Interactive comment on “Characterization of particulate organic matter in the Lena River Delta and adjacent nearshore zone, NE Siberia – Part 2: Radiocarbon inventories” by M. Winterfeld and G. Mollenhauer

Anonymous Referee #1

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General comments:

This study reports stable carbon isotope ratios and radiocarbon concentrations in POM collected from the Lena River, Russia. The paper seems second part of the authors’ work. Except for a few concerns, the manuscript has been well written with a reasonable dataset. Therefore, I evaluate that this paper is publishable in Biogeosciences after minor revision.

The authors consider two independent scenarios to estimate radiocarbon endmember of their interest. I could see wide range and slight difference in $\Delta^{14}C$ estimates be-
between POC:PN-based- and δ13C-based-scenarios. For more clarification, I wonder whether or not Keeling plot approach could be applied to the dataset. [POC] and radio-carbon data are available, and the authors have already assumed the other endmember (i.e., Δ14C of phytoplankton is 49‰. Therefore, y-intercept of the regression line obtained from a plot for Δ14C values (y) vs 1/[POC] (x), would indicate soil POM end-member. Further details on this approach may be found in e.g., “Mortazavi B, Chanton JP (2004) Use of Keeling plots to determine sources of dissolved organic carbon in nearshore and open ocean systems. Limnology and oceanography 49:102-108”.

The authors think that phytoplankton represents photosynthetic autotrophs in the Lena River. However, the study sites seem relatively shallow (water depth is 0.5m, Table 1) and I wonder there are any benthic primary producers (e.g., periphytic algae attached on reverbed substrate, or periphyton) contributing (suspended) POM to water column. If that is the case, the assumption used by authors (i.e., δ13C value of phytoplankton = −33‰ is questionable: in general, periphyton is more 13C-enriched than phytoplankton. For a study of similar setting (carbonate-weathering dominates the source of DIC) but different system (headwater stream), “Ishikawa NF, Uchida M, Shibata Y, Tayasu I (2012) Natural C-14 provides new data for stream food-web studies: a comparison with C-13 in multiple stream habitats. Marine and Freshwater Research 63:210-217” may provide some implications.

The authors should carefully check terminology and δ- and Δ-notations throughout the text. For example, “Δ14C concentration” is not appropriate. Use “14C concentration” or “Δ14C value”. Furthermore, “δ13C composition”, “δ13C signature”, “Δ14C composition” and “Δ14C signature” are often used in text, but some researchers do not accept these expressions. I recommend simply using “δ13C” or “Δ14C value”.

Specific comments:


P. 14415, L. 4, 7: “Guo and MacDonald 2006”, not “Guo et al. 2006”. Check other
references once again

P. 14418, L. 26: Pore size of Whatman GF/F should be $0.7 \mu m$

P. 14419, 2.3 Laboratory analyses: Provide analytical precision/uncertainty

P. 14422, L. 20: “the lowest $\Delta^{14}C$ values”, not “the most depleted $\Delta^{14}C$ values”

P. 14425, L. 16-18: Do you have any evidence of this statement? At least provide one reference otherwise delete the sentence.

P. 14426, L. 25-26: “indirect evaluations have to be considered estimates” is unclear. Do the author want to say that non-phytoplankton materials are potentially included in POM?

P. 14426, L. 29: “$\Delta^{14}C \sim 49‰$” not “$\Delta^{14}C \sim 49‰$ and”

P. 14427, L. 1: “although this might not be true” Why do you think so?

P. 14427, L. 3: “soils, both of which provide”, not “soils, both, providing”

P. 14427, L. 6: “in other words, maximum”, not “i.e. maximum”

P. 14428, L. 25: “The calculated” not “The so calculated”

P. 14429, L. 14: “<11600 yrs BP” not “$\sim11600$ yrs BP the oldest”

P. 14430, L. 2: “Hubberten, 1999). This is also reflected” not “Hubberten, 1999) also reflected”

P. 14430, L. 5: “data suggest” not “data suggests”

P. 14430, L. 13-15: Don’t you think that atmospheric CO2 is also important source for DIC? Your assumption was that modern C of phytoplankton came from atmosphere

P. 14431, L. 14: “samples were” not “samples are”

P. 14431, L. 15: “values were” not “values are”
P. 14432, L. 17-18: “considerably 14C-depleted” not “considerably depleted”

P. 14451, Fig. 3: Additional plot for Δ14C vs sampling date may help understand seasonal variation

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