

Interactive comment on “The GRISLI-LSCE contribution to ISMIP6, Part 1: projections of the Greenland ice sheet evolution by the end of the 21st century” by Aurélien Quiquet and Christophe Dumas

Anonymous Referee #2

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In this manuscript, the authors report on their ISMIP6 Greenland projections with the model GRISLI. The paper is easy and straightforward to follow. Its scientific value beyond the community publication (Goelzer et al., 2020, in press) lies in a more detailed description of the set-up of GRISLI, a more detailed analysis of the results and the fact that the entire suite of ISMIP6 experiments (Tier 1-3) are dealt with.

Overall, I found the results interesting and the presentation adequate. I'd only like to raise some issues that should be dealt with as follows:

C1

The English writing clearly has some room for improvements. I am not going to point out all the issues, but just some examples from the first page: P. 1, l. 3/4: "an increase_d_ mass loss". P. 1, l. 5: "the largest single source contribution _after_ the thermosteric contribution". P. 1, l. 19/20: Assessment of projections? Either "need for assessment of future SLR by projections" or "need for projections of future SLR". P. 1, l. 22: Strange formulation: "from changing boundary conditions such as climate change". Before resubmission, the entire manuscript should be very carefully proof-read by a (near-) native speaker or a professional language editing service.

Throughout MS (e.g., p. 1, l. 10, l. 14): "mmSLE" -> "mm SLE"

Throughout MS (e.g., p. 2, l. 4): "in term of" -> "in terms of"

P. 1, l. 17/18, "most-likely amplitude exceeding 1 metre in 2100": This is not what has been found in the ISMIP6 ensemble projections (Goelzer et al., 2020, TC, in press; Seroussi et al., 2020, TC, in press). Even with the most sensitive model results, it is less than half a metre combined. At some point in the paper, this should be mentioned.

P. 3, l. 7, 17: Add commas after the displayed equations.

P. 3, l. 11-13: The description of the SIA and SSA is over-simplified. Starting from full Stokes, in both cases, some horizontal and some vertical derivatives of the components of the stress tensor are neglected. In very compact form, this is shown in the tutorial at <http://doi.org/10.5281/zenodo.3739009>, p. 22 (for SIA) and p. 24 (for SSA).

P. 3, l. 14/15: Is floating ice included in the simulations? If so, what is assumed for the sub-ice-shelf melt rate?

P. 3, l. 16: "till_layer_"?

P. 3, l. 24ff: 30 kyr is likely not long enough to reach thermal equilibrium for an ice body as large as the Greenland ice sheet. This should be commented on. Further, does the inferred sliding depend on the basal thermal state, or is basal sliding applied everywhere?

C2

P. 6, l. 18ff: I cannot see it so well in Fig. 2, but it seems to me that the simulations do not include/reproduce the floating ice tongues (at least off the NEGIS). If so, this may also be partly responsible for the velocity misfits because buttressing effects are missing.

P. 9, l. 7: It would be interesting to quantify this. How large (e.g., in per cent) is the difference between full forcing and (AO+OO)?

P. 10, l. 15: This is the first time in the paper that the enhancement factor is mentioned. It should be defined and specified earlier in the paper (section 2.1).

P. 11, l. 18/19: This should be made a proper reference and cited here as Quiquet and Dumas (2020). And, BTW: _Z_enodo.

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2020-139>, 2020.