

***Interactive comment on* “Different regulation of CO₂ emission from streams and lakes” by S. Halbedel and M. Koschorreck**

Anonymous Referee #1

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General comments

The paper examines differences in CO₂ emissions from streams and reservoirs and biogeochemical and physical factors affecting FCO₂. The topic is within the scope of the journal. Increasing number of papers has recently focused on CO₂ fluxes from lakes or streams. However, only few papers have compared CO₂ fluxes from lentic and lotic systems. In the recent paper by Weyhenmeyer et al. (2012) temperature and thermal stratification were shown to be the major drivers for CO₂ patterns in boreal lakes and streams. Although physical factors were important also in the current MS, the metabolism was concluded to control the CO₂ concentration and fluxes to the atmosphere both in temperate reservoirs and streams. The current MS shows that both CO₂ concentrations and piston velocity were generally higher in streams than in

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reservoirs resulting in larger CO₂ emissions from streams.

Specific comments

The methods are valid and most results are sufficient to support the conclusions. The paper is, however, rather long and should be condensed in order to highlight most important results and conclusions. Reducing speculative parts of the text focusing on results which cannot properly be quantified would improve the readability of the paper.

The title emphasizes different regulation for CO₂ emission from lakes and streams, although actually most important drivers (metabolism, temperature, stratification) were shown to be the same in lakes and streams. “Regulation of CO₂ emission from temperate lakes and streams” might better reflect the content of the paper. Also the two study lakes are dammed, which might influence results e.g. due to changing water retention time. Consequently, reservoirs might better reflect the results of this paper.

Groundwater contribution to the CO₂ concentrations is very difficult to quantify and I would suggest more cautious conclusions on p. 10034.

Respiration was suggested to be more important in streams. Terrestrial primary production and respiration might contribute especially to stream results, transported to streams either by surface of groundwater fluxes.

The CO₂ concentrations were nearly constant over the whole study in some streams – if metabolism is an important driver for CO₂, is it constant throughout the study period?

Previous literature is well cited.

Abstract and conclusions summarize the most important results.

Figure 7 well summarizes the main message of the paper. Figure 6 is difficult to read due to small size.

References

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Weyhenmeyer, G., Kortelainen, P. Sobek, S., Muller, R. & Rantakari, M. 2012. Carbon dioxide in boreal surface waters – A comparison of lakes and streams. *Ecosystems* 15: 1295-1307.

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