

## ***Interactive comment on “On the biogeochemical signature of the Lena River from its headwaters to the Arctic Ocean” by I. P. Semiletov et al.***

### **Anonymous Referee #1**

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#### General comments:

This effort addressing carbon sources and variability from high in the Lena watershed through to the Lena delta and beyond is commendable in its scope. Also, simultaneous consideration of inorganic and organic carbon is helpful for constraining the potential role of river inputs versus other sources contributing to the carbon budget of the East Siberian Arctic Shelf region. However, this paper could be significantly improved by addressing two major issues. First, the limitations of using data that are primarily from mid to late summer and early winter need to be thoroughly acknowledged. How does a lack of information for the mid-May through mid-June timeframe, when a large portion of export from the Lena River watershed occurs and organic matter composition is markedly different, limit your ability to generalize about how the coupled river/ocean

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system operates? This should be addressed in the introductory material as well as in the Results and Discussion section. Second, given that export of DOC is much greater than POC from the major Eurasian arctic rivers, it should be given more explicit attention in the manuscript. Discussion of “TOC” and “terrOM” at various points in the manuscript must be referring to DOC since the particulate fraction is minor. However, it often seems that these terms are being used with the POC fraction in mind. Although a DOC dataset was collected, it seems almost to be treated as a footnote, with the majority of analysis and discussion of organic matter devoted to POC. More detailed comments are itemized below.

Additional comments:

- 1) Revise the title to reflect the focus on carbon.
- 2) Page 2095, lines 6-10: The end of this sentence does not make sense.
- 3) Page 2097, line 13: July and August is not typically a time of high water levels on the Lena River. While the water level during July/August is certainly higher than during the winter, it is typically much lower than during peak discharge in the spring. If 2003 was exceptional, please explain. Also, consider how atypical circumstances during the summer of 2003 may make it difficult to make generalizations with data from that summer.
- 4) Page 2098, lines 16 and 17: Here it says late June to early August 2003, whereas it says late July to early August on page 2097, line 13. Please clarify.
- 5) Page 2105, lines 7-9. Given that PM concentrations are positively correlated with river discharge, using mean PM concentration and annual river discharge to calculate PM export underestimates the export value (potentially by a large amount!). A more rigorous calculation of flux is needed. The same is true for POC (line 10).
- 6) Page 2106, line 17-21. Awkward sentence.
- 7) Page 2109, lines 5-9. This discussion of terrestrial organic matter age does not ad-

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dress the fact that bulk DOC in the Lena (and other major arctic rivers) is young, while bulk POM is ancient. Also, the modeling exercise mentioned later in the paragraph needs to be described more thoroughly.

8) Page 2111, line 28. Something is missing (CO<sub>2</sub>?) after the word “while”.

9) The methods section describes measurement of inorganic nutrients (nitrate, nitrite, phosphate), yet nothing is said about these data in the results and discussion section. Either remove the inorganic nutrients from the methods or develop them in the results and discussion.

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Interactive comment on Biogeosciences Discuss., 8, 2093, 2011.

**BGD**

8, C751–C753, 2011

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