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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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General comments and replies:

This study estimated the chemical weathering rates and atmospheric CO2 consumption rates in the coastal catchments of SE China, based on the chemistry and isotopes of dissolved inorganic carbon in the coastal rivers. The most important finding of this work is the sulfuric acid plays an unignored role in chemical weathering of carbonate and silicate rocks, which has to be more carefully considered in the calculation of

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weathering rates and carbon cycling in the catchments where strong human activities occur. Overall, the paper was well organized and structured, and the major research conclusion will increase our better understanding of weathering process in river catchments. I basically agree with the major research findings of these study based on the high data quality and interpretation. My minor concern is about the influence of extreme climate events on weathering processes. As some studies suggest, the SE China is subject to strong typhoon impact every year, which could significantly alter the river water chemistry and probably weathering process in the catchments during typhoon season. This impact could not be ignored in the discussion part.

Reply: Yes, extreme climate events do have impacts on weathering processes, especially the geochemistry signals of river water. The impact could be generally temporal and regional. In the sampling period, typhoon “Chanthu” have landed on Guangdong province in July 22, 2010. However its major impaction area is Guangdong, Guangxi and Yunnan province, which are relatively far from our study basins. So, extreme climate events are not considered in this study. To be more cautious, in this revision, we applied for the open access to the Annual Hydrological Report P. R. China and have got more detailed data from different hydrology observation sites.

More specific comments and suggestions:

1) L97-100: How did you define the sizes (small, medium, large) of these different rivers in SE China? Based on their catchment areas, lengths or riverwater and sediment discharges?

Reply: The sizes of the rivers are based on the length and the drainage area. We have added some information in the revision. Pls find it in lines 101-102 in the attached revision in the supplement.

2) On River settings: I suggest this part should include the mean water (and sediment) discharges of these rivers investigated.

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Reply: As there are many rivers, we did not provide the discharge data one by one in the main text. For the refinement of the article, the discharge and basin area information are provided in table 3 in the attached revision in the supplement..

3) L109: Data source?

Reply: It is calculated by the population and the administrative area of these three province.

4) L126: No influence of the Pacific Plate?

Reply: The formation of Yanshanian granitic rocks are closely related to multiple collision events between Cathaysia and Yangtze blocks and Pacific plate. We have added it in the attached revision in the supplement..

5) L141-142: To my knowledge, the estuaries and lower reaches of most of these river studied are subject to strong tidal influence. Based on the sampling locations on the map of Figure 1, it seems that some river water samples were taken much closer to the river mouths. Please make sure that all these samples were not influenced by tidal pumped sea water, or you have some special method to correct this kind of influence.

Reply: Yes, the estuary samples might be affected by seawater. We selected the sampling sites carefully to make it as far as possible from the tidal impacted area and also we avoid sampling during tidal period. In addition, we double checked the water chemistry data before drafting the manuscript and rule out the samples might be contaminated by seawater.

6) L177: change to “Compared”

Reply: It is modified in the revision. pls find it in the supplement.

7) L181-182: Where are these rivers located?

Reply: The location of the rivers are given in the in the attached revision in the supplement.

8) L248-249: Considering the sizes of these rivers investigated, it may be more reasonable to compare them with those small- or medium-sized river systems.

Reply: Data from Gaillardet et al. (1999) are cited here as global typical end-members and variation trend, to put the SECRB in a big picture instead of comparison. To avoid misunderstandings, "for comparison" was removed in the attached revision in the supplement.

9) L271: Do you mean the source rock types? To my knowledge, the tectonic settings of these rivers are much different. The climate regimes and anthropogenic activities as well are also much variable among these river catchments.

Reply: Yes, we have modified 'geological' to 'lithological' in the attached revision in the supplement.

10) L322-324: What are the major reasons for the different silicate weathering rates observed in these river catchments? If the monsoon climate dominates the weathering process, the Xijiang in the southernmost should have the highest silicate weathering rates while the Huanghe in the northernmost has the lowest?

Reply: 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 China and the world in the following section in the attached revision in the supplement.

11) L401-402: How about the influence of seawater intrusion into the lower reaches of these rivers?

Reply: The sampling sites in the lower reaches are selected carefully: as far as possible to the estuaries to avoid the contamination of seawater. In addition, we carefully

checked the water chemistry data before drafting the manuscript. The easily contaminated ions by seawater such as Cl-, Na+ and SO42- in the lower reach samples are in the normal range of fresh water.

12) On the spelling of river names: It always should keep in consistence in the text, figures and tables, e.g. Min, Jin, Han, Jiulong rivers, not “Minjiang, Jinjiang, Hanjiang”

Reply: We have improved this in the revision. pls find them in the supplement.

13) Table 1: The full names of TZ, EC, NICB and TDS should be given with the table. It’s better to include the localities of these riverwater samples.

Reply: We added the full names of TZ, EC, NICB and TDS in table1. The localities of the samples are given in Fig. 1. Pls find all of these in the attached revision in the supplement. For the condense of the table, we did not give the longitude and latitude information in it.

14) Table 3: Sources of riverwater discharges and runoff?

Reply: The data of basin area and annual discharge are from Annual Hydrological Report P. R. China, 2010, vol (7). The runoff was calculated by data of annual discharge and basin area. We added the information in the revision. pls find it in line 303 and the references.

15) Figure 1: You’d better to mark the major names of rivers, and geographic localities, and tectonic units you mentioned in the text, e.g. Huanghe, Cathaysia and Yangtze blocks, Zhejiang and Fujian Provinces.

Reply: We have modified this in the Fig. 1 in the revision. pls find them in the supplement.

16) Figure 4: Wrong spelling of “Contribution” in Y axis. Add a name of “Rivers” to X axis. The spelling of river names should be keep in consistence.

17) On all figures: The fonts used in the diagrams should be consistent.

Reply for 16) and 17): We have improved this in the revision. pls find them in the supplement.

Please also note the supplement to this comment:
https://www.biogeosciences-discuss.net/bg-2018-109/bg-2018-109-AC2-supplement.pdf

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