The Cryosphere

Discussions

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Interactive comment on "Results of the third Marine Ice Sheet Model Intercomparison Project (MISMIP+)" *by* Stephen L. Cornford et al.

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In this manuscript, Cornford et al. report the results from MISMIP+, the third in a series of intercomparison exercises for marine ice sheets. It features a 3D channel geometry that allows buttressing of grounded ice by an ice shelf and a retrograde bed slope in a part of the domain. Several experiments that produce grounding line retreat and re-advance are considered. The study benefits from a variety of contributing models/model variants that cover different treatments of the stress balance and basal sliding as well as different numerical techniques and resolutions. Overall, I found the results very interesting and the presentation adequate. I'd only like to raise some minor issues that should be dealt with as follows:

All multi-panel figures: I'd suggest to label the panels by a, b, etc., and refer to these labels in the captions, rather than using 'top left' etc.

Line 12, "All ice sheet models are based upon some approximation to Stokes flow": This might be misunderstood as no models use _full_ Stokes.

Lines 22-24, "community exercises comparing ice stream and shelf models": Seroussi et al. (2019) and Goelzer et al. (2018) are the InitMIP-Antarctica and Greenland papers, respectively. These exercises were about comparing _ice sheet_ models, which usually include ice stream and shelf dynamics, but the focus was not on the ice stream and shelf components.

Line 47: configuration_s_

Caption of Fig. 1: "MIMSIP+" -> "MISMIP+"

Line 50: Delete comma before "saw".

Line 59: "about" -> "with respect to" (?)

Line 105: "the Weertman (1957)" -> "the Weertman (1957) _rule/sliding law_"

Lines 105-123: Somewhere around here the findings of the study by Gladstone et al. (2017, https://doi.org/10.5194/tc-11-319-2017) should also be mentioned: keeping the basal friction continuous across the grounding line is beneficial for simulating marine ice sheets/grounding line dynamics. Weertman-Budd-type sliding (their Eq. (1)) is another alternative to achieve this.

Line 254: Missing space after "years".

Lines 273-274: The description of the Úa model could be a bit more comprehensive (along the lines of the other descriptions).

Figure 3, right panel: If I interpret this correctly, some of the results fall outside the required interval of 450 ± 10 km. Does this have any consequences?

Line 294: "lines intersect with"

Line 325, "450 ± 15 km": In section 2.2, a requirement of 450 ± 10 km was formulated. How does this go together?

Lines 327-329: What are "distinctive" vs. "conventional" numerical methods/treatments?

Lines 426-433: I'm not sure whether I got this right. Is the recommendation that subgrid melt schemes should not be used?

Lines 439-440: "the distinction ... even between approximate models and full Stokes models, was minor": Fig. 9 (left panel) showed that there was a distinction ("much lower rate of advance"). This seems to be contradictive.

Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2019-326, 2020.