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Interactive comment on “Bio-optical characterization and light availability parametrization in two glacial melt water influenced estuary systems (West-Greenland)” by L. Holinde and O. Zielinski

Anonymous Referee #3

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Review of Bio-optical characterization and light availability parametrization in two glacial melt water influenced estuary systems (West-Greenland) L. Holinde and O. Zielinski, Ocean Science Discussion

General comments: Authors presented a bio-optical study in two fjord systems (Uummannaq Fjord and Vaigat-Disko Bay) in West Greenland. The study is based on a good and rather rare dataset combining a variety of bio-optical characteristics collected during one synoptic campaign in summer 2012. However, in my opinion, authors have not put enough effort to thoroughly look into the dataset and explore its full potential.

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In the first part of the paper, authors demonstrated that despite being geographically close, these two fjord systems have different hydrographic and bio-optical conditions. Uummannaq Fjord is characterized by lower chlorophyll (fluorescence) and higher SPMi concentrations, while opposite pattern was found in Vaigat-Disko Bay.

Despite differences in these two factors (SPMi vs Chl) controlling underwater light regime, in the second part of the article authors proposed a two component parameterization of K_d/PAR based on a merged dataset. This might be partly a reason why the R-squared value ($R^2=0.41$) is so low for the regression between K_d as a function of SPMi and Chl. In my opinion, this is one of the main drawbacks of the study. Even with a limited amount of data, authors are suggested to look at data from Uummannaq Fjord and Vaigat-Disko Bay separately, and maybe try to come up with two separate parameterizations.

Second major deficiency of the article is the choice of the 1% depth of PAR for the modelling part and the focus on this in the discussion. Authors were not able to justify this choice.

Specific comments: Authors presented data from one single cruise representative of summer conditions in two studied fjords. Glacial fjords are known for their strong seasonality in terms of glacial melt and freshwater discharge. During the discussion not much is said about (potential) seasonality of bio-optical conditions and applicability of the proposed K_d/PAR parameterization for other seasons?

Often, highest concentrations of SPMi are found in the few meters of the water column. According to the description in methods, the uppermost sampling depth was at 3 meters. Do authors have an idea whether the inclusion of data (SPMi and Chl) from the upper 0-3 m would help to improve the K_d/PAR parameterization?

There are several corrections that should be made to improve a presentation of data and results. For example, there are a number of geographic names used throughout the text. Unfortunately, none (!!!) of those are shown on Figure 1a,b, which make read-

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ing this article difficult and sometimes annoying for a specialist not familiar with this geographic area in West Greenland. The names include: Greenland, Baffin Bay, Uummannaq Fjord, Vaigat, Disko Bay, Disko Island, Perlerfiup Kangerlua Fjord, Perlefiup Sermia Glacier, Jakobshavn Isfjord, Jakobshavn Isbræ.

Not being a native speaker, I advise authors to ask their native English speaking colleagues to read through the manuscript.

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