

Note to Editor:

Dear Editor,

We would like to thank both Reviewers and the Editor for their time with our submitted manuscript egusphere-2022-236, entitled “Geothermal heat flux is the dominant source of uncertainty in englacial-temperature-based dating of ice-rise formation”. Overall, we believe that the comments of both Reviewers are easily addressable and we submit a detailed plan outlining how we intend to address these. We look forward to your feedback on the revised manuscript and ultimately seeing our work published in *The Cryosphere*. I shall look forward to hearing from you in due course.

Sincerely,

Aleksandr Montelli

Reviewer 1 conclusive remarks:

“The work is a useful contribution and improves our understanding of the limitations of ice-rise grounding from englacial temperature profiles.”

Major comments

We plan to add additional discussion (and potentially a few more sensitivity experiments) that will explore the choice of vertical velocity approximation.

We will expand current discussion and focus specifically on other locations where the accumulation rates are greater than in Ross Embayment region used in this work. We agree with the Reviewer that this would provide guidance of where it is promising to obtain englacial temperature profiles and where it is unlikely to be useful.

In this paper, we assume negligible horizontal ice flow, and expanding the domain into two dimensions might be beyond the scope of this paper that focuses on 1D thermal modelling. However, we plan to add further discussion of the potential impact of horizontal advection and effects of the upstream flow on the temperature profile, with reference to specific locations where such effects are significant and should be kept in mind when choosing future borehole sites.

Typos and values in Table 1 will be checked and corrected. We agree with the Reviewer that the uncertainty of these values and the uncertainty of not treating them as temperature-dependent needs to be mentioned and we plan to discuss these aspects in the revised version of the paper.

Minor comments

We believe that labelling each of the axes might look slightly redundant, but will consider applying Reviewer’s suggestion.

Fig. 5 caption will be rephrased to avoid redundant repetition. Values in the figure itself will be checked for consistency.

Neuhaus reference will be updated.

Heating effects from friction during the regrounding will be mentioned in new discussion.

ApRES vertical velocity results from Dome C will be mentioned, and new reference added: Buizert et al., 2021, Science, “Antarctic surface temperature and elevation during the Last Glacial Maximum”