

Interactive comment on “Fate of terrigenous organic matter across the Laptev Sea from the mouth of the Lena River to the deep sea of the Arctic interior” by Lisa Bröder et al.

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Degradation of terrestrial organic matter (TerrOC) along its transport into the ocean is an extensively investigated yet not fully understood aspect of the global carbon cycle. The Siberian Arctic Shelf, with a width > 800 km, is a unique and ideal place to study the transformation of TerrOC upon its entry into the sea. In particular, with climate-induced mobilization of permafrost-locked TerrOC, this area is receiving greater attention than many other shelves on earth. This paper uses a series of terrestrial biomarkers (including lignin phenols, cutin acids, and wax lipids) to study the abundances as well as degradation of TerrOC along a 800 km transect from Lena River mouth across the shelf to the slope and rise. In conjunction with carbon isotope and surface area analyses,

C1

the authors display an increasing TerrOC degradation with increasing distance from the coast. The dataset is large and unique, and the writing is clear and organized. I have a few suggestions for the authors to consider.

First, in the Results and Discussion, many comparisons are made to other published Arctic (or other non-Arctic) studies, which is great and necessary. But the text is a bit reiterative and I wonder if there is a better way to display all the information from literature with tables or figures more vividly, which will help the readers to digest.

Second, TerrOC degradation is not unique to permafrost-derived OC: it happens in other shelf environments without permafrost OC input. What I am interested in this study is what is special about the transformation of TerrOC in the Siberian Arctic Shelf in comparison with other parts of the world or other depositional environment. I think the authors have made some very nice comparisons with the Mackenzie Shelf. But I think this may be more emphasized in the conclusions, etc.

Other minor points: L19: Change to “Mobilized permafrost carbon” can be either... L147: How does combustion affect surface area measurement? L165: What about FeOx, which plays a key role in the preservation of TerrOC? L346-348: How does hydrodynamic sorting affect the SA-normalized abundance of lignin? This is probably an important aspect (if not more important) other than degradation, which may explain the varied decrease rate for lignin vs. wax lipids. Does this bias the SA-normalized abundances?

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C2