

Earth Syst. Sci. Data Discuss., referee comment RC3
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Comment on **essd-2022-161**

Anonymous Referee #3

Referee comment on "MOdern River archivEs of Particulate Organic Carbon: MOREPOC" by Yutian Ke et al., Earth Syst. Sci. Data Discuss.,
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The manuscript Ke et al. presents a new openly-accessible global database of organic carbon (OC), OC isotopes (^{13}C and ^{14}C) and key element ratios (Al/Si) in riverine suspended matter entitled "*MOdern River archivEs of Particulate Organic Carbon – MOREPOC*". The database aims to provide data to study OC release, transport and cycling across river-basin systems, which serves the increasingly-important purpose of understating global carbon cycling. The MOREPOC builds on a large number of earlier studies that laid out the ground work and published most of the data that is now curated in this database. Hence, this compilation increases the accessibility and usefulness of already-published work, and harmonizes POC measurements across studies and regions in one easy-understandable data set. Standalone, or along with other data collections from land or ocean, I expect this database to be very useful to facilitate a range of biogeochemical studies and I commend the authors for this effort.

The paper is comprehensible, well-structured and fulfills the purpose of describing the database very well. In their writing, the authors also provide a rough outline of the large-scale differences in fluvial OC concentrations and composition, and provide a short perspective of their interpretations. I only have a few minor comments that are described below, and I recommend publication after the authors have addressed these and the other comments provided by the other reviewers.

Minor points

Line 26 "radiocarbon-enriched POC": May not apply to soils, deeper soils are more depleted in radiocarbon

line 27: Similar comment like above, if ^{14}C ages are “multi-millennial” they cannot be enriched

Line 29 “full erosion/sedimentation/exhumation cycle”: If the authors mean rocks would this also include diagenesis and organic carbon maturation processes?

Line 35 “role played by POC”: first, I would rephrase this to “the role of POC in the global carbon cycle”. Second, POC probably plays only a very small role in the global carbon cycle when compared to other fluxes. However, POC provides very valuable information about the global carbon cycle as it provides an integrated signal of biogeochemical processes over large drainage-basin areas.

Introduction: A clear definition of POC, and how it distinguishes from DOC and other OC phases, should be included in my opinion.

Line 84: It is unclear what the authors mean by “projected in a Geographic Coordinate System”. Do the authors mean that the data entries have coordinates according to this coordinate system? Or were the coordinates converted (and re-projected) from one to another coordinate system?

Section 2.4: This is all good information but I am missing a description about the sampling location along the course of the river (e.g. river mouth, headwater, center of the river, ...). Is this information somehow included in the database (e.g. via the coordinates) or can the authors describe where POC usually is sampled in a river?

Line 121: “mesh size” instead of “porosity”?

Line 172: This value is for C3 vegetation only – what about C4 plants?

General 3.1: Could ^{13}C values also be affected by degradation of POC during fluvial transport, and thus affect the isotopic source signal? Some of the values (e.g. $<-30\text{‰}$) are outside the typical window of plant OC.

Line 257: Have the Al/Si ratios been introduced and described somewhere? I suggest to include a brief description in the introduction. Al/Si ratios and its purpose for river-based investigations may not be obvious to all readers.