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Biogeosciences Discussions

Interactive comment on "Riverine particulate C and N generated at the permafrost thaw front: case study of western Siberian rivers across a 1700-km latitudinal transect" *by* Ivan V. Krickov et al.

Anonymous Referee #1

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General comments Our understanding of the role of the extensive Siberian watersheds for the global carbon cycle under a changing climate is still very limited and the study adds new information of the transport of suspended matter and respective concentrations of C, N, and P. In particular, this study presents data on 33 smaller river systems in a very remote location. The study attempts to relate the RSM transport to differences in the watershed including vegetation, surface water area etc.. In this respect I have some general suggestions. Because one of the major objectives of the manuscript is to relate RSM flux and composition to watershed characteristics I strongly suggest

including a more detailed description of the watershed characteristics in the region, rather than referring to 4 different references. It would be good to include estimates on biomass or carbon stores in the different regions if available. RSM transport is strongly linked to hydrological conditions, however, the current manuscript includes no metric to relate hydrology/discharge to RSM transport. This needs to be addressed before other controlling factors for RSM transport can be identified with any degree of certainty. The authors identified a relationship of carbon concentrations to the watershed size, how much of this relationship is caused by the fact that smaller watersheds have a faster flow than larger rivers, which allow for settlement of RSM? Could it be a matter of different sedimentation rates? The current manuscript does not make use of the source information contained in the elemental composition of RSM. C/N ratios have the potential to constrain different sources of RMS. For example if DOM coagulation or flocculation is an important source of RSM in this system the C/N ratio should be quite high (typically >40), however, the C/N ratios reported in the study are all between 10 and 23, more common for soil derived organic matter or microbial derived organic matter. The authors should use the C/N ratio to discuss sources in the manuscript. The authors describe a process by which particles are transported within the soil (suprapermafrost). This process is not commonly known, and should be described in more detail in the new "study site description section". The conclusion section is way too speculative. The presented data do not support such wide reaching conclusions. A closer look at the C/N ratios might help with this. Can the increased C and N concentrations in the sporadic permafrost region be explained by differences in the vegetation or biomass? The conclusions also state that climate change will lead to the drainage of lakes and bogs. This also needs to be explained, why do we expect the bogs to drain in the future?

Specific comments Line 37 should say ". . .the Western Siberian Lowland . . ." Line 56: Why are high latitude rivers most vulnerable to a changing particulate nutrient regime? What are you trying to say? Line 72-74. Awkward wording, change the sentence. Line 108: should say "..on the permafrost-bearing zone" Line 116: "mechanisms to predict

change in. . .”? Line 138-140: Why is the late autumn the time when the soils are best connected to the rivers, this needs to be explained in the “study site description section” Line 146: “. . . temperature was 4 and 2.7 degrees higher. . .” Line 202: What do you mean by “RSM did not depend on the open water season. . .” Line 240:” . . . in the watershed..” Line 260-262: Reword to clarify what you mean here. Line 266: . . . nutrients. . . is not the best term for this title line. Line 354: “. . .was also found in the isolated and sporadic. . .” Figure 3: Include C/N ratios to highlight potential shifts in organic matter sources

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