Biogeosciences
Discussions

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Interactive comment on "Organic carbon characteristics in yedoma and thermokarst deposits on Baldwin Peninsula, West-Alaska" *by* Loeka L. Jongejans et al.

Anonymous Referee #1

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This manuscript is a characterization of different deposit types in a permafrost landscape in Western Alaska. The study is very sound and provides the necessary level of detail to be useful to the research community. The results from this study are a good addition to existing datasets and the authors do a nice job putting the results from Baldwin Peninsula in a larger context within the permafrost zone.

There were some confusing aspects in the manuscript that need to be addressed:

- A simple but crucial fix would be to use meaningful abbreviations for the different deposits throughout the manuscript (in all figures, tables, and text). I am sure the current naming system means something to the authors but it is very disruptive and

confusing to have to read BAL16-B2 and BAL16-UPL1-L1 for two different types of deposits. It should be possible to understand tables and figures without having to read the part about what the different labels mean. The flow of the manuscript would be much better with a simpler naming system.

- Section 3.1.4 Statistical significance: The statistics are too simplistic. I have to assume (you are not mentioning it or showing it) that your data are not normally distributed and that you therefore choose a non-parametric test, correct? The description of data distribution and statistical procedure is insufficient. Also, it is not appropriate to do pairwise comparisons when there are more than two groups without at least correcting for multiple testing. The minimum would be to perform a Kruskal-Wallis test and if significant to add a pairwise Wilcoxon-test, which would calculate pairwise comparisons between groups (you would have to include a correction for multiple testing). But, I think even that approach is too simplistic. You have multiple depths at different sites and so it does not make sense to compare one site with the other when you are not comparing the same thing. You could consider binning your data to different depths or different ages per site and then perform statistical analyses, preferably an ANOVA or something. The statistical results are not the core of your manuscript and that is fine, it still needs to be accurate.

- C/N already says it is a ratio and you do not need to add ratio afterwards

- The photographs in the Supplementary material are useful

- Table 1: I don't understand what Mean cal ages and rounded 14C ages are and why only a few samples had a +/-. You need to explain what +/- is

- Why are you showing 14C Ages again in Fig. 3? Isn't it the same as in Figure 2? It seems redundant but maybe there is a reason for it and an explanation is needed

- Fig. 2 and 3, it would be better to show dots for all the other variables as well and not just for the age column. You are only measuring a few data points along the profile

and it gives a slightly wrong impression if you show lines as you are not continuously measuring

- Fig. 3, why did you not measure biomarkers in the lake sediment? In the method section you say that you only measured it in those two but you don't say why

- When describing results along a depth gradient I think it is much better to go from the surface downwards and not the other way around. All soils have a surface but they go to a different depths and that just makes it confusing

- Section 3.1.3, add that the data to this section are shown in Figure 2 (bottom panels)

- Table S2, here you introduce new acronyms for Yedoma when previously you have used this awkward BAL16-B2 naming, I very strongly suggest that you use informative labels in all figures, tables, and throughout the text

- Figure 4: can probably be moved to the Supplementary Material. Is the number n-C29 or n-C31 that is indicated in the x-axis the dominant chain? I find this figure confusing.

- The grain size distribution figures in the supplementary material require more explanation. Should S7 be for BAL16-B4 and not B2? You show BAL16-B2 in S6. What is B2.1 through B2.42 in S6 and B4.1 through B4.31 in S7? You need to write out what f., m., c., v.c. means.

- Table S2, S3, and S4, what is "outcome of Mann-Whitney-Wilcoxon test'? P-values? Which software did you use? Please also use a consistent number of digits after the comma. I would refrain from adding stars to non-significant outcomes as that is usually used to indicate significance. The table would be so much easier to read if you had less numbers per cell, why not just indicate p-values as <0.05, <0.01, and <0.001 or something like that.

- Figure 6 could be moved to Supplementary Materials

- Discussion: the discussion is very hard to read because it often is a listing of results

C3

followed by another listing of results from other publications. Some re-organization and focus on the important results would help the story line.

- I think it is useful that you compare the results from Baldwin Peninsula with previous studies, I am hesitant to believe the statistical results at this point because of my previous comments in regard to statistics

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