

Response to reviews: “Dissolved organic matter characterization in soils and streams in a small coastal low-arctic catchment” by Speetjens et al.

Comments to the author:

Reviewer 1:

The authors have done a very nice job editing the paper. The Introduction and Discussion are quite good, in line with the high-quality datasets collected. I have a few minor, technical edits suggested, and one more important change that I recommend as follows.

Thank you very much for your positive response; we have revised the manuscript as follows, answers to comments are below each comment in italic font.

Lines 665-672: Right now, you are accounting for storms in your mean value, and then also commenting on the additional POC flux due to storms. I think it would make more sense to provide a baseline POC flux, with storms excluded from the mean values, and then highlight the impact of the storms. Right now, the numbers you present are effectively counting the impact of storms on POC flux twice.

Thank you for this insight. The means, standard deviations and flux calculations have been calculated anew.

This section as a whole (4.4) is quite good now, I agree with the author's decision to keep this estimate in place.

Thank you.

Specific Suggestions

Line 595: "drawdown" should be "dilution", drawdown implies degradation or consumption

We implemented this suggestion.

Line 658: "Arctic ocean" - ocean should be capitalized

Corrected

Line 665: I suggest "area based estimated OC flux for the region." is reworded to "area-based OC flux estimate for the region."

Corrected

Line 755: I suggest "more geographically widespread and longer timespan covering monitoring efforts" is reworded to "more spatially and temporally widespread monitoring efforts"

Corrected

Line 756: I suggest "are implemented, e.g. through sensor installations, use of cost-effective optical proxies to monitor change" is slightly altered to "are implemented (e.g., through sensor installations, use of cost-effective optical proxies) to monitor change. This would help

emphasize the last 3 words are part of the original sentence, and separate from the examples given.

Thank you for this helpful comment, we implemented the improvement.

I recommend the authors include the description of the difference in height at the outlet limiting impact of exchange with the lagoon at some point in the manuscript (there are a few suitable locations to include, preferably sooner than later in the text). Something similar to what was included in the author response would suffice - "there was an elevation difference with the exact outlet of at least a meter where water was shooting/free flowing". Admittedly, while I have been in these environments, I was envisioning a more direct connection with the lagoon so this is an important detail to include for clarity.

This is a good point, we inserted the clarification in section 2.3, where we introduce the sampling at the outlet.

Reviewer 2:

General Comments:

In this manuscript by Speetjens et al they have addressed all comments from the previous round of revision and clarity has improved. The paper continues to be a real asset in C Biogeochemistry especially in Arctic and small coastal watersheds. However, there are some minor improvements that could be made in the introduction to polish a bit more the central idea of the paper.

Thank you very much for recognizing the value of our work and for sharing your improvements with us. Responses to suggestions are included in italics below each comment:

The introduction has improved and now the importance or relevance of these small watersheds is clearer. But the central aim of the paper is to better understand terrestrial aquatic linkages and ocean OM budgets yet the context of these topics are not very clear in the Introduction leading up to the last paragraph where the authors lay out the objective of the paper. This suggestion is not intended to be a major overhaul, just add a few more sentences that help to contextualize lateral fluxes and OM budgets, which are already large black box in terms of OM processes regardless of geographic location. In the Arctic these fluxes have a much greater importance in terms of C cycling and delivery to the ocean but are also a lot more vulnerable to change (whether it is to be enhanced or inhibited due to thaw). Perhaps this sort of rationale is missing. For example, something along the lines of the first sentences in sections 4.4 would be great to include in the introduction prior to the objectives paragraph.

This is a good suggestion, we have added the following to the introduction: "Lateral OM fluxes through and from inland waters are still poorly constrained (Drake et al., 2018), particularly the export from smaller basins draining directly into the ocean. These small basins are at the same time very relevant for OC cycling as their soils are rich in carbon stocks, and also particularly vulnerable to current climate warming that triggers permafrost thaw leading to changes in hydrology and biogeochemistry. Due to their abundance and proximity to the Arctic Ocean, IWP tundra streams have the potential to export large quantities of terrestrial OM into coastal waters." "and the effect of thawing permafrost herein (e.g. enhancing or inhibiting)." – from line 99 onward.

There some citations that are not in the References section, they were probably removed

during the editing process. For example, Couture et al., 2018; Couture & Pollard, 2017, Dunton et al., 2006 are missing.

This was corrected, thank you.

Lines 160 – The phrase “Under current, warming, climate conditions” perhaps there are too many commas?

We removed the commas.

Line 365 – 47mm is mentioned twice, maybe just needs to be mentioned once?

We removed the duplicate mention.