Ocean Science
Discussions

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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

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The paper analyzes the results of the physical and optical conditions in areas influenced by glacial melt-water. Two major contributions are provided:

Contribution 1. Spatial heterogeneity. The paper compares specifically two transect located relatively close (on the west coast of Greenland, figure 1) with CTD, water sampling and optical measurements. The results indicate that there are significant differences between the two data sets (figures 3,4 8 and 9), pointing out the need of

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regular high resolution monitoring in those sensitive areas to global changes.

Contribution 2. Bio-optical model for light penetration depth. The second goal of the study is to develop a light penetration depth model as a relevant factor for bio-optical studies in Arctic environments. The model predicts the 1 percent light depth based on concentrations of Chl-a, organic and inorganic suspended matter, and CDOM absorption in the water (figure 7).

The contribution1 provides a very much-needed data to understand the optical dynamics in areas under glacial melt water influence, and only for these reason the paper should be promoted for publications (after extended discussion on these aspect). However, I think that the contribution 2 should be re-framed somehow to be included in the paper.

For contribution 2, authors should analyse two main questions:

1) (Q1) Why the output parameter (1 percent light depth) is needed for the scientific community? I think that this question could be relatively easy to answer, after an improved literature review on this subject. 2) In the section 4 (discussion) the authors state: "The model is appropriate for rapid estimates of light availability within these melt water influenced Arctic estuaries based on water sample analysis and common bio-optical sensors within CTD profiles. The second question would be (Q2) Why is better for the scientific community to use a model (that provides in some cases gross estimations of 1 percent light depth), rather than directly incorporate a PAR sensor in the CTD? Taking into account that, at present; the cost of some PAR sensors could be negligible compared with the global cost of an Arctic survey.

I think that now Q2 would be the most challenging question in the present format of the paper.

Q2B: However, I think that there is an alternative argument to promote the model use: If authors provide good arguments to answer Q1, they could propose that, rather than

providing "rapid estimates of light availability" the model could be answer the Q2B: Could the model provide reconstruction of light availability based on historical data records?. With historical series of light availability the scientific community would have a method to reconstruct and to analyze large scale trends (if the authors may provide examples of previous monitoring campaigns with on water sample analysis and common bio-optical sensors within CTD profiles). With this method the scientific community would be able to evaluate the effects of increased melt water discharges related to global changes.

In summary:

1) The authors should re-frame the article considering only Contribution 1, if the authors are not able to answer Q1 and Q2B. 2) The authors may add the Contribution 2, if they are able to answer Q1 and Q2B.

P.D: I suggest to scale figure 4 in the depth range to 0-50 m, since this is the range discussed in the rest of the paper.

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