

Interactive comment on “Ground ice, organic carbon and soluble cations in tundra permafrost and active-layer soils near a Laurentide ice divide in the Slave Geological Province, N.W.T., Canada” by Rupesh Subedi

Rupesh Subedi

stephangruber@cunet.carleton.ca

Received and published: 29 June 2020

This is a high-level summary of the changes made in the revised manuscript, important relations with comments by Referees 1 and 2 and by Dr. Wolfe are referenced (R1, R2, W). We have expanded several sections with additional detail and the manuscript has increased in length and complexity. We undertook to preserve simplicity by creating a detailed Supplement and by minor reorganization and editing.

C1

1 Regional context and characteristics of study area

Regional context has been expanded and illustrated with a new figure (R1.2, R1.4, R2.1, R2.14, R2.19, W4). The abundance of surficial geology classes is now tabulated for the study area and two surrounding map sheets (R1.14).

2 Glaciological context

More detailed explanation of the glaciological context and a new figure have been added. With this, the ambiguous notion of being 'near' an ice divide is now specified further in terms of distance and put into a geomorphic and glacial context (W1).

3 Information for individual boreholes

We have expanded Table 1 and added a Supplement that provides a detailed map of the study area, an overview plot comparing all boreholes, and individual plots of major results for each borehole (R1.5, R1.13, R1.15, R2.14, W19). The publicly available core photos are mentioned explicitly and one new figure with core photos has been added (R2.6). The original (but abandoned) sampling strategy has been described and the four terrain types we now use instead are justified (R2.4, R2.11, W10).

4 Accounting for large clasts in aggregated organic-carbon densities

We have derived the approximate proportion of large clasts from the core photographs and applied this to the aggregation of organic-carbon densities. This has lowered the

C2

values we report by up to 7%. (R1.8)

5 Comparison of cation concentrations with other studies

More background on the difficulties of comparing studies in the absence of consensus methods is now outlined (R2.7, R2.8, R2.12) and more studies, also from environments with similar material origins but differing depositional history, have been added (R2.3, W15).

6 Spatial abundance and mapping of preserved relict ground-ice

We now provide spatial aggregates of relict ice predictions by a previous model in a new table (W6, W7). We also estimate plausible ranges for the the spatial extent of relict ice (W20). We discuss the difference between our findings and a published prediction of relict ice abundance more explicitly and explain how the underlying scaling issue can be addressed to improve future models (W8, W16). The importance of the 'mosaic' character of the landscape is now emphasised more clearly throughout the manuscript, accordingly.

7 Conclusions

Our conclusions remain largely unchanged. The statement on spatially aggregated soil-organic carbon storage has been omitted, along with its background in the manuscript, to keep the manuscript length and complexity manageable.

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2020-33>, 2020.