

Reply to referee #2 (in red italic)

Light absorption and partitioning in the Arctic Ocean surface waters: impact of multiyear ice melting S Belanger et al. General Comments: The paper investigates light absorption properties and the vertical variability of light absorbing components in the southeastern Beaufort Sea. Stations sampled include regions influenced by the Mackenzie river and the polar mixed layer waters. An important outcome of the study presented was that the melting multi-year ice was found to release significant amount of non-algal particulates near the sea surface relative to sub-surface waters. The impact of this process on the light transmission and remote sensing reflectance (Rrs) was examined using the Hydrolight radiative transfer model. Modeling studies suggest that the non-homogeneous surface distribution of non-algal particulate matter can significantly affect the Rrs in the blue-green spectral region. The results presented in this study are novel that suggest this area of research this to be considered in future studies. This is a well-written manuscript and is recommended for publication with some minor recommendations.

REPLY: We thank the referee for his/her nice comments. Please find below our reply/comments to each minor comments made by the referee.

Specific comments: i) The study suggests that the ice-melt waters have not been subjected to any mixing/turbulence or the waters have undergone ice-melt within relatively short period before sampling. It would be interesting to show the wind conditions before and during the sampling of the surface waters.

REPLY: We added information on wind speed prior and during the cruise but we refer to Forest et al (this issue) who already presented these measurements. Here is the paragraph we added in section 3.1 :

These slightly above-normal sea ice concentrations compared to previous years was the result of relatively strong and sustained northerly/northeasterly winds conditions prevailing in July. In August, calm to moderate southerly wind conditions dominated, transporting the ice pack Northward (Forest et al., 2013, their figure 2).

ii) The results of the absorption properties of CDOM at the same stations were presented in a previous paper by Matsuoka et al. 2011. A comparison of CDOM in Figure 4 to that of Figure 6 in Matsuoka et al. 2011 show different patterns for the western and the eastern vertical transects. Reason for this could be due to the different scales used for the figures. Would suggest that the same scales/depths be used so that the two papers can be studied seamlessly.

REPLY: The sections presented in Matsuoka et al 2012 did not include all the near-surface samples (0-). In addition, we don't have much particulate absorption data at depth >100 m. This explains why we limit our sections from surface to 100 m depth. In addition, we wanted to compare CDOM with NAP and phytoplankton absorption. To do so, we had to scale the data from 0 to 0.2 m⁻¹ in order to see the patterns. So we prefer to keep the figures as is.

iii) Overall the figures are of good quality, however Figures 1, 10b and 11 are not clear and could be improved with better color contrast or enlargement.

REPLY: DONE.

iv) Please correct subtitle “3.3 Particles enrichment the near the sea surface”

REPLY: DONE.