

The authors have thoughtfully and thoroughly responded to comments on the previous draft and that effort is appreciated. This is a valuable contribution regarding early spring discharge at a tidewater glacier front, which convincingly combines a number of lines of evidence to support their conclusions of higher primary productivity under the ice in such fjords. The purpose and conclusions of the manuscript are now much clearer and, as such, the manuscript is overall greatly improved. I believe that the manuscript is now much improved and close to being ready for submission.

However, I do have some specific suggestions below to once again, aid clarity, for the authors' consideration.

L14: the meaning of the word "sufficient" is unclear. Do you mean the flux is sufficient or that the associated nutrient upwelling is sufficient? It would be good to be precise here.

L18: change to "we **still** observed... and primary production **at this time of year**"

L18-19: "subglacial meltwater" .. suggest changing / specifying "submarine discharge"?

L20: the reason for the two-fold higher under-ice irradiance is not clear from the preceding sentences.

L22: "The nutrient supply increased primary production" .. how are you disentangling nutrient supply from the effects of stratification and irradiance?

L22: increased primary production by 30% where? In the seawater? In the sea ice? Both?

L23: the meaning of the phrase "limiting the inhabitable place" is unclear

L22-23: You switch here to talking about the sea ice communities I believe, and in then in the next sentences are back (?) to talking about the under ice marine communities.. it might be good to keep the discussion about the water together and then talk about the sea ice.

L26-28: This last sentence (arguably an important one since it's the end of the abstract) is unclear. Suggest re-writing. Perhaps split into – making the part after "while sea ice" a new sentence. There are just too many qualifiers re: the sea ice to take in to come away with the overall take-home message as currently written.

Also, for the first part of the sentence regarding the retreat of tidewater glaciers, I think the authors should instead emphasize the possibility of longer, more extensive melt seasons with climate change and thus the higher likelihood for more early season spring discharge and what that effect is on primary production. The study of this spring early-season discharge is really the novel aspect of this paper – so there's no need (in my opinion) to focus on the eventual retreat of tidewater glaciers – which is further into the future, and involves more complicated considerations of bed slopes.

L38: change "upwelling" to "upwelled"

L39 & L43: while I appreciate the authors adding in approximate distances, it seems strange that the region where primary productivity is low in front of the glaciers is in the same range as the region at some distance out where it is higher – particularly since the authors cite the same study. In L39 suggest refining the estimate for low primary productivity in close proximity to the glacier front according to the figure referenced in Halbach et al., 2019.

L41: add “type” after glacial bedrock

L42: change “surface increase” to “surface **can** increase”

L48: change to “**an** overall **low** discharge **flux**”

L49: change to “**However, the** limited amount”

L50: change to “quantification of **spring** subglacial outflow” and “on **both** sea ice..”

L57: change to “Glacier terminus melt rates **of basal ice** at the glacier-marine interface..”

L58: change to “**seasonal** subglacial outflow **flux**...”

L59: suggest change “terminus” to “**basal**” and “than in” to “**compared to the**”

Also, was their evidence for winter upwelling in the Moon et al. (2018) study? Was the flux high enough to permit this? It’s unclear as written but if this was the case I would suggest explicitly stating so.

L60: change depth to “**depths**”, change “deep terminus melt” to “**basal ice** melt”

L63: I wonder why the authors are specifically mentioning cold-based glaciers here – especially as because later they emphasize that their results are extendable to warm or polythermal ice masses. Suggest deleting the specific mention of cold-based here and instead emphasize that this has been observed at several warm and polythermal ice masses in Svalbard.

L72: change “subglacial” to “**submarine**”?

L75: change “to the summer situation” to “**in** the summer”.

L80: change “nutrient ion enrichment” to “nutrient **and** ion enrichment”?

L82-84: Sentence beginning with “Especially” is very unclear and seems a tad redundant (at least as written).

L88-90: Would suggest deleting this sentence and focusing instead of impact of warmer and longer meltseasons – no need to extend to glacier retreat which is really beyond the scope of the study – see comments above for abstract.

L93: delete “ice algae start growing” and also L94: delete “ within sea ice”

L97: change “subglacial upwelling” to “**subglacially induced** upwelling)

L101: extra space between “to” and “wind”

L111-112: Re-write the last sentence: We suggest that even though subglacial upwelling is diminished in the spring, compared to the summer, in the absence of wind mixing, the enriched nutrient may enhance algal growth at this time of year.

L114: The way this sentence is written begs the question – and what about the other glacier front.. why not describe that too?

L146: I have to admit to still being confused as to why additional water was added to the sea ice cores for melting. Why not just directly melt the core?

L247: Do you mean you transferred the phytoplankton communities into their respective environments? Sentence is a bit unclear.

L251-252: Last sentence is unclear. Is “adequate” the correct word here?

L321: Change therefor to **therefore**

L325: extra space after 4 $\mu\text{mol/L}$

L345: It’s unclear in this paragraph what site you are referring too? Is this for all the sites>

L349-350: Is this estimate for inorganic nutrients valid in light of the non-conservative mixing discussed in the paragraph prior?

L437: Add phrase “**there was no**” after “In addition”

L444: change to “below **the** freezing point”

L452: change to glacier meltwater **contributions**

L462: change to have **enriched** silicate concentrations

L464: Note emphasis here on warm or polythermal-based glaciers – see comment above regarding line in introduction on cold-based glaciers

L467: change “last” to **late**

L468: change “melting” to **melt season which as remained** throughout the winter. (delete extra period)

L473: change “substantially” to **much**

L475: change “productions” to **production**

L505: move phrase “in Billerfjorden” to the end of the sentence

L515: make second part of the sentence beginning with “explaining the higher summer ...” a new sentence or re-write to make it follow from the first part of the sentence. As written, it doesn’t.

L519: is “it” referring to submarine upwelling? Suggest clarifying.

L547: With regards to stratification observed at the SG site, would the physical mechanism of upwelling disturb this stratification?

L604: Typo in “studiy”

L607: Change “studies” to **study periods**

L682: Change “Last” to **Lastly**

L698: Change “most of” to **much** and “different evidence” to **different lines of evidence**

L704: systems more similar to NG or IE? NG seems appropriate to refer to here since this is actually an adjacent land-terminating site correct?

L705: change to “but **would result in** higher biomass..”

L706: Sentence beginning with “The pelagic ..” is unclear and a fragment. Suggest re-writing.

L720: What is the depth of the effect of wind-induced vertical mixing?