

Interactive comment on “Results of the Marine Ice Sheet Model Intercomparison Project, MISMIP” by F. Pattyn et al.

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General Comments

This paper presents the results of an intercomparison effort that focuses on the behavior of grounding line migration in 2-D marine ice sheets models, an effort motivated by a recent analytical solution for the ice flux across grounding lines. The set of experiments will become an important benchmark for marine ice sheets, and illustrates how grid resolution, grounding line implementation, or the type of approximation to the full-Stokes equations affects grounding line migration. The models participating in the effort cover a wide range of marine ice sheet models, and the paper therefore provides an excellent reference for what can or should not be done when developing new 2-D marine ice sheet models. I appreciate that the conclusion addresses a potential limitation for this

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benchmark, namely that the boundary layer theory and hence the experiments apply to marine ice sheet in which rapid sliding occur in the vicinity of the grounding line, and therefore the suggestion that model disagreement/spread in behavior is expected to increase as basal sliding decreases.

Specific Comments

1. Does the paper address relevant scientific questions within the scope of TC? Yes
2. Does the paper present novel concepts, ideas, tools, or data? Yes
3. Are substantial conclusions reached? Yes
4. Are the scientific methods and assumptions valid and clearly outlined? Yes
5. Are the results sufficient to support the interpretations and conclusions? Yes
6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes, apart from the comment p 278, l5: "is also included as supporting online material". I have not been able to find the supporting online material, but maybe it is hidden somewhere on the cryosphere website. Otherwise the experiments are described on the website mentioned in the main text.
7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? Yes
8. Does the title clearly reflect the contents of the paper? Yes
9. Does the abstract provide a concise and complete summary? Yes
10. Is the overall presentation well structured and clear? Yes
11. Is the language fluent and precise? Yes
12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Yes

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13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?

Yes, below is a list of minor comments:

P272, I1: do you have 26 or 27 flow-line models? I count 27 entries in Table 2

P278, I5: see comment 6

P280, I7: Is it worth using as Section title “Grid spacing and time steps (Mode M1, M2, M3)”, so that it is easier for the reader to find quickly where the modes are defined.

Exp 3: I am confused about the number of models that took part in this experiment. The text p285, I22 “. . . result of each of the models” or in the caption for figure 5 “all models, only the best Mode for each of the models” suggest that according to table 2 one would expect a plot in figure 5 for the models AVI, BDF, FNI, FSA. Are these not included in figure 5 because they have not completed the experiment? Maybe you could add in Table 2 an entry that states which experiment was completed by the models, or a statement in the text under section 4.2 that mentions that not all models participated in this experiment.

In the text, sometimes “Full-Stokes” is used and sometimes “full Stokes”, see for example p 288, I9, or p288, I17 (but there are a few other places). Can you use one or the other?

Figure 2, plot of GRL position against $1/A$: the green line is hard to see when it overlaps the bleu line, would using a red dashed line for example improve the graphics?

Figure 5: I understand that to maximize the space for your plot, you do not want to include horizontal and vertical labels for all of your plots. However, you do have space for vertical text on the left hand side of plots labeled “FS. . .GDU1”, “SIA. . .DPO2”, and “ASY. . .DPO1”. Similarly, you have space for the horizontal text “ $1/A$ ” beneath plots “SSA. . .CSC1”, “SSA. . .HGU1”, and “SSA. . .RHI1”

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14. Are the number and quality of references appropriate? Yes, but can you clarify in the text p273, l7, whether you are referring to Durand et al. 2009a or 2009b, or both?

15. Is the amount and quality of supplementary material appropriate? See comment 6

Technical corrections:

See comments 6, 13, and 14 above

Interactive comment on The Cryosphere Discuss., 6, 267, 2012.

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