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 2 conclusive remarks:

"The manuscript is clear in its purpose, well written and requires only minor updates. "

Planned response to the major comments of Reviewer 2

The boundary conditions applied in the Methods section, previously referred to Dahl-Jensen et al. (1999), will be clearly outlined in the revised version of the manuscript. This will make it easier for the reader to follow the methodology presented in the paper.

Forward Monte-Carlo and the inverse MCMC simulations will be separated more clearly in the Results and Discussion sections. As suggested by the Reviewer, we will refer to forward Monte-Carlo simulations as sensitivity experiments to avoid confusing them with MCMC inversion.

Figures will be updated according to the guidelines (changing capital letters to bracketed).

Figures 3 and 4 and captions to them will be clarified according to the Reviewer's suggestions; however, we believe that both figures should be presented fully as they emphasise multidimiensionality of the problem.

We will add information about effects of accumulation change for a 500 m thick ice into the Section 3.2.

We will expand the discussion on the effect of uncertainties in accumulation rates, surface temperatures and other parameters on our results with respect to currently available data over Antarctica. This also relates to the Reviewer's comment about the parameter values, and accumulation rates in particular.

Planned response to the minor comments of Reviewer 2

2.1.1. Model equations – First sentence will be reworded for clarity.

w_s will be defined in Equations (3) and (4).

Table 1 will be expanded with numerical values of our forward and inverse modelling runs.

Section 3 will be checked for correct numbering.

Results 3.2 Steady state and transient runs will be separated into two subsections for clarity.

The Figure 5 caption will be shortened accordingly.

Few typos will be corrected.

References will be checked for proper formatting.