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Biogeosciences Discussions

Interactive comment on "Geochemistry of the dissolved loads of rivers in Southeast Coastal Region, China: Anthropogenic impact on chemical weathering and carbon sequestration" *by* Wenjing Liu et al.

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Final Response to RC1:

Comments from Referees:

The Ms explored chemical weathering drawdown CO2 rates, major ion sources, and contribution of anthropogenic acids in the chemical weathering in a most severe acid rain impacted region, China. This is interesting, and the Ms is well structured and well written overall. The Ms could be improved with consideration as follows.

1. The field trip was conducted in the high-flow period. Whether is one hydrological sampling representative or can it represent a hydrological year, which must be explicated.

Author's response: The river water of the southeast coastal rivers is mainly recharged by rain, and the amount of precipitation in high-flow season accounts for more than 70% of the annual precipitation in the area. During the high-flow season, the abundant water recharging facilitates the weathering product entering river system. However, during the low-flow period, the ground water contribution to the surface water might be greater and overprint the weathering information in river system, which would bring more inaccuracies to the weathering and CO2 consumption estimation. Therefore, it could be more representative to investigate the rock weathering during the high-flow season in the subtropical monsoon climate watersheds in this study.

2. Alkalinity is titrated using HCl, while in the dataset of Table there is no alkalinity. I guess that the HCO3 is from Alk, is it right? If yes, please demonstrate how to calculate the HCO3.

Author's response: The content of HCO3- rather than alkalinity is titrated using HCl. We have made this point more clearly in the attached revision in the supplement.

3. Authors referred many studies of rock chemical weathering, while several studies in Asia, such as Han River in the Yangtze and Mekong River in the Southeast Asian were ignored.

Author's response: According to the RC, we have cited these studies in the attached revision in the supplement in both introduction and discussion sections.

4. Authors should inform the extent of CO2 consumption rate in this study in contrast to the world rivers, particularly Asian rivers and highly-impacted rivers.

Author's response: According to the RC, we have compared the CO2 consumption rates of SECRB to the major rivers in the world and Asian. Please find it in Lines

366-378 in the attached revision in the supplement.

5. I have noted that the references is mostly old, some new citations should be included.

Author's response: We have added recent studies in both the introduction and the discussion sections in the revised version attached in the supplement.

6. L 65 Change stronger to intense

Author's response: It is revised in the attached supplement.

7. L 138 How many samples?

Author's response: We have added the number of samples, please find it in line 155 in the attached revision in the supplement.

8. L232-L233 Very high proportion of SO4 and NO3 is from atmosphere, if correct, does it mean the estimated CO2 consumption rate is still overestimated because of contribution of HNO3?

Author's response: Yes, we do think the N deposition also plays a role in rock weathering and have impacts on CO2 consumption. However, the sources of NO3- in river waters are complicated, e.g. atmospheric deposition, fertilizer, industry and urban waste water, as well as nitrification and denitrification. Although it is difficult to determine the origin of nitrate in river waters, we can at least assume that nitrate from acid deposition is one of the providers of protons. We added the discussions about the effect of HNO3 in section 5.4, and recalculated the CO2 consumption in the SCERB. Please find them (from lines 381 to 450) in the attached revision.

9. L393-394 Please could you supply the chemical equations for these weathering by HCO3, H2SO4 or both HCO3 and H2SO4. This will be helpful for readers to quantify the end-members.

Author's response: The chemical equations for carbonate and silicate weathering by

HCO3 and H2SO4 have been repetitively mentioned in many previous basin scale weathering studies (e.g. Li et al., 2008; Spence, and Telmer, 2005; Chetelat et al., 2008; Xu and Liu, 2010). In addition, we discussed the δ13C isotopic composition of the end-members in lines 414-430 in the attached revision. For the condensing of the whole manuscript, we did not provide the chemical equations for carbonate and silicate weathering by HCO3 and H2SO4.

10. L477 No year for this citation

Author's response: The year is at the end of the citation.

11. Fig. 5. Please add p value

Author's response: We have added p value ($p<0.01$) in Fig. 5 in the attached revision.

Please also note the supplement to this comment:
https://www.biogeosciences-discuss.net/bg-2018-109/bg-2018-109-AC5-supplement.pdf

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