Reply to editorial and reviewer comments

We thank the editor and the reviewers for their very valuable feedback to our manuscript. Their critical comments have substantially improved our study.

We understand that both reviewers would have appreciated more explanations why the simulated firn temperatures of the two models vary so strongly. We acknowledge that this is an important aspect, which hopefully will be addressed in subsequent work.

Regarding the requested minor modifications, we have modified lines 344-345 as follows:

"The substantial differences between runoff limits simulated by MAR and IMAU-FDM (e.g. Figs. 3 and 4) could be caused by (i) differences in RCM simulated accumulation or melt, or (ii) differences in the parameterizations of firn and firn hydrology. A third possible reason are the differences between MAR and IMAU-FDM firn temperatures. We will discuss this aspect in the context of the differences between the firn parameterizations."

With this modification, the differences in firn temperatures are now mentioned as a potentially important factor much earlier and more prominently. We prefer to discuss the potential influence of the differences in firn temperature together with the influence of different firn parameterizations, mainly because differences in simulated firn temperatures are closely linked to differences in firn parameterizations.

Furthermore, we noticed that there was still a sentence in the manuscript that referred to Figs. 3 and 4 showing RACMO runoff limits. However, upon reviewer requests RACMO 1 km runoff limits had been removed from these figures in the previous round of revisions. Hence, we now removed the following sentence (lines 431 to 433):

"While RACMO has much fewer firn layers, the runoff limit is similarly immobile (Figs. 3 and 4) because RACMO uses a very similar bucket scheme with the same parameterization of irreducible liquid water saturation and a similarly deep firn column."

Editorial comments:

Dear authors,

Thank you for revising your manuscript thoroughly. The reviewers think your paper is much improved after revision. I'm happy to accept it for publishing in TC.

The reviewers raise concerns about the temperature discrepancy between the models in their previous review reports. The reviewer #1 suggested to further discuss the

discrepancy in the sentence in L 344-345 (see the review report). I agree with this suggestion. So please consider adding the discussion before finalizing your paper.

Best,

Dr. Kang Yang

Editor, The Cryosphere

Reviewer 2: General Comments:

I thank the authors for their consideration of my critiques and making associated edits. While I still find the lack of explanation of the large temperature discrepancies unsatisfying, I recognize that a full analysis of those differences is outside the scope of the present work (and likely a large enough task to warrant its own study). I appreciate that that language regarding this temperature difference has been edited to more clearly indicate that the reason is yet unknown.

I recommend that this paper be accepted as is.

Reviewer 1

It is maybe a bit unfortunate that it is not clear where the discrepancy between the models in simulated firn temperatures come from, but it is what it is. I think it is substantial improvement that this is now mentioned and discussed as a reason for why runoff limits vary between the models.

One suggestion is to also include it in the sentence in L 344-345: "The substantial differences between runoff limits simulated by MAR and IMAU-FDM (e.g. Figs. 3 and 4) could be caused by (i) differences in RCM simulated accumulation or melt, or (ii) differences in the parameterizations of firn and firn hydrology."

I would say that it could also be caused by the discrepancy in simulated firn temperature, or in any case, related to the cause of this discrepancy.