

**Second revision of manuscript tc-2021-166:**

**Title: High Nitrate Variability on an Alaskan Permafrost Hillslope Dominated by Alder Shrubs**

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**Comments to the manuscript (second revision)**

This manuscript has radically improved during revision and now presents a much clearer storyline and has a logical link from results to the conclusions, which are presented much more clearly. The limits to the study that cannot be changed are still there, but are acknowledged and conclusions can be made with that in mind. I have a few specific comments and otherwise recommend acceptance of the manuscript.

**Abstract**

Nice and clear writing here

**Introduction:**

I appreciate how the authors have improved the storyline – the build up is much better now.

**Materials and methods**

I like the additional details on the statistics. It is a complicated study and thus needs a long material and methods section.

**Results and discussion**

The story here is much improved and the summary of the results of the isotopic data functions well as a comment that adds nuance to the main story.

Interpretation of the data is now in a coherent way arguing for the main conclusions of the study, and the isotopic data is used well to support your argument.

**Conclusion**

Nice summary of your conclusions, why you ended there and why they matter

**Specific comments with line numbering**

L 124: Is there a word missing between ‘down’ and ‘gradient’ ?

L 126: Nice with the description of why you measured Mn and Fe :)

L 145: ‘hereafter’ in stead of ‘hereby’?

L 266: the (21-22) refers to the date, I assume – maybe change to (21-22nd) or (21-22.)

L 283: Why is the labile N inaccessible according to Darouset-Nardi and Weintraub (2014)?

L 291: If you want a more recent reference, Rasmussen et al. 2020 also saw a flush of organic C and N during and after a rainfall event.

L 335-337: Agreed. And assessing the time around snowmelt and soil thaw and the transport potential related to redox environments present there is also necessary in the future.

Supplementary: A few of the references are underlined

## Refs.

Rasmussen, LH, Michelsen, A, Ladegaard-Pedersen, P, Skov Nielsen, C. and Elberling, B. (2020). Arctic soil water chemistry in dry and wet tundra subject to snow addition, summer warming and herbivory simulation *Soil Biology and Biochemistry* 141 (2020) 107676.