Interactive comment on "Generalized models to estimate carbon and nitrogen stocks of organic soil layers in Interior Alaska" by Kristen Manies et al.

Anonymous Referee #1

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Manies et al. present a soil carbon and nitrogen data set for boreal Alaska and categorize the soil profiles according to their drainage conditions and disturbance history. The methods of collection and analysis of the data are well explained and this manuscript presents a very valuable data set which is worth publishing. I suggest to publish this manuscript after minor revisions. In particular, it would be beneficial to have a more extended discussion of the data set and how this data set relates to other soil carbon and nitrogen data sets in Alaska. Please find below more detailed comments on the manuscript.

Abstract

Line 3: I suggest reformulating the sentence "Boreal soils [. . .] organic soils". E.g. "Boreal soils are unique because the mineral soil layers are often covered by thick layers of organic soil"

Line 4: Is there a difference between "layers" and "horizons"? You use both terms throughout the entire manuscript. I suggest you define that in the method parts or stick to one of these expressions.

Introduction

Detailed comments:

Line 16: Please reformulate the sentence "These soils [. . .] organic soil layer." In particular, avoid writing "in that" since this makes the sentence structure complicated.

Line 22: Please better link the last sentence of this paragraph to the rest of the paragraph or highlight the importance of it. E.g. ". . .especially where protected by permafrost, which make boreal soils high C containing soils including mineral and organic layers"

Line 24: Please add a source for the first sentence of the paragraph

Line 24: Replace "is" with "are"

Line 30: layers or horizons?

Line 35: I suggest writing "C and N" instead of C/N. This might be misleading. C/N is often understood as C:N ratio.

Line 36: I suggest writing "Fires affect. . ."

Line 36: I suggest replacing "several" with "multiple"

Line 37: "First" but where is the second and third in this paragraph? – Please restructure the paragraph and make it more clear, which are the several ways boreal soils are affected by fire.

Line 37: I suggest reformulating "the amount of which". E.g. The soil depth, which is affected, varies based on the fire severity

Line 38: Add "Second, the..."

Line 41: How does post-fire vegetation affect the chemistry of C and N inputs to the soil? Please add another sentence or give an example.

Line 47/48. This is a hard transition from these two paragraphs. Please try to better link these paragraphs. E.g. Boreal soils have not been adequately characterized in terms of their disturbance history.

Line 52: I suggest writing "including more than 3000 observations" instead of "(> 3000 observations)"

Line 53: I suggest writing "categorized" instead of "examined"

Line 54: I suggest writing "data set" instead of "results"

Methods

General comments:

I suggest adding a sentence over which time period the samples were collected. Could you add information on the depth of sampling? What was the aimed depth during sampling? How many locations and sites were sampled? In the data set, I find 57 different locations with coordinates but in chapter 3.7 it is written that more than 290 soil profiles were sampled. Please state that in the text.

I think it is great that you established a classification for soil drainage.

Detailed comments:

Line 77: I suggest naming this classification as Table 1.

Line 93/94: The references here are basically the same. Soil Survey Staff (1982, 1993), just different editions. I suggest choosing one and naming it Soil Survey Staff

(1993) in the reference.

Line 98: I suggest replacing "in that" with "because"

Line 101: Redoximorphic – check the spelling

Line 136: "In the field the best call was made to if it was..." I suggest re-writing this sentence. E.g. "in the field visual inspection of the soil samples gave a first indication..."

Line 140: Please add "R core Team" to the source. Also, I could not find this reference in the reference list

Line 142: "was tested" Please add "for significant differences among the different soil horizons"

Dataset Review

General comments:

In this section you talk about horizon or horizon types. Is this different to layers?

I suggest adding another main chapter for the two subchapters 3.6 and 3.7 since it is more a discussion chapter. I suggest adding "4. Discussion of the data set" and then include the chapters 3.6 and 3.7 in there. In addition, my question is, how does your data set relate to the Soil pedon carbon and nitrogen data for Alaska by Michaelson et al. (2013). Maybe you can refer to that during the discussion and indicate how your data set adds or fits within this data set. Also, in a discussion chapter you could state again why your data set is so valuable.

Detailed comments:

Line 169: Please write "were not" instead of "weren't"

Line 178: "likely due in large..." I suggest rephrasing this sentence.

Line 204: I suggest naming this sub-chapter "soil horizon thickness"

Line 215: Please write "was not" instead of "wasn't"

Line 216: Please write "it is" instead of "it's"

Line 238: I wonder whether the accuracy of the bulk density measurements could be a reason for the differences, too. Often it is difficult to accurately measure bulk density, therefore I could think that maybe the accuracy of the bulk density measurements in both, the reference and your data set might be a reason for the differences.

Line 239: I do not understand the first sentence. What do you mean with "previous results"? Please, also consider restructuring this sentence.

Line 246: Please insert a "the" between "than" and "measured"

Line 261: Please insert a "the" between "into" and "mineral"

Line 264: Please add Boreal in this sentence.

Line 264: I suggest moving the first sentence of this paragraph to the conclusions.

Line 265: I suggest writing "drained sites" instead of "drainages".

Line 274: Please change "is" to "are"

Conclusions

Line 282: I suggest writing "lack input data for" instead of "do not do a good job"

Figures and Tables

Figure 1: I suggest writing "included" instead of "used" in the figure caption. I suggest to improve the map because the scale bar is hardly visible and the map looks a bit blurred in general. Maybe add more names in the maps for the regions or locations where the sites are.

Figure 2: I like this figure. However I suggest to add photographs with a higher resolution.

C5

Figure 3: This figure shows that humic soils are most important in C and N storage. Maybe you can mention this in the text as well.

Table 1 + 2: I have some troubles understanding the tables and whether it is significant different or not. There are a lot of superscript letters, sometimes the same, sometimes two or three. While I acknowledge the effort in putting everything into one table, I would suggest to make a separate cross-table for the p values and whether it is significant different or not. The same for the tables S2-S5 in the supplementary material.

Dataset:

Thank you for publishing this very valuable data set.

Generalized_models_for_C&N_Alaska.csv: You write in the methods section that four different methods were used in collecting the soil cores. I suggest adding a column to the data set indicating which method was used for the collection of the samples.

Site_GPS_coordinates.csv: Could you add the key for the abbreviations of the regions and sites. I could not find it in the metadata what e.g. HCCS or BZ means. Also, it would be nice if the sites could be found in Figure 1, e.g. by adding the region names to the map.

References:

Michaelson, G.J., Ping, C.-L., and Clark, M. (2013). Soil Pedon Carbon and Nitrogen Data for Alaska: An Analysis and Update. Open Journal of Soil Science 3, 132-142. doi: 10.4236/ojss.2013.32015

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C6