

Review of *Biogeosciences Discussions* manuscript (BGD 8, 1445–1461, 2011) entitled “Widespread release of old carbon across the Siberian Arctic echoed by its large rivers” by Gustafsson, van Dongen, Vonk, Dudarew, Semiletov.

This manuscript by Gustafsson et al set out to study the release of old organic carbon from northern permafrost based on measurements of compound specific radiocarbon in n- alkanes in surface sediments collected from the river mouths of five Siberian Arctic rivers. The fate and transport of vast quantity of soil organic carbon stored in high latitude regions in a warming climate are of considerable concern. However, specific pathways of permafrost soil organic carbon remain poorly understood.

Over the last few years, Gustafsson’s group has published a series papers focused on the remobilization of soil organic matter under on-going climate changes in the Arctic region. This manuscript presents new data on compound specific radiocarbon of sediments from several river mouths across the Siberian Arctic region, providing insights into our better understanding of sources and mobilization mechanisms of permafrost soil organic carbon in high latitude region. I appreciate their effort and the work that they are doing.

In general, this manuscript is well written. Text is concise and the results are very interesting with original and high quality data. Figures are clear and well presented. Results reported in this manuscript are suitable for the publication in *Biogeosciences*. My minor comments are given below.

Additional comments for consideration:

- 1) Abstract seems to contain too many introductory sentences, but less specific data and results. Specific sample information could also be added into the abstract.
- 2) Methods and Table 1: I suggest that water salinity data be added into Table 1 so that one knows where in the estuaries the samples were collected.
- 3) Discussion: Although the soil biomarker in the sediments may not be changed, to what extent do the bulk radiocarbon ages in the estuarine sediments deviate from those of end-member soil organic carbon in each river basin?
- 4) Coastal erosion vs. River export: Both river export and coastal erosion contribute soil OC into the estuaries. What is the relative or quantitative importance between river export and coastal erosion to SOC and soil biomarkers in the estuarine sediments? The proportion of these two sources may significantly affect the isotopic and chemical composition of estuarine sediments. This should be pointed out in the manuscript.

