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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 RC3

Comments from Referees:

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., Many papers on dissolved loads in rivers have been published, but the papers about anthropogenic impacts on chemical weathering and carbon sequestration are

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Discussion paper

rare. Thus this is an interesting paper. Used the water chemistry data measured in many rivers in the Southeast coastal region of China, Liu et al. presented their study on geochemistry of the dissolved loads in the region with severe acid rain impacts. They sampled over 100 sites in the high-flow period in 2010, and employed the chemical compositions and carbon isotope ratio to quantify the associated atmospheric CO2 consumption rates and the contribution of anthropogenic acids. This study found that sulfuric acid played an important role in in chemical weathering, and acid deposition should be considered in studies of chemical weathering and associated CO2 consumption. In addition, this paper provides a valuable dataset on the water chemistry which can be used for carbon fluxes study. Thus, this paper fits well into the theme of this special volume on carbon fluxes in Asian river. I recommend to accept this manuscript after some minor revision.

1. Line 215-217, when the authors discuss the source of Cl-, they say “In pristine areas, the concentration of Cl- in river water is assumed to be entirely derived from the atmosphere, provided that the contribution of evaporates is negligible”. Please give a reference. In fact it was found that ground water was an important source of Cl- for rivers in many regions of China such as the Yarlung Tsangpo basin on the Qinghai-Tibetan Plateau.

Author’s response: The reference has been added in the attached revision. As the reviewer suggested, the Qinghai-Tibetan Plateau and arid area, groundwater play as an important source for Cl-. However, in humid and hot area like Southeast China, no salt-bearing rocks was found there. In addition, river water is mainly recharged by rain, but groundwater contribution is far more less than arid area. So, groundwater impact on river Cl- is not considered in this study.

2. L232-L233 High proportion of SO4 and NO3 were found in the study area, but the discussion mainly focused on the SO4. What was the role of NO3 in the estimation of CO2 consumption rate?

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.

3. Line 321-324, The authors made a comparison between the studied rivers in east coastal region and other major/large rivers in China such as Changjiang, Huanghe and Xijiang river. It will be good to have a forward discussion explaining the major reasons for the difference.

Author's response: Silicate weathering are complicated and affected by lithological setting, temperature and precipitation, etc. Silicate weathering rates in southeast coastal area is higher than the Xijiang and Huanghe but lower than Changjiang basin is the complicated results of silicate dominated bedrock (compared with Xijiang), high MAT and high runoff (compared with Huanghe and Changjiang basin). We added some discussion with rivers in Asia and the world in the following section (section 5.4) in the attached revision in the supplement.

4. Line 386-387, "Carbonate rocks are generally derived from marine system and, typically, have 13C value close to zero", please add a reference

Author's response: The reference has been added in the attached revision in the supplement.

5. Table 1, how do you measure the HCO3? Are they calculated from the alkalinity? Please provide more info in the method section.

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.

6. Fig. 5. Please provide the p value.

Author's response: P value is provided in the attached revision ($p<0.01$) in the supplement.

Other minor comments from referee 3:

Line 72-74 the sentence is not well structured, please re-phrase.

Author's response: We have re-phrase it in the revision. pls find it in the attached revision in the supplement.

Line 195 lack space between "%" and "of"

Author's response: Modified in the attached revision in the supplement.

Please also note the supplement to this comment:
https://www.biogeosciences-discuss.net/bg-2018-109/bg-2018-109-AC7-supplement.pdf

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