

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

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Response to Prof. Saito’s review

We thank Prof Saito for this supportive and thorough review and have made a number of modifications in response. We respond to specific points made in the review (black text) in blue text below.

This paper present the results of MISMIP+, a new model intercomparison of marine ice sheet models. I think this paper is fairly well written with some exception below, and can be accepted with minor revision.

L23 to L38: MISMIP+ is the first experiment among MISMIP series, which changes the

C1

mass balance. I think this should be emphasized.

We added this point to the paragraph beginning in L39

Figure 1. Remark at top or bottom as $t=0$ may help. The vertical directions show a schematic view of ice volume (bigger ice sheet towards upper), which can be mentioned. The subexperiment names (lce1r, lce1rr, lce1ra etc) should be mentioned in the figure.

$t = 0$, $t = 100$, $t = 200$ markers were added to the diagram. The sub-experiment names were added too. The relationship with vertical direction and grounding line advance/retreat was mentioned in the caption - it seemed misleading to place e.g an up arrow on the diagram because it might suggest that the experiments start with different ice volumes.

Eq (1) and Table 1. I try to draw the bedrock map using the equation and values in the table, but I cannot reproduce the figure. I suspect the signs of B_n are all opposite. If that is correct, elevation around (0,-40) is higher than +300m, which is not clear using the present contours.

Yes, the signs were confused. More contours (+5 m, and + 205 m) were added so that it is clear that elevation around (0,-40) is well above sea level (+349 m is the maximum value)

L46 in Asay-Davis et al. (2016).

corrected

L56. Need to include somewhere around here that the x -direction is toward the flow while the y is across, or at least refer Figure 2.

Added a sentence: Ice flows in a direction roughly parallel to the x -axis from $x = 0$ toward $x=640$ km, so that we will refer to x as the along flow direction and y as the lateral or across flow direction.

C2

Eqs.(4) (5): alpha is not defined.

We added detail on α^2 , the coefficient of friction in a Coulomb friction law.

Eq.(7) confusing. max is outside tanh, but not clear.

A bracket was introduced to more clearly delimit the argument of tanh: $m_1 = 0.2 \tanh\left(\frac{z_d - z_b}{75}\right) \max(-100 - z_d, 0)$

L145. It is not clear whether m_2 is applied only at the base of ice shelf or not. It matters for the regions close to the lateral walls.

A clarification was added to the definition of m_2 , stating that it was applied to ice shelf regions only.

Figure 3. Horizontal labels are missing. x(km) and t(yr)?

Yes - corrected

Figures 4 and 11 top left. Ice1r (t=0) and Ice2r (t=0) is identical by definition, which may be better to mention.

A note was added to the caption of fig 11, which now includes a sentence: The Ice2r experiment starts (as does the Ice1r experiment, see fig. 4) from the Ice0 steady state position

L313 less than 10km. But, this value is correct? It looks around 20km spread for yellow lines.

Yes, around 20 km. The text was modified accordingly

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