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Interactive comment on "Carbon and nitrogen pools in thermokarst-affected permafrost landscapes in Arctic Siberia" *by* Matthias Fuchs et al.

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Authors reply Matthias Fuchs, on behalf of all Co-authors (matthias.fuchs@awi.de)

We thank the Anonymous Referee for the positive feedback on our manuscript and the valuable comments. We have gone through your comments and improved our manuscript according to your suggestions. Also, we uploaded the data in the PANGAEA data repository and will provide a doi link in the final version of our manuscript. We hope to address with this reply all your suggestions and questions. Our changes and point-by-point replies are presented below.

C1

Referee Comment (RC): Fuchs et al present analyses of soil carbon and nitrogen stocks across a range of representative landforms for two study areas in the Lena River Delta in northern Siberia. These areas are underlain by ice rich Pleistocene age yedoma permafrost, which is poorly represented in pan-Arctic inventories. The study quantifies variability within and between landforms, and uses high resolution multispectral and DEM data to create a landscape classification used for up-scaling soil carbon and nitrogen stocks. The methods of sampling and analyses are conventional, and executed well. The results are in line with other studies in that higher carbon and nitrogen stocks are found in yedoma soils. These results help improve understanding of landscape variability in permafrost soil properties. The nitrogen stocks are particularly useful, as these data are not often analyzed or reported.

Authors Reply (AR): We thank the referee for this positive feedback and acknowledging the importance of our study.

RC: I do wonder if the data are open access, and if so, the authors should post a link to the repository or include a data citation with doi. This is becoming increasingly common, and this is a good thing. These data are valuable, especially given the remote location and importance of the data. The summaries in the supplement are a good start, but tabular data in a slightly more raw form would be good.

AR: We submitted the data to the PANGAEA data repository (www.pangaea.de). With the following link the data is accessible:

https://doi.pangaea.de/10.1594/PANGAEA.883582

We submitted the data from Table 1 from the manuscript, the sample site characteristics, the carbon and nitrogen data presented in the supplement material, as well as the radiocarbon data to the PANGAEA data repository. We will include the doi link in the final version of our paper.

RC: P3 L5: See also Webb et al 2017 – this is a recent citation and may be relevant

here and in the discussion.

AR: Thank you for the suggestion. We included this citation in the introduction and added a sentence in the discussion.

RC: P3 L13: Perhaps cite Abbott et al 2016 here – I'm not sure that NPP increases will offset permafrost SOC emissions, even with increased N availability.

AR: We changed this part of the introduction slightly according to referee #2. Though, we included the suggested reference in the discussion.

RC: P3 L23: I don't think DTLB has been defined yet.

AR: Yes you are right, thank you for the hint. We included the definition of this abbreviation in the sentence on P3 L20-24.

RC: P9 L28-29: This statement is unclear – do you mean to say that a single core is affecting the mean? Please clarify.

AR: For thermokarst on Bykovsky Peninsula we only have one core (BYK14-T3-3) reaching a depth of two meters. Therefore, the mean for 0-200 cm is based on this single core only (see Fig. 3). This core was very carbon rich compared to the other cores (see Table S4) from thermokarst sites and therefore the high carbon storage for thermokarst in 0-200 cm need to be interpreted carefully. We added the following sentence in the manuscript on P10 L7: "However, this estimation is only based on one relatively C rich core (BYK14-T3-3), since this is the only core reaching a depth of two meters for thermokarst on Bykovsky Peninsula. Therefore the carbon estimation for thermokarst on Bykovsky Peninsula for the soil interval 0-200 cm has to be interpreted carefully."

RC: P32-33: In figures 3 & 4 it would be good to have an outline around the key for the striped bars.

AR: Changed as suggested

References:

Abbott, B. W. et al. (2016), Biomass offsets little or none of permafrost carbon release from soils, streams, and wildfire: an expert assessment, Environ. Res. Lett., 11(3), 1–13, doi:10.1088/1748-9326/11/3/034014. Webb, E. E. et al. (2017), Variability in above- and belowground carbon stocks in a Siberian larch watershed, Biogeosciences, 14(18), 4279–4294, doi:10.5194/bg-14-4279-2017.

We thank the Anonymous Referee for the constructive comments and suggestions.

On behalf of all the Co-authors

Matthias Fuchs