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Biogeosciences Discussions

Interactive comment on "Annual follow-up of carbon dioxide and methane diffusive emissions from two boreal reservoirs and nearby lakes in Québec, Canada" *by* M. Demarty et al.

M. Demarty et al.

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Hi, These are our responses to Referee # 2 comments (berween "quotes"). We hope it will meet the referee's requirements. Sincerely, Maud Demarty

"General comments: This study provides a meso-scale estimate for the greenhouse gas fluxes from the reservoirs and the lakes situated in the same area. The study presents interesting results about the greenhouse gas balances in the reservoirs and lakes based on several sampling occasions and sampling depths. I think this manuscript is worth publishing, but it will require revisions before publishing. I find the manuscript in the present form somewhat incoherent and confusing, it requires a lot

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Interactive Discussion

Discussion Paper

of patience and effort from the reader to be able to form a general view of what have been done and how and why. I do realize it is difficult to present a large dataset and a lot of results in a very simpleway, but the manuscript would be greatly improved with a more focused approach and a more accurate use of terms and references. " We agree with the reviewer that this study is supported by a large amount of data and it should be published. In order to clarify the manuscript, and in accordance with the reviewers' recommendations, we focused on Eastmain 1 reservoir in this study, we have added more details on how the study was realised and we have modified the text accordingly.

"p. 5433, l. 20 There is nothing here about the sampling at Robert-Bourassa reservoir. Please revise." In order to clarify the manuscript, Robert Bourassa results were removed from the manuscript.

"p. 5437, l. 7 Do you mean spatial variability? Please clarify. " yes, the text was clarified accordingly.

"p. 5439, l. 20 "As explained above" Where? In the previous paragraph, there are CO2 results. Please clarify. " In the modification of the manuscript, this paragraph has been removed.

"p. 5440, l. 7 On what basis do you assume that increase of pCO2 under the ice is linear? Drawing a regression line between two sampling occasions (two flocks of points) will give a reasonably good regression coefficient but no signal if the line is linear or curved. The method you present for estimating springtime emissions might be useful, but you will have to convince the reader by discussing about the possible sources of error. " AND "p. 5442, l. 17 You refer to Demarty et al. (2009) telling that the continuous measurements have been performed in the reservoirs earlier. This leaves me wondering why to estimate CO2 spring emission by a few sampling occasions and extrapolation if CO2 has already been measured continuously? You also justify the linear extrapolation of the CO2 increase under ice by these continuous measurements. Again, question is why to use regression between two sampling occasions, if you have

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measurements that are more frequent? If the idea of this whole sampling frame was to provide a tool to accurately estimate annual CO2 flux by only 3 to 4 sampling occasions per year, use continuous measurements to confirm this method, I think you should tell a bit more about the methods and the results of these continuous measurements. Referring published paper is not quite enough in this case. " In order to clarify the text, we added a paragraph in the methods showing the trends obtained with GHG monitor installed in Eastmain 1 generating station. The new figure 2 shows the linear increase of pCO2 under ice cover during winter, and we explain that we rely on this observed trend to calculate annual fluxes from sampling campaigns.

"P. 5441, l. 13. A comment on the discussion as a whole: One of objectives of the study is to present a follow-up from 2006 to 2008 of GHG concentrations and fluxes, but in the discussion, there is nothing about the differences between years nor how the previous year affects the next year's concentrations and fluxes. Please check that your objectives and finding are in line with each other. " The question of differences between years has been addressed in the results with a short discussion about the observations. The objectives have been revised accordingly.

"p. 5442, l. 5 I don't understand how CO2 accumulation between January and March tells something about formation of ice before January. Please clarify. " In the clarification of the manuscript, this sentence has been removed.

"p. 5442, l. 22 In several places in this manuscript, you refer to Demarty et al. (2009) by stating "We observed" or "we showed". I understand it is quite correct, because you are referring to yourself. However, starting the sentence by "we observed" leaves the reader to think that you are talking about this study, not the parallel study. Please refer to the parallel study by "Demarty et al. (2009) observed. . ." or "Demarty et al. (2009) showed. . ." to avoid confusion." This misleading error has been corrected in the manuscript.

p. 5442, l. 27 I think this kind of the information belongs to methods or results, definitely

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not to discussion." We changed the paragraph to underline that the results pointed there are presented as discussion purpose only.

“p. 5444, l. 12 You don’t tell what is this conclusion suggested by Duchmin et al (2006) that you find contradicting to your results.” This paragraph has been revised regarding the new structure of the article.

Thank you for your attention

Interactive comment on Biogeosciences Discuss., 7, 5429, 2010.