

Interactive
Comment

***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

Received and published: 29 October 2014

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 $\Delta^{14}\text{C}$ estimates between C6291

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tween POC:PN-based- and $\delta^{13}\text{C}$ -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., $\Delta^{14}\text{C}$ of phytoplankton is 49‰. Therefore, y-intercept of the regression line obtained from a plot for $\Delta^{14}\text{C}$ values (y) vs $1/[\text{POC}]$ (x), would indicate soil POM endmember. 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., $\delta^{13}\text{C}$ value of phytoplankton = -33 ‰ is questionable: in general, periphyton is more ^{13}C -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, “ $\Delta^{14}\text{C}$ concentration” is not appropriate. Use “ ^{14}C concentration” or “ $\Delta^{14}\text{C}$ value”. Furthermore, “ $\delta^{13}\text{C}$ composition”, “ $\delta^{13}\text{C}$ signature”, “ $\Delta^{14}\text{C}$ composition” and “ $\Delta^{14}\text{C}$ signature” are often used in text, but some researchers do not accept these expressions. I recommend simply using “ $\delta^{13}\text{C}$ ” or “ $\Delta^{14}\text{C}$ value”.

Specific comments:

P. 14414, L. 12, 20, 22: “ $\delta^{13}\text{C}$ ”, not “ $\Delta^{13}\text{C}$ ”

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

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references once again

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

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

P. 14422, L. 20: “the lowest $\Delta^{14}\text{C}$ values”, not “the most depleted $\Delta^{14}\text{C}$ 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: “ $\Delta^{14}\text{C} \sim 49\text{‰}$ ” not “ $\Delta^{14}\text{C} \sim 49\text{‰}$ 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 “~11600 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 CO_2 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”

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P. 14432, L. 17-18: “considerably ^{14}C -depleted” not “considerably depleted”

P. 14451, Fig. 3: Additional plot for $\Delta^{14}\text{C}$ vs sampling date may help understand seasonal variation

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