Dear Prof. Dr. Engel, Dear Anja,

We are pleased that the reviewer accepted the revised version of our manuscript and was satisfied with our answers to his questions. We believe that the comments of both reviewers have contributed significantly to improving the scientific quality of our manuscript. I would like to thank them once again on behalf of all the co-authors. We would also like to thank you, dear Anja, for "accompanying" us through the review process!

We have implemented all further comments of the reviewer and hope that the manuscript in its current version meets the requirements for publication in Biogeosciences.

Yours sincerely

Jens

Point-by-point response to reviewer #2's comments (anonymous):

Abstract line 18 (in referee-report-one): Only one freeze melt cycle?

No. The river water goes through at least one cycle. We reformulated the sentence: „A significant proportion of this tDOM-rich river water undergoes at least one freeze-melt cycle in the land-fast ice that forms along the coast of the Laptev and East Siberian Sea in winter."

Abstract line 25: "surface" distribution of tDOM?

That's right. The river water and the meltwater mainly influence the concentration distribution in the surface water. We have changed the sentence accordingly: „Although removal of tDOM cannot be ruled out, our study suggests that conservative mixing of high-tDOM river water and sea-ice meltwater with low-tDOM sea water is the major factor controlling the surface distribution of tDOM in the LS and ESS."

Introduction line 78: "Is this for the "whole" AO, or pertinent value for the LS/ESS part of the AO? Please clarify."

The value given refers to the entire Arctic Ocean. To make this clearer, we have reworded the sentence (line 60 in the last version of the manuscript): „The terrigenous input (particulate and dissolved) of carbon by coastal erosion to the entire AO is estimated to be 15.4 Tg yr^{-1} (9.2-24.2 Tg yr^{-1} with one standard deviation; Terhaar et al., 2021)."

Line 118: "Suggest to change to: "provides a low-salinity" source"

We have accepted this suggestion: (line 91 in the last version of the manuscript) "On the other hand, melting of CDOM-poor drifting pack ice (Kowalczuk et al., 2017) or immobile land ice (Wegner et al., 2017) is also important because it provides a low-salinity source that can dilute higher DOM concentrations in the surrounding sea water (Amon, 2004; Mathis et al., 2005; Granskog et al., 2015b; Logvinova et al., 2016; Tanaka et al. 2016)."

Line 151: "Was DOC defined already?"

Yes, DOC has already been defined in the Introduction (line 48 in the last version of the manuscript).

Line 183: Deleted "doi of the Pangaea data publication" and replaced with "data sets".

We accept this change. (line 139 in the last version of the manuscript)

Table 1: “check the correct symbol for delta (lowercase delta should be used?)”

Done.

Line 252:

We have corrected f_{rw} (Line 203)

Line 268:

We added the missing unit (Line 219)

Figure 3: “Give units for these too, or drop for all.”

We have removed the units in the caption.

Figure 6 “what is the maximum salinity in this figure? I would perhaps add isohaline at 33 if salinity reached that high along the section?”

We have revised the figure, it now also shows the isohaline for 32.5. In addition, the maximum salinity has also been indicated.

Line 550: “was this value updated on another part of the ms??“

We overlooked changing the value at this point in the text. Thank you very much for your comment. The value has been changed: (line 423) „During the course of the freshet in 2014 the Lena discharged about 211 km^3 of freshwater with a flow-weighted average $a_{CDOM}(350)$ of 26.1 m^{-1} and a DOC load of 2.83 Tg.”

Line 574and 598 : frw changed to f_{rw}

Line 600: The sentence was changed to: (line 460) „However, in this context it must also be taken into account that the freezing of the river water in the fast ice - 30-50 % of the annual freshwater discharge of the Lena River (Eicken et al., 2005) - also leads to the extraction of tDOM from the river water.”

Line 680: “you mean "brine"??”

The sentence was changed to: (line 524) “Thus, the rapid removal of DOC in the brine or the remineralisation of the remaining ice-bound DOC could also play an important role.”

Line 740: "inhibit" has been replaced by "reduce".

We accept the change (line 570).

Line 754: “A number of studies looked at this in the Arctic prior to these papers cited here, which I guess would also merit to be mentioned when solar radiant heating and its vertical distribution is concerned..

Pegau, W. S. (2002). Inherent optical properties of the central Arctic surface waters. Journal of Geophysical Research, 107(C10), 8035. https://doi.org/10.1029/2000JC000382

Hill, V. J. (2008). Impacts of chromophoric dissolved organic material on surface ocean heating in the Chukchi Sea. Journal of Geophysical Research, 113, C07024. https://doi.org/10.1029/2007JC004119

Granskog, M. A., Pavlov, A. K., Sagan, S., Kowalczuk, P., Raczkowska, A., & Stedmon, C. A. (2015). Effect of sea-ice melt on inherent optical properties and vertical distribution of solar radiant heating

in Arctic surface waters. Journal of Geophysical Research: Oceans, 120(10), 7028–7039. https://doi.org/10.1002/2015JC011087

That is certainly correct. We have therefore added the suggested citations to the text (line 584).