

## General comments

The authors have taken advantage of repeat oceanographic measurements in the Kangilliup Sermia fjord region to examine the influence of glacial mélange meltwater on water column temperature and salinity. Along with discussing the event and its impact within Kangilliup Sermia, the authors compare with Kangerlussuup Sermia and consider possible alternative processes that could influence observed changes. Overall, the paper is nicely organized, provides complete analysis of the observations, and presents a variety of useful visuals in the primary manuscript and supplementary materials. The results will be of interest and use for researchers examining ice-ocean interaction, modeling glaciated fjord environments, and considering system connections from glacier/ice sheet to ocean properties and onto biogeochemical processes.

For all figures the authors should check compatibility with colorblind requirements. They might also consider introducing different symbol types when appropriate to help to distinguish datasets.

Finally, I've included a variety of mostly minor comments below. After completing my initial review, I also read through the comments from Benjamin Davison and overwhelmingly agree.

## Specific comments (by line number)

1. Consider shortening title to “Ice mélange melt changes observed water column stratification at Greenland tidewater glacier”
12. “brash ice” is only used twice in the manuscript – suggest using an alternative in both places and avoiding the phrase
30. correct to “marine-terminating”
31. Rather than use “these glaciers”, suggest specifying the glaciers in question again. E.g., “The rapid retreat of Greenland marine-terminating glaciers...”. It is easy for use of “these/this” type of words to be confusing and I recommend checking this across the manuscript. I noted similar instances of confusion here: “where” in line 351, “This” in line 396.
- 32-34. The note in this sentence (and in the last sentence in the paragraph) feels out of place to me or perhaps a not-so-useful transition. The topic within this sentence is rigid mélange influence on ice dynamics/retreat. But this paper really focuses on mélange melt. This could link with other ice-ocean processes that influence ice dynamics/retreat (noted line 49), but I find the focus on mélange rigidity re: glacier dynamics perhaps unnecessary.

It does strike me that this connects with the comments from Benjamin Davison re: ~line 300. The authors might think more about how much or little to discuss mélange rigidity across the paper and edit accordingly.

45. remove “of”

49-50. The sentence is easier to read and shorten when writing “increasing glacier and ice mélange submarine melting”. Consider if similar changes can help in other parts of the manuscript. (This is one of many excellent writing tips from the recommended Writing Science book by Joshua Schimel.)

69, 73, 76. Recommend adding information on the bathymetric uncertainties in this region. Those vary widely across Greenland and would be helpful context for the reader. Similarly, including information on maximum fjord depth in this paragraph.

75. remove “-1,000 m;”

86. It would be useful in this paragraph to introduce a clear definition/distinction between icebergs and ice mélange that can be used throughout the manuscript. This paragraph would also benefit from including mention of the time periods evaluated by Sulak et al. (2017) and any note on whether there’s an expectation of substantial change between that observation period and the one used within this paper’s research.

87. remove “similarly”

Figure 1. (a) would benefit from slightly more satellite image viewable on the right and could be balanced by a small reduction on image left. It would also be useful to have the sill locations indicated in (a) and consider adding the tracks from (c) into the map-view in (a) (they could even have hash marks to help viewers align the data in (c)). In the caption, it would be helpful to add the rough time period for clearing at the end of the sentence noting formation over 6 hours (e.g., x hours or z days).

106. change to “event discussed here”

135-136. Why 250 m plume width? Also, why use the post-ice mélange CTD casts for the initial plume model stratification instead of pre-ice mélange? Can the authors also provide a note on uncertainty related to the plume model and what that implies for confidence on neutral buoyancy depth?

163-166. The second sentence here is confusing re: varying the depth range – please edit for clarity.

167. The authors note here that runoff/subglacial discharge don’t vary substantially. Looking at Figure S7, an initial read would suggest a notable reduction in runoff (~300 to 100 m<sup>3</sup>/s) during the mélange event when only looking at the runoff record. Providing

comparative numbers (runoff vs mélange melt) or an alternative justification (e.g., line 284 about runoff vs subglacial discharge) could be helpful to convince the reader of the reasonableness of this approach.

180+. The authors note that the ice mélange broke up, moved down-fjord, and most of the ice mélange was transported out of the fjord. How much do you expect that freshwater is going to circulate and transport out along with mélange? In other words, what might you speculate about freshwater changes between August 9 (fjord cleared of ice) and August 11 (date of observations)?

Figure 2. I don't understand why the Aug 11 ~0-20 m water column is warmer than the Aug 4 0-20 m temperatures and this isn't explained in the text. Perhaps some of the information in the sentence at lines 206-208 is meant to help (noting freshwater surface input), but I was no less confused after reading this sentence. Or is the note at line 286-287 meant to address this?

Figure 3. In (a) it would be helpful to label some of the depth squares. At first the data I expected in (b) based on (a) and the caption note didn't seem to line up with (b) until I realized that I wasn't identifying the squares in (a) properly. They are very hard to see and it can be difficult to tell black from blue, so some help there would be nice. Please double check all the along-transect plots re: color/direction. For (c), it says that toward-glacier flow is positive (red) and that distance along fjord begins in the south at 0. These appear to mismatch – the top right corner of (c) should be southside toward-glacier flow, not northside toward-glacier flow (and based on line 217 sentence). It does get confusing since the toward-glacier flow pattern is reversed between the surface and below 100 m. Consider if further editing can help keep this clear for the reader.

231. Clarify “highest at the ocean surface” (not subaerial)

279. Note the location/boundaries of the warm temperature anomaly

298-300. This sentence does not read correctly – please rewrite.

300-301. Suggest using “facilitates” instead of “leads to”

Note: I agree with Benjamin Davison's comments on this topic and that modifications to this explanation are warranted.

394. Suggest specifying “Kangilliup Sermia fjord”

Figure S4. Add information to understand north/south on these plots.

Figure S9. What are the black triangles in (a)?

Table S1. Suggest stating the “full water column” depth range in the caption.