**Anonymous Referee #3**

*The manuscript "Shear-margin melting causes stronger transient ice discharge than ice- stream melting according to idealized simulations" by Feldmann et al. investigates a relatively straightforward question: where does melting of ice shelves matter most? A lot of previous work has focused on the along-flow direction when addressing this question, while the authors focus on the across-stream direction. They apply localised melt either directly at the grounding line or in the shear margins. Maybe unsurprisingly they find that persistent melting matters most where the ice is slowest, which is in the shear margins of an ice shelf in their experiments.*

*The paper builds heavily on Reese et al. (2018) and is similar to Zhang et al (2020) and thus not overly novel in its approach. Nevertheless, I think it is worth pointing out that spatial variation in melting matters and to try to identify regions where melting is most influential.*

We are grateful for the willingness of Referee#3 to review our manuscript and appreciate their helpful suggestions and the constructive criticism. We agree with the referee that our approach is related to the studys cited by the referee, i.e., we investigate grounding-line flux sensitivity to basal ice-shelf-melt perturbations. However, we would like to note that our study is based on transient simulations. Thus our results provide insight on the time-dependent glacier response, which is not covered by the two mentioned studies. For instance, our simulations show a clear qualitative difference between the quasi-instantaneous response and the longer-term response.

*My main points of criticisms are:*

- *I think a more systematic investigation involving more locations would have greatly benefitted the paper and would have allowed a more systematic analysis of the role of distributed melt.*

  We agree with the referee that a more systematic investigation of melt regions would indeed be very interesting. However, we think that this would be beyond the scope of our study. Our work is intended to focus on the response difference to the two mentioned dynamically very different melt regions and the underlying physical mechanism which from our point of view deserves a study on its own. Therefore, and in the light of the considerable computational resources that have already been used for the conducted simulations, we would like to refrain from running further experiments. We would like to add a sentence to the conclusions section, stating that a systematic, transient analysis of the outlets of the Antarctic Ice Sheet would be an interesting next step.

- *The findings of the paper are really quite straightforward, and I don't see the need for 8 figures in the main text plus an additional 5 in the appendix to convey the results. Figures 1, 3, 4 and subsets of figures 5 and 6 would in my opinion suffice.*

  We see the referee's point here. At the same time, we think that omitting one or several figures would indeed mean a loss of information to the paper. For instance, Fig. 2, which shows the ice-velocity field, visualizes the regions of the ice stream's shear margins that are central to our study. Neglecting panels from Figs. 5 and 6 would neglect information regarding time evolution changes in the ice velocity and thickness. Fig. 7 covers the differences between the quasi-instantaneous and the longer-term response, which we deem very important. Fig. 8 summarises the flux sensitivity of all conducted experiments. Nevertheless, if the number of figures turns out to be a relevant point also for the editor, we would offer to shift Figs. 2, A1 and A3-A5 to the Supplement.

- *Ice stream shear margins are interesting for many authors because they are regions of enhanced warming with implications for ice flow and stability of ice shelves. I think this could be mentioned in the*

*text.*

We thank the referee for this valuable hint. We will include this information in our revised manuscript.

- *The paper title is a bit misleading -- being familiar with the large body of literature on ice stream shear margins, I didn't expect the paper to solely focus on isothermal ice shelf margins.*

  We understand the point raised by the referee here. When choosing the manuscript title we decided to use the term “idealized simulations” in order to account for the simplified nature of our simulations and we would wish to keep it like that. However, if the referee/editor thinks that this is a crucial issue, we could imagine to change the title such that it states that the simulations are isothermal.

- *The paper is well-written, but somewhat selective (not to say negligent) in its discussion of existing literature. Relevant studies worth mentioning include (just to name a few)*
  - *Alley KE, Scambos TA, Alley RB, Holschuh N. Troughs developed in ice-stream shear margins precondition ice shelves for ocean-driven breakup. Science advances. 2019 Oct 1;5(10):eaax2215.*
  - *Alley KE, Scambos TA, Siegfried MR, Fricker HA. Impacts of warm water on Antarctic ice shelf stability through basal channel formation. Nature Geoscience. 2016 Apr;9(4):290-3.*
  - *Hunter P, Meyer C, Minchew B, Haseloff M, Rempel A. Thermal controls on ice stream shear margins. Journal of Glaciology. Cambridge University Press; 2021;67(263):435–49.*

  We thank the referee for these important references that we missed. We will gladly add them to our manuscript and discuss them.