

In the submitted manuscript, 'Seasonal carbon dynamics of the Kolyma River tributaries, Siberia' by Keskitalo et al., the composition and source of organic carbon in the Kolyma River network was spatially and seasonally measured to improve the understanding of carbon dynamics in the Arctic region. The results of this study are interesting, as there is limited research on the topic in lower order Arctic streams, and important to understanding how warming and hydrological changes to the Arctic in the future may impact inland water carbon dynamics.

General points:

- Include information about the snow/ice melt during the freshet period in the methods. This is important in understanding the results and conclusions made.
- The results section could be restructured to separate out the spatial and seasonal aspect so that it can more clearly be followed.

Abstract:

L 16: What type of studies?

L20: weather → temperature

1 Introduction: Concise and to the point.

2 Material and methods:

L45-55: Could information be added in this section about the snow/ice cover in the catchment/river?

L63: Was ice/snow present during the spring sampling?

L90-95: were the methods used the same between labs?

L135-137: Report the n values for freshet and summer here.

L138-129: I assume for the ANOVA test both summer and freshet data was combined, please clarify in the text and add the n values for the three groups.

140: It could be nice to have an opening sentence as to why you used liner regression, e.g. to look at how carbon related to catchment characteristics and water chemistry.

3 Results: In general, this section could be restructured slightly. It was confusing to know which test (i.e. t test, Anova, linear regression) related to which result and also to separate out the spatial vs seasonal aspect. One suggestion would be separate section 3.2 out into a separate seasonal and spatial section. Further the 2.6 stats section could be rearranged to follow how the states are presented in the results, first linear regression and then the t test and anova. And in the results section when presenting the p value, you can write what test it is referring to.

L 155: larger **spatial** variability during freshet **compared to the** summer

L175 – 199: This section could be split into two, e.g. 3.2.1 Carbon across seasons and 3.2.2 Carbon across river network.

L 175: Rewrite, suggestion, “Concentrations of TSS were higher during fresher compared to summer at most sites, except at FPS1, FPS2 and Y3, but was not statistically significant (p = 0.3)”

L175 and L179 include the “not statistically significant” as part of the sentence and only the p value in ()

L227: missing “.” At end of sentence

Discussion:

L 260-263: If there is snow still in the catchment during this time of year (see comments in methods section as to why this is important to mention), could the smaller streams that are more connected to the snow melt be experiencing a dilution effect?

L296: In section 4.1 the conclusion is that primary production starts earlier in small and warmer streams. How does this relate to trends in higher DIC in warmer waters mentioned here? Could the higher temperatures indicate more terrestrial inputs during the freshet? In particular, for the floodplain streams, which seemed to have highest DIC and temperature. Was there water pooling in the floodplain area during the freshet? Even though the streams have high primary production, they are still very hydrologically connected to the landscape. Could consider adding water to table 1 since it is referenced in the text here.

Conclusion: Could a sentence highlight the importance of the freshet season and how by not including it we miss an important time of year for carbon cycling.

L 350: Wouldn't there be an initial uptake of CO₂ before fueling CO₂ evasion?

Figure 2: In the legend you write which regression is significant but can this also be displayed in the graph, e.g. an * next to the regression that is significant. In (a) the spring freshet line isn't shown and in (c) the summer line isn't shown and in (d) both freshet and summer aren't shown, write this in the legend text, e.g. “Linear regression for summer only was not significant, or for tributaries and Kolyma mainstem separately (**not shown**).”. Include the n = for the freshet and summer (L1709). Can the line colors (black, brown and blue) be added to the figure legend?

Table 1: Ave → Avg. Consider adding water temperature to table 1 (see L 296)

Figure 3: Fractions → Fraction

Figure 4: If so, could consider adding the significance results to the figure. L 255 add “during freshet and summer” at the end of the sentence.