Review of Biogeosciences Discussion bg-2016-260 by Salvadó et al.

The presented study provides a new and exciting data set from the outer East Siberian shelf investigating the sources and cycling of different organic carbon pools. The ongoing warming in the Arctic will likely increase the amounts of organic matter exported from land (trough rivers & coastal erosion) and our knowledge about the fate of the different terrigenous organic matter pools in the ocean and across the Siberian shelves is still surprisingly small despite recent publications trying to fill this gap.
The combination of bulk dissolved, suspended particulate and sedimentary organic carbon (DOC, POC, and SOC) parameters including stable and radiocarbon isotopes as well as biomarker data (lignin phenols) from surface and bottom waters offers highly needed insights into the sources, quality, and age of the different terrigenous organic matter pools transported across the East Siberian shelf and their relationship with each other. The strong contrast between relatively young terrigenous surface water DOC and old terrigenous bottom water POC and SOC and the fact that they seem to be completely decoupled from each other are the most interesting outcomes of this study.
I recommend this manuscript for publication in Biogeosciences.

In the following, you can find my questions and remarks.

Lines 42-45: How does the sea ice cover and Pacific inflow relate to the older and more enriched $\delta^{13}C$? Can you please elaborate here shortly?

Line 174: What is the pore size of the Teflon filters? Is it different from the GF/F filters and if so how could that influence the lignin yields and source as well degradation ratios in comparison to the DOC samples (filtrate from GF/F filters?)?

Lines 183-186: Do you have any data or reference for the fact that GF/F filters are not compatible? As far as I understand the problem is that the silica of the GF/F filters could react with the NaOH and use it up, which would change the pH and the needed alkaline conditions for the CuO oxidation. Did you ever try it? If you would use a higher concentration of NaOH, it could keep the solution in alkaline conditions despite some of the silica reacting with the NaOH.

Lines 206-209: Is there any estimate about the approximate age of the surface sediment slices (0.5cm and 1cm) analyzed here? The sedimentation rates are generally lower on the outer shelf than on the inner and they can vary quite strongly. Therefore, it would be important to know how much time is integrated in these samples when comparing them.
Also, can you please add the information on the sediment depth of each sample in Table 3 for easier readability?

Lines 330-335: Is there some information/words missing here? What "processes of terrigenous DOC along the offshore transport" are reflected here? Do you want to suggest that "processes such as hydrodynamic sorting, deposition, resuspension and uptake by primary production influence the DOC $\delta^{13}C$ and $\Delta^{14}C$ concentrations? Please clarify.

Lines 338-339: I generally agree with the statement made here that "large proportions the DOC exported to the outer shelf comes from young vascular plant material".

Although "young" is a relative term. Based on the fact that the DOC is younger than the underlying sediment (and deep ocean DOC in the Atlantic for example), you could call it young. However, it is important to mention in this context that the DOC-$\Delta^{14}C$ values of Eurasian rivers, such as the Lena, are much more enriched in $\Delta^{14}C$ with values >0‰ (containing bomb-^{14}C, see Raymond et al. 2007, *Glob Biogeochem Cycl*) and are therefore much younger than the samples presented here. That implies that there is either a considerable change in composition (and age) within the DOC pool during the cross-shelf transport likely affecting the young and labile fraction of DOC or mixing with older marine DOC.
Please include this aspect into your discussion.

Lines 399-401: Here it would be helpful to add information on for example the concentration of the hexadocenoic acid (C16FA:1), which is also a product of the CuO oxidation used here, in the POC and SOC samples. As Tesi et al. (2014) have shown, the C16FA:1 is a good indicator for marine organic carbon on the East Siberian shelf. Additionally, the dual-isotope ($\delta^{13}C$, $\Delta^{14}C$) three-endmember Monte Carlo simulation (see e.g. Vonk et al., 2012) could give an estimate about the contribution of marine, ice complex and surface soil organic carbon to these samples, which would improve discussion on the fraction of terrigenous and marine OC present in these samples.

Lines 401-403: Please clarify that the young Terr-OC is transported mainly in the *surface* water DOC, because the statement made here does not hold true for the bottom water DOC (3 out of 4 samples are older or as old as the respective bottom water POC samples).

Lines 431-433: Please mention in which ways to these processes alter the original composition (e.g. degradation causing a shift to towards woody lignin).

Lines 436-438: Please explain in more detail here. Are you talking about the surface water or bottom water POC? These two POC pools seem to be influenced by different transport processes (more buoyant surface transport versus nepheloid layer transport, resuspension) working on different time scales (shorter at the surface versus longer, likely thousands of years, in nepheloid layer).
How would you explain the distinct clustering seen in the C/V versus S/V plot? Does selective degradation, hydrodynamic sorting, leaching/adsorption influence the source signal in the different OC pools?
Bröder et al. 2016, Biogeosciences Discussion (in your reference list still Bröder et al. submitted – please change), observed an increasing S/V ratio with increasing distance from the coast and suggested that this is rather a result of hydrodynamic sorting or selective degradation than a change in source.

Furthermore, when I looked into the data of Bröder et al. 2016 I realized that the sediment samples presented here with the IDs 1, 4, 6, 14, 23, and 24 are the same as presented there. Only here the prefix SW is missing, but the Longitude and Latitude match and as both studies are based on samples from the SWERUS-Expedition in summer 2014 I assume these are the same samples. At first, I thought you forgot to put a reference in here for the $\delta^{13}C$ and lignin data of these samples. And for the $\delta^{13}C$ SOC data you should do that, because Bröder et al. published it first in Biogeosciences Discussion. However, the lignin data presented here by Salvadó et al. (S/V; C/V; Sd/Sl; Vd/Vl; 3,5-Bd/V) is considerably different from the data in Bröder et al. 2016 for these samples, e.g.

in the C/V vs. S/V plot the data from Bröder et al. 2016 for these particular samples would plot much more in the direction of woody angiosperm material. So, maybe I got it all wrong and you used different samples than Bröder et al. 2016 or something got mixed up. Please check your data again and clarify.

Lines 439-455: First of all, the Pn/P and P/V data is missing in Tables 1, 2, and 3. Further, I'm not convinced that the Pn/P ratio is a good proxy for marine versus terrestrial OC contribution here. In Tesi et al. (2014) active layer permafrost soil samples from the Indigirka, Lena, and Kolyma watersheds yielded Pn/P ratios <0.1, which could be a possible source for the low POC values here.
As mentioned above, you could use the C16FA:1 concentrations or the dual-isotope three-endmember Monte Carlo simulation the assess the relative contributions of terrigenous and marine organic carbon in these samples.

Line 455: Sentence missing in the end.

Tables 1-3: Pn/P and P/V ratios missing.

Tables 1 and 2: Please explain swi in DOC-swi and POC-swi.

Fig. 2A: The second y-axis on the right shows a different maximum value and different intervals. Is one of the axes for POC and one for DOC? Please clarify.

Fig. 8A: Where do the boxes for angiosperm leaves, etc. come from? Can you give a reference?

Fig. 9C: It is hard to see in this figure, but is there a slight trend in SOC pCd/Fd ratio with Longitude? And if so, how would you explain that?