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Interactive comment on "From fibrous plant residues to mineral-associated organic carbon – the fate of organic matter in Arctic permafrost soils" *by* Isabel Prater et al.

Anonymous Referee #1

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The present manuscript by Prater et al. reports new data on various physical fractions of soil organic matter (aggregated, small occulted, mineral associated) in Arctic permafrost-affected environments in the Lena River Delta, Siberia. Several chemical analyses (C and N content, d13C, 13C NMR) were jointly used on the different fractions to better understand the fate of fibrous plant residues in permafrost soils. The manuscript is well written and the presented results and discussion are important for understanding the soil organic matter fate in changing Arctic regions. The authors should consider some minor comments before accepting the manuscript for publication with Biogeosciences.

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Specific minor comments and suggestions:

- line 45: please check the reference (should be Frank et al., 2012)

- lines 58-59: the sentence should come before, the warming climate is already mentioned lines 38-39 for example

- lines 75-78: please clarify your objectives, the “physical fractionation” is an approach and not an objective

- line 81: add “Siberia” somewhere

- line 98: add “electric conductivity (EC)” to be consistent with line 117

- line 162: “to detect correlation”: check the sentence, statistically a correlation is quantified and not “detected” using a plot

- line 179: the data could be presented with cumulative area charts for each profile and each element (C and N) to illustrate the proportions of each fraction by depth (in supplement)

- lines 221-222: move to the discussion

- line 271: “considerable amount of N” compared to what?

- line 283: change “C:N” to “C/N”

- line 340: change “dinitrogen” to “N2”

- figure 3: use “I” and “II” instead “a” and “b” to be consistent with the figure 2

- figure 4: the quality is too bad, be consistent with fig. 2-3, use indication of x log-scale (and not just 10 and 100 that are not indicative, add minor gridlines for example), use the same color code as in figure 5

- figure 5: change the labels in the PCA to be in agreement with the text (C/N, a/o a ratio, etc.)

- figure 7: same comments as for the Excel plot in figure 4

- figure 8: I do not understand the point of adding both PCA and correlation matrices. I suggest to keep either the PCA, including individuals (as done in figure 5), or correlation matrices only

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