

Interactive comment on “Technical Note: Drifting vs. anchored flux chambers for measuring greenhouse gas emissions from running waters” by A. Lorke et al.

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Reply to Anonymous Referee #2

We would like to thank the reviewer for her/his positive evaluation and the very helpful comments and corrections. Below we reply on each specific comment.

- Abstract – in the list of four points made from this study, switch numbers 1 and 2 so that you start by stating that anchored chambers produce turbulence. It seems to make more sense to start by saying that you find something in one method and then that you didn't in the other, instead of the other way around.

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Reply: We agree and would change the abstract accordingly.

- P14622, L19-22 – I am not sure if this sentence regarding microbubbles fits here, especially since the papers you cited refer to lakes. Perhaps you can be clearer with what you are trying to convey with this point and you could use Beaulieu 2012 as a better reference for elevated kCH_4 in rivers.

Reply: What we are trying to convey here is, that gas exchange velocities which were obtained for CO_2 may not be representative for CH_4 . Therefore, methods are needed, which allow for direct and gas-specific flux measurements, including bubble-mediated fluxes. Such methods include chamber deployments. We would make this point more clear in a revised version of the manuscript and revise the references.

- P14623, L8 – Vachon et al. 2010 also discusses turbulence bias of chambers

Reply: We relate our findings to the study of Vachon (which refers to lakes and reservoirs) in the discussion section.

P14624, L6-7 – Change 'produced' to 'produce' and add a question mark at the end of the question.

Reply: We will correct this.

- P14624, L8 – More details should be given about the size or stream order of the 9 rivers, especially since Hotchkiss et al 2015 just found that CO_2 emissions change with size of streams. This new article should be cited and discussed in your manuscript. (Hotchkiss, E. R., Hall Jr, R. O., Sponseller, R. A., Butman, D., Klaminder, J., Laudon, H., ... & Karlsson, J. (2015). Sources of and processes controlling CO_2 emissions change with the size of streams and rivers. *Nature Geoscience*, 8(9), 696-699.)

Reply: The discharge at our study sites varied between 0.6-1.4 m^3/s (data set A), 7.7-12.8 m^3/s (data set B), 0.1-7.6 m^3/s (data set C). We would add this information to Table 2. We will add a brief discussion of our findings in relation to the new article.

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- P14623, L12-17 – Does using these different methods influence your flux results? I presume not seeing as what is important is the rate of accumulation and not absolute concentrations; however, you should make this clear in the text as it may cause confusion.

Reply: We assume the reviewer is referring to p. 14624. The uncertainties related to the relative accuracy of the different instruments is small compared to differences observed between different deployment types. We would make this clearer in a revised manuscript.

- P14625, L9 – add '(F)' after 'fluxes' to define the variable in eq.3

Reply: We agree with this suggestion.

- P14626, L20-25 – this section is a bit hard to follow. Is it possible to include a supplemental figure that will help the reader understand this process?

Reply: We suggest to reword this paragraph to make more clear that flow and turbulence parameters were estimated relative to the chamber edge in both, the anchored and the drifting deployment. This allowed to extend the sampling area over the entire chamber diameter by combining PIV observations obtained at different distances from the leading chamber edge. We did not find an intuitive way to illustrate this procedure in a figure.

- P14627, L15 – delete 'measured' - P14628, L6-7 – rewrite 'than those under drifting chambers, with individual measurements of k600_CO2_a being up to 20 times higher than k600_CO2_d. The average ratio' - Figures 2a and b can have fit lines that refer to those discussed on P14628, L20 & L23

We agree and apply the suggested corrections and improvements.

Interactive comment on Biogeosciences Discuss., 12, 14619, 2015.