Response to reviewer 2 for *The Impact of Ice Structures and Ocean Warming in Milne Fiord* by Bonneau et al. https://doi.org/10.5194/egusphere-2024-3651

We thank the reviewer for their comments which improved the clarity and the reach of the manuscript. We have added more details on the implementation of the subglacial discharge in the model and have made a concerted effort to connect this study to other sites in the Arctic.

Reviewer's comments in **dark bold**

Author's answers in blue

From the manuscript in *blue italic*

Reviewer 2

This paper investigates recent and anticipated future changes of the distribution of marine glacier ice in Milne Fiord. Using a combination of observations and ocean-circulation modelling, the authors examine how glacier retreat affects subsurface ice melt. The removal of the ice shelf and the ice tongue is found to have only a small impact on the melt at the grounding line of Milne Glacier.

The paper is well structured and written, and should be published after some minor revisions.

Comments

1) It would be useful to connect the present study to work in North Greenland (see e.g., Hill et al., 2017), as similar conditions prevail in this part of the Arctic. The paper cite many studies from Antarctica and Southern Greenland, but Petermann is the only glacier in North Greenland mentioned. In the discussion around L24, it would be relevant to cite Jakobsson et al. (2020) and Nilsson et al. (2023), who investigate the role of sills for blocking inflows of Antarctic Atlantic Water in north Greenlandic fjords. On L70 Thwaites is mentioned, but also C. H. Ostenfeld Glacier in North Greenland has a recently disintegrated ice tongue (Hill et al., 2017). And Ryder and C. H. Ostenfeld glaciers are situated in fjords that terminate in the perennially sea-covered Lincoln Sea (Hill et al., 2017).

Thank you for this suggestion, it is a good idea to add more information and comparison to northern Greenland fjords. We have used the suggested studies and others.

We have added comparison to Ryder, 79N, Petermann Glaciers and other north Greenland tidewater glaciers in the introduction and discussion.

We have added comparison to Tracy, Steensby and C.H. Ostenfeld glacier tongues in the site description and discussion.

2) Please describe the implementation of the subglacial discharge in the model in section 3.1; this issue is commented on around L355.

We agree more details are warranted. We added on the location of the subglacial discharge outlets. This section now reads:

The amount of subglacial discharge is determined by integrating the negative surface mass balance from RACMO2.3 (Noel et al. 2018). Two subglacial discharge outlets are used (in the IcePlume package), both coincident with depressions in the bathymetry (Section 4.2). While the exact number of subglacial discharge outlet is unknown, observations showed one outlet in a bathymetry depression on the west side of the fjord. Another one was therefore added in a depression on the other side of the fjord. Subglacial discharge is discharged equally in the two outlets.

3) Check the consistency of the dimensions in Eqs. (5, 6); or state that delta x and delta h are velocities (?)

Good point, we have added the units (we here use m a^{-1}).

4) Table 1, 90-220 m Q_{ex}: 2.8ex10^8 -> 2.8x10^8

Yes, thank you

5) L273: cie shelf -> ice shelf.

Yes, thank you

References shared by the reviewer

Hill et al., 2017: A Review of Recent Changes in Major Marine-Terminating Outlet Glaciers in Northern Greenland. doi: 10.3389/feart.2016.00111

Jakobsson et al., 2020: Ryder Glacier in north-west Greenland is shielded from warm Atlantic water by a bathymetric sill. doi: 10.1038/s43247-020-00043-0

Nilsson et al., 2023: Hydraulic suppression of basal glacier melt in sill fjords. doi.org/10.5194/tc-17-2455-2023

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