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## ***Interactive comment on “Storage and transformation of organic matter fractions in cryoturbated permafrost soils across the Siberian Arctic” by N. Gentsch et al.***

### **Anonymous Referee #4**

Received and published: 18 April 2015

This is a review of the manuscript “Storage and transformation of organic matter fractions in cryoturbated permafrost soils across the Siberian Arctic” by Gentsch, et al. This manuscript presents an impressive dataset regarding the organic matter content and quality in 3 regions across the Siberian north. The paper is very straightforward in presenting its data and the results. The authors could consider a stronger attention to hypothesis testing and to extrapolating their results across the arctic – both for our understanding of the C stocks and for the ways that arctic C stocks are currently generated. How well do current stock estimates account for cryoturbation? How should the community better sample to account for the findings in this manuscript? I agree with Reviewer 3 that greater discussion on the use of a longitudinal transect would help

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here – how do these results likely scale across the great continental region they span? A conceptual diagram at the end of the results or within the discussion may help here.

Otherwise the manuscript is well put-together, important, and a good contribution to science. I recommend it for publication following the revisions described above and below.

#### Specific comments

I have a number of relatively small improvements to suggest below. Some of the writing could be improved by a more thorough attention to detail, and perhaps a look by a native speaker of English.

Abstract – has too much detail, particularly for the methods, and could be significantly shortened. p. 2700, line 8 – “most important” OM fraction – but is largest OM fraction the most important? I would tend to think of the most labile as the most important, and the largest fraction as the greatest contributor to C stock.

p.2701, line 10, soils to soil

p. 2701, line 17 add “an” before “Ecosystem”

p. 2703, ln 13 remove “the” before “transport”

p. 2703, ln14 “triplicate” not “triplicates”; line 20 “given by” not “described by”?

p. 2707 line 7 “so-called” in English means “erroneously called”. I think you can say just “referred to as the transient layer”

p. 2711, line 19, “relatively contained” is confusing – maybe rewrite without “relatively”? I can’t follow the logic here.

p. 2713, line 22, add “a” before “response”

p. 2714, line 12 needs a date for Palmtag paper; line 14 add “the” before “Results”, line 26, “constant” seems too strong since I don’t think it’s a truly continuous process –

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maybe just remove this word?

p. 2716, line 3, change “precipitating” to “precipitation”, line 19-20 remove either “in” or “within”

p. 2717, line 13 “LF fraction” is redundant – just say “LF”, line 21 change “the” to “a” and clarify the writing so that it doesn’t appear that lichens are plants

p. 2723, line 5 remove s on “causes”; line 4 add “an” before “object”

Fig 3 caption change “occur” to “occurred”

Fig 5 it is very difficult to read the scale bar on these microscope images, please adjust

Fig S3: capitalize “Siberian” and remove “ing” from “showing” both times

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Interactive comment on Biogeosciences Discuss., 12, 2697, 2015.

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