Referee 1

We are very grateful for this review that will help to improve our manuscript. Furthermore, we are happy that the referee stated clearly that our manuscript "is within the scope of the journal", that the used methods are "valid", that "previous literature is well cited", that the "abstract and conclusions summarize the most important results" and that "most results are sufficient to support the conclusions". Nevertheless, the referee raised also points that must be addressed to improve the manuscript and highlighted the speculation in parts of the discussion. We agree with all of these points and will consider them in our revised manuscript. Furthermore, we thank the referee for the suggested article of Weyhenmeyer et al. (Ecosystems (2012) 15: 1295-1307). That study is based on an enormous data set from 851 boreal lakes and 64 boreal streams and showed the regulation of the CO_2 concentration in streams and lakes via temperature. Temperature differences between bottom and surface water seem to be important drivers of the CO_2 concentration in lakes. Thus we will include this article in our discussion.

In the following we answer to the critical points mentioned by the referee:

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.

> We agree that we have to reduce speculative parts of the discussion chapter to highlight most important results and conclusions and increase the readability of the text.

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.

> We will follow the suggestion of the referee and change our title into "Regulation of CO_2 emission from temperate streams and reservoirs".

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

> Thanks for this comment. We have detailed information about the amount of the lateral inflow (groundwater, surface runoff) that affects our investigated streams from tracer experiments that were done in parallel (Halbedel et al. 2013 Biogeosciences). We will add these include these data into Table 1. Nevertheless, no data exist on the CO_2 concentration of the lateral inflow or on the general amount of groundwater inflow into the reservoirs. The geological underground (bedrock) and the volume of the reservoirs leads us to the assumption that groundwater had a minor effect on the CO_2 concentration in reservoirs. But, since we cannot fully exclude the effect of groundwater inflow on reservoirs and we had measured significant lateral inflow into the stream Hassel, we decided to weaken the mentioned chapter. The chapter is now:
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> "…Especially in streams, lateral fluxes (like groundwater) might be a significant CO_2 source (Humborg et al., 2010;). We measured in a parallel study (Halbedel et al., 2013) the lateral inflow with chloride as conservative tracer. The highest lateral inflow (>15 % of Q) was detected for the stream Hassel. Thus terrestrial metabolism might in this case also contribute to stream results. But we also found that besides Hassel, all other streams have very low lateral inflow or even an outflow into the adjacent soil or sediment. Nevertheless, no data exist on the CO_2 concentration of the lateral inflow. Thus we think that lateral inflow could be relevant for these streams. Even though we have not investigated the groundwater inflow into the reservoirs we think, because of their geological underground (bedrock) and volume it is not directly affecting the CO_2 evasion. In lentic systems CO_2 often derives from the mineralization of organic matter. As shown below, the physical separation of the zone of organic matter mineralization from the water surface is probably a major reason for the lower surface CO_2 concentration in the reservoirs."

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?*

The referee suggested correctly that CO_2 “derived primarily from groundwater sources will not follow a temperature related seasonal pattern” (Dinsmore et al. 2013 Global Change Biology). Thanks for this comment which refers to our statement on page 10031 L5-6. We stated there: “the CO_2 concentrations were especially in Ochsenbach and Zillierbach, but also in the Rappbode nearly constant over the whole year”. We checked our data again and came to the conclusion, that this statement is not correct. The average CO_2 concentration followed in Zillierbach, Spielbach and Rappbode a seasonal pattern. We detected following CO_2 values for these streams: Zillierbach had in spring 810.0 (SD 115.0) ppmv, in summer 1080.0 (SD 164.9) ppmv, and in fall 815.9 (SD 81.0) ppmv; Ochsenbach had in spring 813.1 (SD 155.8) ppmv, in summer 1054.6 (SD 174.1) ppmv, and in fall 638.1 (SD 79.7) ppmv; and Rappbode had in spring 1245.4 (SD 84.6) ppmv, in summer 1448.7 (SD 149.6) ppmv, and in fall 1089.98 (SD 341) ppmv.
Only Hassel values decreased in summer. For this stream was the CO_2 concentration in spring 2535.0 (SD 439.3) ppmv, in summer 2043.7 (320.5) ppmv, and in fall 2432.9 (SD 240.3) ppmv. This decrease in summer could be a result of the disturbed metabolism resulting from extensive cow ranging during this time (compare Halbedel et al. 2013 Biogeosciences). This assumption is supported by the finding that the seasonal CO_2 changes followed in Hassel changes in net ecosystem production (compare results from Halbedel et al. 2013). We will correct our wrong statement and include all mentioned details into the result chapter as well as in the discussion. Nevertheless, we cannot fully exclude that the CO_2 concentration was affected by groundwater. And, as stated above, we can also not exclude that terrestrial primary production and respiration affect the CO_2 variability. We will consider in our discussion that “*terrestrial primary production and respiration”* as well as groundwater could also contribute to the CO_2 concentration in streams.

Figure 6 is difficult to read due to small size.

We will split this figure in two figures and increase the size.