# Review of "Freshwater sources and circulation in northern Greenland fjords from a multi-tracer analysis"

June 15, 2026

## 1 Summary of Content and Reviewer

The authors present a thorough characterization of 2 north Greenland fjords using a range of hydrographic, tracer, and isotope measurements. They characterize the distinct water masses and their likely sources, as well as addressing likely water modification pathways. In discussion they compare and contrast the fjords well, using the observations and the existing literature well.

As a reviewer I have experience modeling fjord circulation and iceberg/mélange dynamics in Greenland, though not this far North. I have experience using data products like those produced here, but not collecting them. My comments will focus on the discussion and analysis of these measurements, but I will avoid commenting on the design of the experiment and their methods for collecting data, though they seem reasonable to me.

## 2 Overall Feedback

Overall I find this to be a well scoped and well written manuscript. The data set is rich and well presented, the figures and text are well formatted and relatively straightforward to understand. The selection of tracers and isotopes was well explained. Overall I find the manuscript fit for publication, with a few minor comments on potential expansion of the discussion at the authors discretion.

## 3 Icebergs and ambient melt as a source of deep mixing, SMW, and AIM

It is mentioned on line 392 eventually, but icebergs not only contribute significantly to melt water budgets, but also contribute to vertical velocity and potential mixing (e.g. FitzMaurice et al., 2017; Kinne et al., 2025). Additionally, ambient melt on the glacier face as well as iceberg faces can directly injection meltwater at depth (i.e. not carried up to the surface layer with a major SGD plume) (Jackson et al., 2020). This can add some nuance to how glacially modified waters can end up in the subsurface layers, Line 290 for instance. Similarly, this physical mechanism is relevant for discussion around Line 381. It is interesting to see values of SMW remain high above 400m (Fig 5d), I wonder if this can be compared to estimated/observed iceberg drafts?

## 4 Physical Geometry of the Fjords

The maps in figure 1 are useful, but it could be useful to discuss the physical geometries of the fjords and have a discussion on the degree to which differences in geometry could impact the interpretation as well. I think the fjords are largely similar and geometry is not a major driver of differences, but this will be useful context for those not familiar with this region.

## 5 Line by Line Comments

These are hopefully useful to the authors, but do not require individualized responses.

Line 32 Most citations are order by year, but this first citation is alphabetically sorted.

Line 35 Perhaps 'sills and troughs, which can restrict or allow inflow, respectively.' to clarify which features cause which behavior?

Line 107 Perhaps a citation/doi for TEOS-10 for readers less familiar with this standard?

Line 118 Can you elaborate or cite these '3 internal standards'?

Line 140 Is there a rough time frame for how long AIM must be in contact with the crust to become geochemically distinct? 1 year? 10,000 years?

Line 229 Numerous commas here make this clause confusing, perhaps it can be reworded more directly?

Line 360 Could you elaborate on how much sampling timing could have impacted your results and/or how much the collected data truly captures differences between the systems?

Line 430 Including your plotting scripts in the data file, or as another code source (e.g. hosted on zenodo.com) could increase reproducibility. The data is well documented on `bolin.su.se`, so again this just a suggestion and at the author's discretion.

## References

FitzMaurice, A., Cenedese, C., and Straneo, F. (2017). Nonlinear response of iceberg side melting to ocean currents. *Geophysical Research Letters*, 44(11):5637–5644.

Jackson, R. H., Nash, J. D., Kienholz, C., Sutherland, D. A., Amundson, J. M., Motyka, R. J., Winters, D., Skyllingstad, E., and Pettit, E. C. (2020). Meltwater Intrusions Reveal Mechanisms for Rapid Submarine Melt at a Tidewater Glacier. *Geophysical Research Letters*, 47(2):e2019GL085335.

Kinne, K., Sanchez, R., Siegelman, L., Straneo, F., and Hughes, K. (2025). The Seasonality of Greenland Iceberg Melt and Its Influences on Fjord Properties and Dynamics. *Journal of Geophysical Research: Oceans*, 130(8):e2025JC022587.