is to compare the EC and FC methods and thus we have not tried to explain the origin of individual emission peaks (although certainly something we will proceed with in future work)

12. Figure 5, The importance and meaning of this plot are not clear.

This figure shows the spatial variability of FCH₄ in the lake. The spatial variability of FCH₄ measured with the FC's could not have been captured using the EC method. This highlights one major difference between the FC and EC methods. We will address this in the revised ms.

13. Figure 6, Does EC2 show more diurnal fluctuation than EC1? If so, why?

Interesting question, however since we do not have EC2 measurements from two nights we cannot say if EC2 measures a diurnal cycle or not.

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