

Biogeosciences Discuss., community comment CC1
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Comment on bg-2022-26

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Community comment on "The dominant role of sunlight in degrading winter dissolved organic matter from a thermokarst lake in a subarctic peatland" by Flora Mazoyer et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2022-26-CC1>, 2022

The manuscript is devoted to experimental assessment of sunlight and bacteria impact on DOM degradation in peatland waters. The paper is suitable for the journal, the novelty of this work is that the authors used, for the first time, the water collected in the end of winter (under ice) to assess the degree of DOM bio- and photodegradation. The results are useful for broad scientific community working in C cycle assessment and modeling in the Arctic waters.

The objectives (as presented) are valuable and worth a study.

I have only technical issues to be revised before eventual publication.

In the Abstract, there is some self-contradictory: 18 % efficiency (L 18) is not full mineralization of the DOM pool.

L18 & L 24-25 again, half loss and full mineralization are not the same things.

L42 Here, a reference is needed. Note that sediment respiration, soil input and groundwater discharge are also important drivers.

Methodology: The change of redox conditions between sampling and storage – partial oxidation after aeration during sampling should be discussed.

Table 1 Please add the pH value and specific conductivity.

Detailed description of experimental setup is highly appreciated!

L132-133 The reason for this delay is not totally clear. Why this experiment was not run from 30 May to 18 June, given that the light conditions and temperature in summer are not the same as in early spring.

L145 A reference for UV-transparency of FEP bottles is needed.

L211-212 Unclear, what kind of data are discussed. Either make a part of this study or

remove result of and reference to the unpublished work.

Results: Please present the changes in pH if any.

Discussion. The authors do not discuss any possibility of phototrophic bacteria production. The BP by leucine is good for assessment only heterotrophic bacteria.

L405-429 Was there any bacterial exometabolite production that could diminish overall DOC loss?

L433-435 Rose Cory did not work with peatland lakes and rivers and thus irrelevant in this paragraph.

It is a bit surprising that a seminal paper on biodegradation is not cited in this manuscript. I can only guess that it is not an intentional action from the senior authors but simple negligence from their younger colleague. My advice for the young researcher would be to check the keywords for the articles in the journal before submitting a manuscript. (Vonk, J. E., Tank, S. E., Mann, P. J., Spencer, R. G. M., Treat, C. C., Striegl, R. G., Abbott, B. W., and Wickland, K. P.: Biodegradability of dissolved organic carbon in permafrost soils and aquatic systems: a meta-analysis, *Biogeosciences*, 12, 6915–6930, <https://doi.org/10.5194/bg-12-6915-2015>, 2015). In particular, Vonk et al here discusses the seasonal effects on DOC biodegradation.

L 430-431 and L 443-444 are somehow inconsistent; may be tone down the statement in L 430-431 or be more specific about the season.

L451-454 May be provide the maximal range of this process

L 489-490 The reference is interesting; however, without comparison of this duration with water residence time in specific reservoirs, it does not add anything useful. It absolutely does not matter if half of DOC is biodegraded over 2.5 years if water resides in a given pond or streams for less than a few days or weeks.

L570 Unclear what is complex pattern of sunlight exposure.

L590-591 The 7-cm depth of this study is strongly inconsistent with 0.8-m depth (L586) of other studies. Explain the context more specifically, i.e., humic vs non-humic lakes.

Recommend minor revision.