

Review of Wang et al. (2025) ‘Quantifying Temperature-sliding Inconsistency in Thermomechanical Coupling: A Comparative Analysis of Geothermal Heat Flux Datasets at Totten Glacier’

Summary

This paper presents a new set of metrics to assess the inconsistencies between modelled basal temperatures and observed surface ice velocities in ice-sheet simulations, and applies them to evaluate the likely shortcomings of eight different geothermal-heat-flux datasets in the Totten basin in East Antarctica. The paper finds that its results in this regard agree with previous work that assessed the eight datasets using radar specularly observations to determine the presence of basal water and thus whether the ice was warm or cold, which suggests it is indeed performing well in identifying problem areas, and validates the method as a way of assessing the consistency of simulation results.

I reviewed the first version of this paper and had some relatively minor comments of a structural nature. I am pleased to see that the authors have addressed these and I think the clarity and flow of the paper are now much better. I have only a couple of small further comments related to the new material added in response to the first round of review, but, otherwise, I think the paper is ready for publication at this stage. So, minor revisions, but no more than that!

Page and line numbers refer to those in the clean version of the submitted manuscript.

Major Comments

- None

Minor Comments

- Section 2.2-2.3: I know why these sections are here, having read all the reviews, but, if one hasn't, these both intrude rather awkwardly into the paper, seemingly for no reason. I think the easiest way of solving this might be to just add a sentence to the start of Section 2.2 saying something like ‘We validate our work in this study by comparing our ranking of GHF datasets to the observationally constrained ranking of Huang et al. (2024). For readers not familiar with this paper, we provide here a brief summary of their method and, in the next section, clarify the distinction between their paper and the present study.’ Then at least readers will understand the point of these sections and the paper will flow a bit more naturally.
- Section 4.2-4.3: I might suggest swapping the order of these two sections. 4.3 follows on naturally from the discussion of possible mismatch causes in 4.1, so having the unrelated relatively technical section on sensitivity that is 4.2 in-between them feels a little odd.