

Interactive comment on “Molecular and radiocarbon constraints on sources and degradation of terrestrial organic carbon along the Kolyma paleoriver transect, East Siberian Sea” by J. E. Vonk et al.

Anonymous Referee #1

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This manuscript by Vonk et al. presents a great data set on molecular and radiocarbon composition on sediments and suspended particulate matter from the Kolyma paleoriver transect in the East Siberian Sea. The study area is an important component in the Arctic climate system and global climate and environmental changes. Measurements included stable isotopes, radiocarbon, molecular composition of lipids and compound specific isotopic signatures. The methods and approaches are novel, and the results should have important implications for understanding the fate, trans-
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port, and feedback of permafrost soil organic carbon in a changing climate. Thus, this manuscript should be of great interest to scientists in the fields of carbon cycles, climate change, soil dynamics, and biogeosciences as a whole.

In general, this manuscript provides detailed information on scientific background, study area, sampling and analytical procedures, and data statistics and analysis as well as scientific hypotheses. Using a three end-member organic carbon mixing model combined with isotopes/radiocarbon data, the authors tackled one of the most interesting scientific issues in Arctic carbon cycles and climate changes, providing significant constraints on sources and degradation of terrestrial organic carbon in the Eastern Siberian Sea. Results presented in this manuscript are suitable for publication in Biogeosciences. I support publication of this manuscript.

Additional comments:

1) Page-5207, line 26: should “the erosion OC” read “the eroded OC”; 2) Section 3.4: The benthic boundary layer transport is a very likely mechanism, but should not be repeatedly stated; 3) Section 3.5 and other places: Just a question here; why marine OC has to be young in the ESS? Are there any radiocarbon measurement for DIC samples? Considering the old nature of arctic riverine DIC and large methane fluxes in this region and the degradation of old OC during their transport, the C-14 age of DIC and thus marine OC in arctic coastal waters could be “old” although riverine DOM has been shown to be contemporary. 4) Table 1: if data available, I suggest the list of both suspend particle concentrations and POC concentrations in addition to OC (in mg/gdw) for better comparison with other studies. 5) Figure 2: should be cleaned up a little bit. Also, the lower panel in Figure 3. 6) Figure 4: again, the horizontal lines could be removed.

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