



EGUsphere, referee comment RC2
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Comment on egusphere-2022-485

Anonymous Referee #2

Referee comment on "Carbon emission and export from the Ket River, western Siberia" by Artem G. Lim et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-485-RC2>, 2022

General comments

- The manuscript entitled "Carbon emissions from Ket River, western Siberia" provides a meaningful contribution to the understanding of carbon export and emissions in the western Siberian Lowland. The title of the manuscript is sufficiently precise and the overall presentation is well structured and clear. Many findings presented in this study are relevant and bring new insights into the processes and controls of carbon processing in this environment. Since the system is influenced by multiple factors, some of the interpretations raised in the discussion are relatively vague or inconclusive. Still, all interpretations and conclusions seem to be well supported by the results. For this reason, I believe that the manuscript will be suitable for publication in "Biogeosciences" after a careful revision.
- I applaud the initiative of using floating chambers for direct measurements. Although they require more work, the study would provide completely different and much less accurate FCO₂ estimations if they weren't employed. Maybe this finding could be emphasized in the abstract or in the final remarks.
- From a cost-effectiveness perspective, I do not see major problems in the approach you took for the final C emissions quantification (especially considering how difficult it is to perform multiple sampling cruises in these areas throughout the year). However, I think that the uncertainty calculation is too simplistic and most probably misleading. I urge the authors to follow best practices recommended at volume 1, chapter 3 of the "2006 IPCC Guidelines for National Greenhouse Gas Inventories" (IPCC, 2006). More specifically, Monte-Carlo approaches (based on probability density functions) have been successfully employed in other assessments. Also, the methods should show all the information required for reproducibility and traceability (e.g. by providing all the equations and later the full data set in online repositories). This does not seem to be the case in this manuscript.
- Estimations for lateral carbon fluxes and POC/DOC are not crucial for most of the conclusions in this paper and seem to be very simplistic and subject to large errors. I recommend authors to reconsider the importance given to the obtained values throughout the text and to improve methods section for a better traceability in this part.

Specific comments:

Lines 34-35 = Poorly known?

Lines 42-43 = Please consider also including the pCH₄ ranges.

Lines 50-54 = Please consider revisiting these last sentences after a careful revision of the methods employed in the uncertainty calculations. I think it is important to be very clear on what are the limitations of these estimations right in the abstract to avoid poor usage of the emission values. For example, you mention in lines 50-51 that "C emission from the Ker River basin was estimated to 127±11 Gg C y⁻¹", however, you've discarded important hot moments/spots, soil emissions/uptake, etc. I guess you should use another term instead of "River basin" here.

Lines 73-83 = please consider including some of the values instead of presenting this information in a more qualitative way.

Line 113 = I am not sure if "-0.6..-0.9°C" is a proper way of presenting the temperature range.

Line 201 = I am not a native English speaker, but "wetted streams" doesn't seem right.

Line 226 = Please consider including the pCH₄ ranges.

Line 244 = This may be a bit far-fetched, but what about emissions linked to vegetation or other hot spots that helps gas leakages? I know this is a completely different context, but something like seen in floodplain trees (e.g. Pangala et al., 2017), maybe? Also, some pictures of the river and streams in the supplementary material would help readers to have a better idea of the environment.

Lines 376-380 = To me it seems that you have raised a hypothesis (fluxes comes from bog water), tested it (calculate the bog area) and the results "falsified" your hypothesis. Shouldn't you then present an alternative hypothesis here?

Lines 381-386 = Does it has any relationship with increased primary productivity per area inland? Any estimates?

Line 456 = Also mentioned "ket basin", I guess this is inaccurate.