

Biogeosciences Discuss., referee comment RC1  
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## Comment on bg-2022-183

Anonymous Referee #1

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Referee comment on "Particulate organic matter in the Lena River and its delta: from the permafrost catchment to the Arctic Ocean " by Olga Ogneva et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2022-183-RC1>, 2022

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Review of the manuscript "Particulate organic matter in the Lena River..." by Ogneva et al.

The paper addresses a fundamental question of riverine fluxes of particulate organic carbon in still poorly studied permafrost regions, and its potential impact on surrounding marine environments, and as such it fits the scope and potentially can make a good addition to the journal.

Major critical comments are listed below.

- The main conclusions of the authors – that estimation of river OM discharge to the coastal zone cannot be based solely on the data of the main stem far from the deltaic region – is certainly useful for modelers, although not novel and generally agrees with large body of evidences collected for example, by Shirshov's Institute of RAS in Arctic rivers and coastal zones (A.P. Lisitsyn's marginal filters concept suggested more than 30 years ago).
- The Introduction is well written but it is way too general. Former studies on the POC were not discussed (Semiletov, Kutscher, E. Karlsson). As a result, specific objectives

and novelty of this work are unclear; and no new hypothesis is proposed to be tested ( a degree of pOC lost in the deltaic zone or the age and origin of POC could be such hypotheses). In anyway, the authors should clearly position this work with respect to former studied of the Lena River to prove its real novelty.

- The Discussion is very much driven by postulated overwhelming role of phytoplankton in POC,  $\delta^{13}\text{C}$ ,  $\delta^{14}\text{C}$  control in the main stem vs. delta. Without Chl a analysis, or any information on the phytoplankton, such a discussion is not substantiated and suggested explanations have low novelty and probably unwarranted. As a minimal research efforts, the authors could examine their TSM samples by SEM to show the presence of higher amount of diatoms in their deltaic samples vs main stem samples
- Examination of C/N ratio could also help a lot in distinguishing different sources of POM
- The discussion and data treatment (Fig 4) also ignore that part of POM may be represented by contemporary vegetation debris (i.e., lignin), especially from larch trees, dominating the Lena catchment

Specific comments:

L117-120 This might be true; however, do not the former works of Semiletov, Kutscher etc address the transformation of C between Zhigansk/Yakutsk and the delta?

L176-177 Provide some numbers on the magnitude of  $\delta^{14}\text{C}$  between "old" and "modern" for non-experienced reader

L185-187 Neglecting the beginning of spring flood may underestimate sizable amount of riverine C, transported to the delta (which is not the case for the winter time). Justification here is needed.

L197-198 Former studies already shown this; why additional efforts are needed?

L203-205 Unclear. If there is no difference in deltaic region (L197-198), why there should be any in the river main stem? More likely explanation is due to seasonal variations in C concentrations in the Arctic GRO dataset.

Fig. 2 is well presented. However, the data of former researchers, obtained at these transects (at least, the Yakutsk – Kusur one) should be also presented

Section 4.1.1 can be strongly shortened; the novelty of these findings is low. Summarize in one paragraph. Some relevant information can be shifted to the caption of Fig. S1.

L314-320 This is site description; re-arrange

L353 Present the numbers of velocities in thee regions

L420 There should be some data for the man stem

L439 d13C of POC?

L558-563 The novelty of the present study seems to be low