

Comment on bg-2021-181

Anonymous Referee #2

Referee comment on "Regional-scale phytoplankton dynamics and their association with glacier meltwater runoff in Svalbard" by Thorben Dunse et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-181-RC2>, 2021

General comments:

The manuscript examines summer phytoplankton bloom in the fjords of Svalbard region and its association with glacier meltwater runoff, sea ice and ocean variables- MLD and SST for the period 2003-2013. Satellite derived surface CHL data and model simulation data is used for getting RUNOFF, SEAICE, SST and MLD. The manuscript shows correlation of summer bloom (CHL data) with the model variables. And reports that 50% (7 of 14) hydrological regions of Svalbard showed CHL increase in summer when RUNOFF increases. But the correlation was limited only up to 10 km distance from the coast. The manuscript suggests that the association can be due to subglacial plume upwelling and estuarine circulation. For other 50% hydrological regions that do not follow the correlation between summer bloom and glacial melt, role of other players, including land terminating glaciers and sea ice, is attributed.

The manuscript also discusses phytoplankton dynamics of the fjords of Svalbard in the productive season from April to August, and compares it with other Arctic fjords.

One of the purposes of the manuscript is to explore the feasibility of regional scale monitoring of phytoplankton. And it shows that indeed monitoring by satellites can be useful where in-situ monitoring is not possible or data is not available, though satellites have limitations such as cloud cover, sea ice and lack of sub surface overview.

In literature, such studies are mainly reported for Greenland fjords with limited information on Svalbard fjords. Thus, the gaps identified are valid and the manuscript has attempted to fill the gap.

Limitations:

What could be the reasons for 50% of the fjords not complying with the pattern of increase in CHL with increase in glacial runoff? Though mentioned briefly, this point needs to be dealt in detail.

Other detailed comments are mentioned in the attached PDF file.

Please also note the supplement to this comment:

<https://bg.copernicus.org/preprints/bg-2021-181/bg-2021-181-RC2-supplement.pdf>