

Interactive comment on “Longitudinal discontinuities in riverine greenhouse gas dynamics generated by dams and urban wastewater” by Hyojin Jin et al.

Anonymous Referee #3

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Jin and co-authors present an extensive dataset of greenhouse gas (GHG) measurements along a human-impacted river in Korea. The river is divided in three sections: the upper reach which is characterised by forest and agricultural land use, the middle reach which is impacted by multi-purpose dams and the lower reach which is influenced by wastewater discharge of the city of Seoul. Significant discontinuities in the GHG concentrations were found in the dam and sewage impacted reaches. Although the conclusions are not very surprising, the importance of this manuscript is the comprehensive dataset created by the authors, which provides a lot of quantitative information for larger-scale overview articles.

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General comments

In the introduction, you often mention that previous studies looked at only a single anthropogenic factor. It took me a second reading before I distinguished the two anthropogenic factors, dams and sewage, as spatially distinct along the river (middle and lower reach). Even though it might be a slight over-simplification, it might help the reader if you make it more explicit (similar to the second sentence of previous paragraph). Your many sites and tributaries can become confusing, but framing it as ‘natural’, ‘dams’ and ‘urban/sewage’ would help to keep track.

You have a tendency to make complicated sentences because you want to include all your reasoning or justifications in one sentence. While these sentences were grammatically correct, they are really hard to read. Be critical to sentences which are more than 4 lines and consider splitting them up. I will indicate a few of those sentences in the detailed comments.

Specific comments

L. 16: I have difficulties with calling the dams and sewage primary controls, because I perceive the term ‘primary’ as the ‘first’, while the human impact is actually superimposed on the natural dynamics. I would suggest changing it to “major controls”. Also, the effects are not controlling the GHG dynamics. “... to investigate the influence of dams and urban water pollution on GHG dynamics ...”

L. 28: might (without e at the end)

L. 112: Add the length of the river

L. 115-118: Split over two sentences. One about major land use, one about the metropolitan area.

L.127: What is the treatment level of the three WWTPs.

L. 138-140: What are the observation dates/month & year?

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L. 219: It was not clear to me where the agricultural stream and forested headwater stream belong to. Are they both part of the upper reach? Also the submerged weirs is not clear to which section they belong. It felt like you are jumping up and down along the river in the description of the longitudinal variations. Try to be consistent in describing each parameter from upper reach over middle reach to lower reach.

L. 225: replace “less impacted upstream or downstream reaches” with “compared to the upper and lower reaches”. All of the reaches are impacted, just in a different way.

L. 225-227: This is a complicated sentence. Consider splitting it up (especially the explanation for sites HR8 and HR11).

L. 233: What is the water discharge ratio between the tributary and the main river?

L. 238: This is a complicated sentence. “When we pooled the measurements for the whole river basin, at least two of the GHG’s exhibited significant ...”

L. 260: How can the WTPP effluents and tributary reach values of the upstream river. Consider rephrasing.

L. 261: the large scatter (without s)

L. 273: “though” doesn’t seem the correct word.

L. 304-309: Very long and complicated sentence with lots of subsentences.

L. 408: Could the composition of the respired organic material be responsible for the variation in $\delta^{13}\text{C}$? I expect very little C4 plants in Canada, which is consistent with the very low $\delta^{13}\text{C}$ values. If you have more variation in C3-C4 plants throughout your catchment, then you would expect to see that change reflected in the riverine C.

Figure 2: Could you indicate the three different reaches in the graphs?

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