

Interactive comment on “Organic matter quality of deep permafrost carbon – a study from Arctic Siberia” by J. Strauss et al.

Anonymous Referee #1

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Fate of permafrost soil organic matter and its response to warming process have attracted increased attentions from the community of geosciences. This paper is focused on the difference in the property of soil organic matter in Yedoma and thermokarst region, to illustrate the impact of Holocene degradation on the soil organic matter composition and properties. They have done extensive characterizations for two deposits and found there is no significant difference between Yedoma and thermokarst deposits. Such result is interesting, while partial explanation needs clarification. The extensive characterizations for two deposits request a better integration and overall discussion. In the abstract, the response of Yedoma permafrost soil to global warming is discussed, but the implication of soil characteristics on the response of permafrost soil to warming process is unclear. This reviewer suggests focusing the discussion on the fate of soil organic matter during the Holocene degradation. The authors need to generate

C7367

clearer conclusive statement. For instance, the results probably can lead to conclusion about whether there is geochemical preference for organic matter degradation during the thermokarst processes.

P15946 L16 What is a better quality? Please give a brief definition.

P15946 L26-28 Can authors be more specific? What kind of degradation steps? How did data support such degradation reactions?

P15947 L16 What does that mean by “recent atmosphere”?

P15948 L3-5 It seems there is large uncertainty in estimation for Yedoma OC amount. How about the uncertainty compared to OC in other regions? Can the current study contribute to the reduction in such uncertainty?

P15958 L5 Any reference to support this statement?

P15959 L11-15 Is there relationship between the particle size and availability/degradation of organic matter?

P15960 L8 Any explanation for odd preference?

P15961 L1 Probably to make this statement more accurately. What is the standard for higher hop-17(21)-ene concentration?

P15966 L18-20 If taking the standard deviation into consideration, does this mean anything significantly? The authors may want to do statistical analysis (t-test).

P15967 L15 What does the “relative state of degradation” mean?

P15966 L20-22 What is the variance in N content of these soils? If N does not change substantially, this relationship will be self-correlation between TOC and C.

P15970 L8-12 This is interesting. Why does freezing protect the further decomposition of acetate compared to the degradation of soil organic matter to acetate?

P15985-15986 These two figures are probably too busy. It may be helpful to select

C7368

representative parameters to present and leave the rest in the supporting information.

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C7369