

Biogeosciences Discuss., referee comment RC2
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Comment on bg-2021-331

Anonymous Referee #2

Referee comment on "Organic matter characteristics of a rapidly eroding permafrost cliff in NE Siberia (Lena Delta, Laptev Sea region)" by Charlotte Haugk et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-331-RC2>, 2022

Haugk et al. worked on organic matter in the permafrost samples collected from the Sobosise Yedoma cliff spanning the last 52 ka in the Lena River Delta. They analyzed C and nitrogen content, bulk carbon isotope and biomarkers to characterize the sources and the quality of OM in the permafrost. They discovered the high quality of permafrost OM for potential decomposition and also demonstrated the associations between permafrost OC characteristics and past climate in the spanning record. This study adds to the present chemical composition data pool of permafrost OC from the Arctic, especially from the eroding Arctic river bank rich in yedoma. This is also well-written and I would recommend a publication with minor revision.

Specific comments:

Line 86 Aim 2 and aim 3 might be combined as they are basically telling the same thing.

Line 93 The locations of the three geomorphic units is not all clear. Only the second unit is stated in the north-western part.

Line 139 What is the precision of TOC and $\delta^{13}\text{C}$ measurements?

Line 146 The statement about radiocarbon age is misleading as those data are adopted from Wetterich et al., 2020 but not measurement in this study.

Line 154 What is the reason of using 13 samples for fatty acids analysis and 28 samples

for n-alkane?

Line 161 What is temperature of the following 5 min of heating?

Line 231 I guess SOB10-01-01 should be SOB18-01-01?

Line 231 What is the precision of TOC measurement? I am not sure if two decimal points is really needed.

Line 238 It may be better to keep consistency on the number of decimal points for the same data set.

Line 254 "and" should be "showed"?

Line 279 It should be "lowest values in unit III" for HPFA index.

Line 313 Can the formation of those peat layers in this area be related to the formation of different geomorphic units?

Line 349 Presumably, when the OM is frozen, decomposition should be very limited and may not cause much difference on the decomposition index. And the decreasing trend of HPFA doesn't seem to be very significant. In addition, how would you explain the change of iso and anteiso FA when HPFA shows consistency in unit III?

Line 364. "Our findings show that freshly thawed and...15.7 m/yr" may be rephrased as this study did work on the mobilization of permafrost.

L373, van Dongen et al 2008 argues that greater degree of decomposition was found in the western Eurasian Arctic. Please check again.