

## Anonymous Referee #1

*The focus of this paper is on the sea-level rise response from localized melting on regions of a buttressing ice shelf. The melting is applied either at the grounding line or along the lateral edges where the topography increases and the downstream flow is slower (Figures 2 & 3), i.e. the shear margins. The difference between the effects of additional melting at the grounding line versus melting below the ice shelf shear margins is notable. And it make sense from a force balance perspective, thinning the shear margin lowers the buttressing balance and the ice stream will accelerate. Similarly, if we considered a unbuttressed ice shelf with a single pinning point, it would be clear that melting at the pinning point would affect the flow more than melting at the grounding line. Although it is an intuitive result with few actionable consequences, I would tepidly support publication in The Cryosphere.*

We would like to thank Referee#1 for their willingness to review our manuscript, the helpful comments and the constructive criticism. We are glad for the referee's positive assessment of our study and are happy to hear that they would support the publication in TC. We are gladly willing to implement all the suggestions and points raised by the referee (see below).

### Additional thoughts:

- *the force balance argument described above doesn't appear in the text and the description of the difference between the grounding line and shear margin melting is too thin.*

We thank the referee for this helpful comment. We will add the mentioned force balance argument and will expand the description of the difference of the two melt patterns as suggested by the referee.

- *I find the 'three dimension' description of the simulations as misleading, since SIA/SSA hybrid can have three-components but is still depth integrated.*

We are willing to change the wording according to the referee's suggestion.

- *the second sentence in the abstract is missing a comma before 'the melting'.*

Will be corrected.

- *what is solid-ice? I would replace this with 'grounded' both in the abstract, introduction, and anywhere. Right? Solid, as opposed to what?*

We are glad to change the wording as suggested by the referee.

- *it seems like the SM1 is nearly as effective at instigating ice flux as SM2, yet the text in the second paragraph on page 5 is confusing as compared to Figure 4.*

We think the confusion here is based on the difference between the absolute ice-flux response (mentioned in lines 11-12 on page 5) and the relative ice-flux response (mentioned in lines 13-15 on page 5 and shown in Fig. 4). We will revise this paragraph for clarification.

- *lastly, it seems like the authors have discovered for themselves why shear margins are important. Yet I know that others have worked on shear margins, such as Lhermitte et al (2020). I suggest a clearer*

*connection to the existing literature.*

We are thankful for this hint and will revise our manuscript in terms of a deeper connection to the existing literature, as the referee suggests

S. Lhermitte, S. Sun, C. Shuman, B. Wouters, F. Pattyn, J. Wuite, E. Berthier, and T. Nagler. *Damage accelerates ice shelf instability and mass loss in Amundsen Sea Embayment*. *PNAS*, 117(40):24735–24741, 2020