

## ***Interactive comment on “The impact of model resolution on the simulated Holocene retreat of the Southwestern Greenland Ice Sheet using the Ice Sheet System Model (ISSM)” by Joshua K. Cuzzone et al.***

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This study examines the effect of model resolution on simulating the Holocene retreat of southwest Greenland using ISSM. The study is well designed and does a good job of highlighting the impact of resolution on the results. The authors conclude that high resolution is particularly valuable in regions with complex bedrock terrain and fjords. I recommend publication after only minor revisions.

It is quite interesting how different retreat histories are obtained in the south with the

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different resolution models. But then it also surprised me that none of the models actually compared well with geological constraints. Given this, it would be valuable to be able to visually compare the simulations to the constraints, for example, by adding some exposure ages of known locations to Figure 7.

I would suggest simplifying the Eqs. 2 and 4. Basal friction is important and the broader description here is relevant. However, it would be simpler to remove the exponent  $r$  and the term “ $|V_b|^s-1$ ” since they are effectively not used. Also, the text for Eq. 4 is a bit ambiguous – does the limit of 300 apply to  $\lambda$  or  $k$ ? If it is applied to  $\lambda$ , as it appears in Eq. 4, perhaps it would make more sense to apply this limit in Eq. 3 directly.

Finally, while the paper is generally well written, I would recommend additional proof-reading before resubmission. Some of the discussion seems repetitive, for example.

Minor comments

P3, line 18: of model resolution on => on model resolution for

P4, line 8-13: Consider rephrasing here (delete although).

P4, line 24-27: “Because . . .” <= consider removing this sentence or moving it to introduction, as this was already made clear and seems more related to the motivation.

P6, line 3: “Surface air temperatures . . . transiently” => “Transient surface air temperatures”

Reference: Tarbone et al. => Tabone et al.

Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2018-249, 2018.

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