Biogeosciences Discussions

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Comment on bg-2021-272

Anonymous Referee #1

Referee comment on "Age and chemistry of dissolved organic carbon reveal enhanced leaching of ancient labile carbon at the permafrost thaw zone" by Karis J. McFarlane et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-272-RC1, 2021

General comments:

This is a very interesting study and a nice dataset. While the ultimate conclusions of the study are not especially wide reaching, this is an interesting dataset and what appears to be a robust and interesting analysis. The manuscript is quite short, not necessarily a bad thing, but the introduction is quite long relative to the actual results/discussion. The discussion wouldn't be harmed by the addition of a bit more of a deeper discussion and exploration of wider implications.

It would have been nice to see the introduction focus more on studies that have considered headwater catchments specifically in the Arctic as there are a few in the literature now, although still lacking as noted here.

But overall, I don’t really have any substantial criticisms of the manuscript other than the relatively minor points raised below. This is a sound study with some interesting and unique data adding to the relatively sparse number of studies looking into radiocarbon export in headwater streams in the Arctic.

Specific comments:

L52, 56. Permafrost “thaws” rather than melting.

L176. The Neff and Wild studies are of larger Arctic rivers, a better comparison would be other studies that look at DO14C in headwater catchments, e.g.

https://doi.org/10.1088/1748-9326/aaa1fe , or see
https://doi.org/10.1029/2020GB006672 for more 14C-centric studies.

L225. It is very hard to see from Fig 4 how the correlation between DO14C and CH4 is positive, particularly for the surface samples. The surface samples look like a straight vertical line, were these log-transformed for the correlation? The positive relationship between DO14C and CH4 in the shallow samples look driven by a clustering of higher CH4 concentrations in July (circles), it would be useful to justify why you can group by timing in the correlations here but separate by timing in other places, e.g. Fig 2.