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Biogeosciences Discussions

Interactive comment on "Widespread release of old carbon across the Siberian Arctic echoed by its large rivers" *by* Ö. Gustafsson et al.

Ö. Gustafsson et al.

orjan.gustafsson@itm.su.se

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We are thanking both anonymous referees for their comments and are glad to read that both referees are positive about the manuscript.

Both reviewers suggested that the abstract adds some further description of the samples.. We agree that the abstract was a bit too concise and will add information on the type of samples we have analyzed and additional results in the revised manuscript. Furthermore, we will incorporate the technical comments that were kindly suggested by anonymous referee #1.

Anonymous referee #2 asks about the possibity to add salinity data to Table 1. This could be informative for estuarine conditions, but we suggest it would be more appro-

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priate if our data were water column measurements, rather than surface sediments. Salinity data were not recorded as that would be representative for the water masses just at the time of sampling, but unlikely to be representative for the mean salinity of the water overlying our sediment for the period that the surface sediment samples were accumulating (yr or longer).

Anonymous referee #2 asks "...to what extent the bulk 14C ages in the estuarine sediments deviate from those of end-member soil organic carbon in each river basin." It is a key objective to make progress on what soil carbon components is being fluvially released. Had we known that, the end-member composition, incl 14C, would be possible to constrain. A few relevant aspects include: Macdonald et al. (2006) investigated the basal age of peat cores in the circum-Arctic (see Supplementary Figure S2), showing that massive initiation of peatlands started 8-14 ka ago. Their data do not show any continent-scale trends, although the data coverage is far better in Western Siberia. Depending on hydraulic release pathways and active layer depth, the bulk soil organic carbon "end-member" in each river basin is therefore maximally 8-14ka old. This implies that the deviation of estuarine bulk sediment OC age from soil OC end-member is larger in the west (bulk OC 570-3000 14C yr) than in the east (5600-7600 14C yr). However, as indicated in the text (p. 1450, line 11-13) this likely reflects the permafrost extent and the colder climate in the east.

Finally, anonymous referee #2 addresses the issue of riverine versus coastal erosion OC input. We agree that this is interesting and this particular source division is in focus for our continuing research (see also Vonk et al., and Karlsson et al., in this special issue). The quantitative input of coastal erosion OC is likely much lower in the Ob and Yenisey estuaries, and nearly absent in the Bothnian Bay (Kalix) system. However, in the Lena delta and Indigirka and Kolyma estuarine sediments, the proportional input of erosion OC could be significant. We are thankful for this comment and will elaborate on this issue in the revised manuscript.

BGD

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Interactive comment on Biogeosciences Discuss., 8, 1445, 2011.