



EGUsphere, referee comment RC2
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Comment on egusphere-2022-516

Anonymous Referee #2

Referee comment on "Contrasts in dissolved, particulate, and sedimentary organic carbon from the Kolyma River to the East Siberian Shelf" by Dirk Jong et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-516-RC2>, 2022

The Jong et al. manuscript contained an enriched dataset of organic matter in different forms, including dissolved, suspended and sedimentary, from samples collected along the Kolyma River to the East Siberian Shelf. A comprehensive list of parameters was measured on these samples, including carbon stable and radio-isotopes, lignin phenols, lipid biomarkers, mineral specific surface area etc. They also used a mixing model to quantify the contribution of organic matter from three endmembers to these samples. The main conclusion was that DOC, POC and SOC along the transect have distinct compositional and degradation patterns, with significant contributions from permafrost-derived OC, particularly for SOC and DOC. It was also concluded that degradation occurred along the river to ocean transit based on biomarkers and OC loadings on minerals, among other minor conclusions.

Clearly this data is much more comprehensive than what has been published about the Kolyma River, or other Arctic rivers in general, as they included all three phases of organic carbon, and bulk and specific parameters. These data will be of value to the community, thus need to be published. The conclusions are solid, although I have to say that they are kind of expected and it is hard to find anything particular novel from what we already know.

It is great that DOC, POC and SOC were all measured in a same study, but the authors need to acknowledge the fact that SOC may be in totally different time scales in terms of mobilization and transport than DOC and POC. DOC and POC are co-transported with water flow, but SOC is likely not unless in a storm fasion. In other words, their residence times are way different. It is also not clear the depth of riverbed sediment was collected. This is important to know, as one could imagine surface 1cm could be very different from 10cm, in terms of not only the transport but also the level of dissolved oxygen which would affect degradation. The authors need to factor this in to the text.

Despite the comprehensives of this dataset, I still feel that there are a couple of key parameters missing, which would strengthen their arguments. For example, production was attributed to be the major contributor to the POC, but why not directly quantify the Chla concentration? This would direct address riverine production. 14C-DOC was not measured, either. They offered a couple of references, but I think this is a key parameter to have, particularly because its changes along the transect would offer further insights into the OC dynamics. The situation may not be as simple as cited, "earlier studies show that Kolyma River and tributary DOC is relatively young...". Similarly, I am not sure why lignin phenols were not measured on POC?? This would directly address the contribution of terrestrial plants...

One of the motivations for conducting this work was the elusive nature of cycling and degradation of POD during the lateral transport through the whole watershed, as set up in the Introduction by the authors. However, when all the data are integrated, say from Figures 3-7, the degradation signals were most pronounced from the river mouth to East Siberian Sea, regardless of the end member contribution (Fig. 4), normalized biomarker concentration (Fig. 6), or biomarker degradation (Fig. 7). In a sense, I think that these data collectively mean that the estuary section is more important than the river stream itself in terms of organic matter processing. Yet, this was not discussed but should be (even though you may not agree with me).

Line 60: delete the "." before "degradation"

Line 68: should be "Hilton et al. (21015)"

Lines 121-130: it is a bit awkward to have a table and figure in the introduction. I would suggest that this be moved to the next section.

Line 153: how deep did the sampler penetrate? This may be important information (see my comment above).

Line 174: change to "according to Deirmendjian et al. (2020)."

Line 252: it's not clear what you meant by "...our own algal sample". How do you know it was algal bloom? And there would be other types of organic matter in a riverine sample!

Line 499: it could be simply due to the conversion of aldehyde to acid during oxidation, not necessarily selective degradation.

