

Interactive comment on “Reviews and syntheses: Anthropogenic perturbations to carbon fluxes in Asian river systems: Concepts, emerging trends, and research challenges” by Ji-Hyung Park et al.

Anonymous Referee #2

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Thank you for the opportunity to review this paper. Overall the authors provide a great deal of information and a nice compilation of existing information on Asian Rivers. The pace of development and ecosystem change is well emphasized and this is clearly an important topic and region of the world to focus on. The structure of the paper is quite weak, however, and the explanation of key concepts (especially pertaining to figure 2) must be improved to make the paper coherent. I hope my comments will help in this regard. My review is broken up into general and specific suggestions below.

General comments:

1. Throughout section 3 beginning on l. 149, this information is not clearly linked to

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issues specific to Asian Rivers. I challenge the authors to improve this section and link it more strongly to outstanding issues in Asia.

2. The organization of the paper needs improvement. The manuscript could be strengthened if it were more tightly organized, shortened, and if there was less repetition. In sections 4 and 5 the authors break information up by flux pathways (Fig. 3 is a nice summary and example), but then repeatedly present findings for each region/river system and revisit previously discussed flux pathways. The discussion of one river system after another, without clear conceptual progression from one paragraph to the next, made it difficult for me to extract any generalizable information from these sections. The authors should do a better job grouping information. I think the obvious structure is grouping results from individual studies by pathways/fluxes, and explicitly defining how damming and pollution each appear to impact these fluxes (link back to figure 2).

3. The authors introduce their conceptual figure 2 then make little effort to integrate it in sections 4 and 5. This must really be brought in, both to guide readers conceptually, but also to provide evidence that what they are suggesting is happening in figure 2 is actually supported with existing data.

4. There is no clear summary of section 4. The section is quite long, with much anecdotal information. I encourage the authors to end by brining this information together to make a more clear statement as to what current information suggests impoundment is actually doing to C fluxes in Asian Rivers. Brining the discussion back to their conceptual figure 2 would especially strengthen the paper.

5. The authors repeatedly lead paragraphs by pointing out that Asian systems are undersampled. I think this paper would be more useful to readers if the authors instead presented a summary of the state of knowledge from existing literature, then explained what is missing or has large associated uncertainty, then either presented a new synthesis of information or concluded with a statement of what needs to be done in the

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future. For example, on line 126 the authors criticize the outdated existing C budgets, but do not follow up with any new information or an updated budget. Another example is found on line 297/8, where the authors say that few systematic studies exist, then proceed to cite 2 such efforts. To me it makes more sense to restructure these paragraphs to lead in with what is known, then either refine these estimates, or lay out in a clear way what is needed to refine this understanding.

6. Throughout the paper, the authors finish many paragraphs without a clear concluding statement to summarize the pgph. I point out a number of instances below, but the authors really need to go through the paper and try to fix this.

7. Summary section: The title of the paper includes 'concepts and emerging trends'. Neither of these themes are really revisited in the summary. Instead, new topics are introduced here that should not be (i.e., monsoons and climate are introduced, then more site specific trends are presented, and CO₂ sampling methodology is brought up). This section really needs to link back to figure 2, it needs to summarize what was discussed in sections 4 and 5, and needs to lay out existing gaps in our understanding of C cycling in Asian Rivers (more than just saying we need more sampling and coverage).

8. I get the sense that this is a pCO₂-focused paper, but CH₄ data are thrown in here at random. I would consider removing any discussion of CH₄.

Specific comments:

L21. Objective, not object

L22. Change 'a latest update' to 'an update'

L30. Change to 'vary greatly'

L32. Change to 'The rapid'

L52. This pgph contains multiple themes (Global C cycle, Asian Rivers, waste water

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effluent). Please restructure to 1 theme per paragraph.

L85. Remove 'the' from 'the riverine'

L105. This pgph is off topic and should not be in section 2. Consider integrating this information with the introduction.

L111. Remove 'either'

L125. The pgph lacks a concluding sentence.

L135-138. Remove this information, it is off topic.

L146. How does this pgph relate to the theme of section 2? Add a concluding sentence that links it back to the question.

L160. Be specific. How are hydroclimates and aquatic ecosystems affected? Consider rephrasing.

L166. Latitudinal? Unclear

L198. Better introduce/explain serial discontinuity

L210. Be specific. Rather than quoting here, please explain what you mean.

L229-31. Not a great end here. You just said most changes are due to human activity so this is a little inconsistent. You need to cite actual data and numbers to quantitatively compare these effects.

L232. Improve sub-heading: Effect of river impoundments on what specifically?

L246. Affected how? Be specific.

L264-265. This information is contradictory. Which is it? A stable C sink, a site of intense OC conversion, or both simultaneously? please rephrase.

L275 and 276. Turbulence?

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L279. Weak conclusion. Add a sentence to summarize pgph.

L320. Weak conclusion. Add a sentence to summarize pgph.

L321. This pgph is just a series of anecdotes. What is the point?

L336. Again, effects on what? The C cycle? pCO₂? Be specific.

L335. More of an introduction pgph. Consider moving this section should be carbon-specific.

L368. Conclusion sentence? Are you saying that labile OM inputs appear to boost CO₂ pool?

L385. I'd cite fig. 3 instead of fig 4 here.

L401. Can you link this back to figure 4 and actual CO₂ trends?

L495. Be specific. What kind of alterations?

L503. Be specific. What contrasts?

Figure 4: Consider presenting boxplots, this would help readers summarize the data.

Figure 5: Completely underused. This figure needs to be cited more throughout the text.

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