

Earth Syst. Sci. Data Discuss., referee comment RC4
<https://doi.org/10.5194/essd-2022-161-RC4>, 2022
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Comment on **essd-2022-161**

Jin Wang (Referee)

Referee comment on "MOdern River archivEs of Particulate Organic Carbon: MOREPOC" by Yutian Ke et al., Earth Syst. Sci. Data Discuss.,
<https://doi.org/10.5194/essd-2022-161-RC4>, 2022

In this paper, Ke and co-workers compiled a global database of river POC, including the carbon isotopes, nitrogen content and aluminum-to-silicon ratios. Using this dataset, the authors showed the pattern of stable carbon and radiocarbon isotopic ratios of the global river POC and investigated the controls on the source of the POC. The dataset of this paper is very useful for the studies of river organic carbon and therefore, is useful for global carbon cycle and modelling.

The dataset is generally well formatted, and this paper is well-written. It would be interested a broad biogeochemistry community. I only have some minor questions, which I hope are useful for the authors to strength the paper.

General comment: 1. Grain size is a very important factor controlling the characteristics and fate of the POC. Since the Al/Si ratio has been compiled in the dataset, the paper could have some text to address the controlling of grain size on the concentration, source, and characteristics of the POC.

- the expression of POC concentration is confusing. I see the authors try to separate POC in the unit % and mg/L, using POC content for the unit wt.% and using POC concentration for the unit mg/L. but there is still someplace confusing, e.g., Line 210. Please clarify them in the text.
- please consider adding POC in wt.% versus SPM into Fig. 4 as panel B. I guess there would be a dilution trend.

Specific comments in the text:

Line 47: need to specify that the "riverine POC" is "riverine POC_{bio}". The conclusion is not right if taken the petrogenic OC in account. For instance, Taiwan rivers have high fraction of petrogenic carbon, thus very old total POC.

Line 78: Why error could be generated during the compilation? I guess some papers only show data on the figure, how did you convert them to values?

Line 129: There is another decarbonization method that has been used in some papers. Carbonate is in-situ removed by adding liquid HCl in silver capsule, and then oven-dried (Menges et al., 2020, GCA). Also, I found this paper is missed in the data compilation.

Line 201-205: The argument should be careful here. First, I don't see a very clear trend. Second, the $\delta^{13}\text{C}$ and $\Delta^{14}\text{C}$ of the POC is generally controlled by the fraction of petrogenic versus biospheric POC in the global rivers (Fig. 2). Therefore, the high or low $\delta^{13}\text{C}$ and $\Delta^{14}\text{C}$ are more related to the fraction of different endmembers (including the C3, rock and in situ production beside C4 plants). I found that the Taiwan rivers and Congo rivers both have high $\delta^{13}\text{C}$, but the reason is different, the former is because of high contribution from rock.

Line 220: reference Hilton et al. (2008) studied the impact of typhoon on the POC source and flux. Please consider adding the reference Wang et al. (2015, Geology) or Firth et al. (2018, Nature Geoscience) for referring to the impact of earthquake.

Line 222: This sentence may be not correct. Taiwan, Amazon and Ganges are tropical rivers, but are very high in SPM and the POC content is not high in Taiwan either.

Reference: some references are missing, e.g., Wang et al., 2012, Wang et al., 2019.