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Ocean Science Discussions

Interactive comment on "DOM and its optical characteristics in the Laptev and East Siberian seas: Spatial distribution and inter-annual variability (2003–2011)" *by* Svetlana P. Pugach et al.

Anonymous Referee #1

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General Comments:

In the manuscript entitled "DOM and its optical characteristics in the Laptev and East Siberian seas: Spatial distribution and inter-annual variability (2003-2011)" the authors describe the dominant factors which control the distribution of dissolved organic matter (DOM) in the Siberian shelf seas. On the basis of a data set of several years the authors also try to explain the reason for the observed year-to-year variability of the DOM distribution. A further focus of the work is on the estimation of the utility of in situ fluorescence measurement.

Basically, the article describes phenomena that have been already investigated and published by other authors, i.e.: - The atmospheric forcing of the Lena freshwater plume - and thus the associated high content of terrestrial DOM (for example: Dmitrenko et al., 2005, Wind-driven surface hydrography of the eastern Siberian shelf, doi:10.1029/2005GL023022).- - The geochemical behavior of DOM on the Laptev and East Siberian Seas (for example: Alling et al., 2010, cited in the manuscript) - The usefulness of in situ fluorescence measurements for the investigation of DOM in the East Siberian and Laptev Seas (Belzile et al., 2004; cited in the manuscript). Actually, some of the co-authors of this manuscript were also co-authors of the study published by Belzile. Because both studies are based on samples from the same region and the same year, the question is whether it is the same set of samples? What is the main difference to the work of Belzile et al.?

In general, it is hard for me to recognize on which data set the analysis is based on. According to table 1, CDOM (for absorbance measurement) was sampled on 245 stations, but in Table 2 (statistics) the number of samples (N) is 90. Also Figure 2a and 5 give no explanation because the gridded maps do not show the sampling locations for CDOM. Figure 9 (DOC) only shows ∼19 sampling locations. This makes it difficult to follow the study's line of argumentation - at least for me. In my opinion, the presentation of the data has to be revised.

The authors distinguish a western biogeochemical province from an eastern province and state that the CDOM concentration is high near the Lena Delta and low in the eastern East Siberian Sea, a region that is less influenced by riverine freshwater. They also found a strong negative correlation between the CDOM absorption and the salinity and concluded that the CDOM is mainly of terrestrial origin. For the Arctic Ocean, this is a well-documented hypothesis (see the work of R. Amon, C. Stedmon; M. Granskog and many others). Unfortunately, no figures were presented to show the correlation between salinity and CDOM. In my opinion, we are not dealing here with different biogeochemical regimes but with differences in the hydrography and spatial expansion of

the region of freshwater influence (ROFI) driven by atmospheric forcing. The conclusion that “the atmospheric circulation regime is the dominant factor controlling CDOM spatial distribution” is therefore somewhat misleading. Are the geochemical processes fundamentally different within and outside of the ROFI? This point needs to be discussed in much greater detail

Specific and technical comments:

- Are the DOM data accessible? - Please indicate the sampling locations in the figures. - I guess you used the DIVA tool (ODV) for the spatial gridding. I believe the interpretation of data can be misleading if a spatial interpolation that is based on 17 sampling locations covers an area of approx. 500.000 square kilometers (Figure 9.). The DIVA interpolation gives DOC and CDOM concentrations $\sim$400 km north of the last sampling location. I would like to suggest to redraw all figures and to show the original data (e.g. as colored dots) instead of the interpolated data. - Samples were taken from a “seawater intake system” that pumped the water into a 300 l barrel. Have you measured the salinity directly in the sample, or did you use the salinity data from the Seabird CTD? The inlet of the ship was at 4m water depth. If you have taken the salinity data from the CTD, which depth have you chosen? - Please do not use acronyms in the heading of the manuscript - Page 3 line 147: I guess 0.7 μm is the correct nominal pore size of the filters. - Is figure 3 really necessary? What does it tell about the CDOM distribution? - Figure 4: Wouldn’t it be better to show the relation between aromaticity and salinity instead of longitude? - English is not my first language, but I believe the text needs a linguistic revision.

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