

Interactive comment on “MOSAIC (Modern Ocean Sediment Archive and Inventory of Carbon): A (radio)carbon-centric database for seafloor surficial sediments” by Tessa Sophia van der Voort et al.

Anonymous Referee #1

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I enjoyed reading the manuscript by T.S. van der Voort et al. entitled “MOSAIC (Modern Sediment Archive and Inventory of Carbon): A (radio)carbon-centric database for seafloor surficial sediments”. The need for a surficial sediment database for organic carbon and radiocarbon is well justified in the text. I would like to see the MOSAIC database established, and as an indication of my support and approval, I am likely to contribute most of my radiocarbon and organic carbon data to such a program. I like the idea of using open-source software and making this focused database convenient to the scientific community and user friendly.

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The only concern I have about MOSAIC, as it strives to become accepted as a global database, is that I wasn't certain as to which 200 papers were used to establish the initial database. The authors make generalizations regarding C-13 and C-14 data in the discussion section, but the rigor of these generalizations depends on which 200 papers were used to establish the data base. Were these primarily papers written by Tim Eglinton's research group or was a broader approach used in the selection of the organic carbon and radiocarbon data? There is reasonable global coverage of continental margin sedimentation in the MOSAIC data, but there are some obvious holes in the database, such as the continental margin sediments surrounding the Antarctic Peninsula (where there has been substantial radiocarbon data published in the past several years).

The manuscript does describe QA/QC concerns of the radiocarbon and total organic carbon data, but these are primarily from a statistical perspective. Very little is mentioned in the manuscript about analytical concerns, blank issues, and potential contamination during sampling. The database currently lists radiocarbon data using a Fraction Modern (Fm) nomenclature, but mentions that Delta14C nomenclature will ultimately be used for the database. If so, I would recommend that the authors include a “Date of Collection” data box in their submission data and website display, so that users can easily go back and forth between Fm nomenclature and Delta14C nomenclature. In fact, I think it would be useful to list the radiocarbon data using both the Fm and Delta 14C formats. In addition, I also would recommend that the authors consider adding to the data input table the type of coring device used to collect the marine sediments. There is a big difference between the quality of surficial sediment collected by a multicorer or megacorer as compared to a kasten corer or piston corer. Such information would be useful to a researcher comparing organic carbon or radiocarbon abundances over a basin or region.

I think that the authors make the case that radiocarbon data are the most needed information for continental margin databases. That being said, of the total 8706 data

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entered into MOSAIC, there are only 709 radiocarbon measurements (as compared to 8688 analyses of Total Organic Carbon). Thus, although radiocarbon may be the primary emphasis of the MOSAIC database, it represents less than 10% of the data entered into the system. The MOSAIC database also lists the Calcium Carbonate content and the Silicate (SiO₂) content of the sediments. The text does not reference how these measurements were made or even if the silicate abundances includes biogenic silica with the lithogenic silica content.

Minor Suggestions and Concerns:

1. The manuscript could have been proofread more thoroughly prior to submission. For example: -On lines 159-161 the words don't comprise a complete sentence. -On line 193 add commas on either side of "for example". -On line 276 the text reads "rather that" and it should be "rather than". -On line 289 "exhibits" should be "exhibit". -On line 327 change "couple" to "couple with". -On line 336 add "of" before "geochemical". -On line 345 change "14C" to "14[^]C". -On line 363 change "derives" to "was derived". -On line 370 change "explain users" to "explain to users". -In Fig. 5 the partial derivative sign is used instead of the small Greek symbol delta. The Greek symbol is used correctly in Fig. 4, but the partial derivative symbol needs to be changed to a lower case delta symbol in Fig. 5.
2. On lines 128 and 179, the authors should consider not only listing the "mixed-layer depth", but also include "bioturbation intensity" as a parameter for characterizing the nature of surficial sediments.
3. On line 293 the text states: "ageing associated with sediment reworking by bottom currents". The authors should mention bioturbation as well as physical sediment reworking. It is much more likely that continental shelf and continental margin sediments are mixed by bioturbation than by physical reworking.
4. On lines 318-322 the text reads: "The latter is particularly pertinent for 14C data and ancillary measurements necessary to broadly apply isotopically-enabled models

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of organic turnover and burial in sediments (e.g., Griffith et al., 2010) and constrain geographic variability in the age distribution of sedimentary OC . . .". I suggest that the authors consider adding the following reference after the Griffith et al., 2010 citation: Isla and DeMaster, 2018 (GCA, v. 242, 34-50; entitled "Labile organic carbon dynamics in continental shelf sediments after the recent collapse of the Larsen ice shelves off the eastern Antarctic Peninsula: A radiochemical approach"). This paper is a recent example of "isotopically-enabled models of organic turnover".

5. Why do the authors use the word "seafloor" in the title instead "marine". Using "seafloor" and "sediment" so close to each other seems redundant to me.

In summary, I support publication of the MOSAIC ESSD article after minor concerns, mentioned in the review above, have been addressed by the authors. I encourage the authors to continue their efforts to develop and create these new databases that enable scientists easier/facilitated access to organic carbon and radiocarbon data published in the marine science literature.

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