Reply to comments by anonymous Referee (R1)

We would like to thank the reviewer for their thorough and valuable comments on our manuscript. We appreciate the opportunity to clarify and improve our work based on the feedback. Below, we provide responses to the comments.

General comments:

Comment: (1) I find some conclusions not evidently supported by the simulations. For example, 'While discharge from outlet-glaciers remains a substantial factor, the future evolution of the ice sheet is governed by mass loss due to changes in SMB.' First, this conclusion might be forcing dependent, i.e. if you use another ESM output as SMB forcing, does this conclusion stand? Second, the authors prescribed ice front retreat in the simulations to compare, although ice discharge is not the same as mass loss due to frontal retreat (calving), and frontal retreat is only one of many factors that can cause changes in ice discharge (others are like basal sliding, dynamical thinning).

Response: We agree that the results regarding the relative importance of SMB vs discharge is forcing dependent. Indeed, in our manuscript we have analyzed this partitioning for a range of different forcings as simulated by the ESM-scenario ensemble used in our study (see for example Fig 10). However, following both reviewers' suggestions, we aim to streamline the storyline of our revised mauscript to focus on the novelties (initialization, etc.), and therefore will omit this part of the study. Thus, we will also remove the corresponding sentence from the abstract.

Comment: (2) Methods description is quite general. For example, what does medium sensitivity mean and how is it defined? For the mechanisms that the authors are trying to explore, such as SMB-elevation feedback, it would be helpful to present the equations.

Response: We acknowledge the need for more in-depth description of our setup and the methods used. We will revise the manuscript accordingly and include more details about the retreat parameterization and the SMB-height feedback and its parameterization.

Comment: (3) The writing is easy to follow, but the logic is not always clear. For example, after reading the introduction, I don't see how these pieces of

work connect with each other to form one piece of story. There are other mechanics not explored in ISMIP6 (e.g., sliding laws, initialization methods) if the target is to compensate ISMIP6. Here, I by no means suggest more experiments, but organizing and streamlining the structure.

Response: We appreciate this feedback and have decided to restructure the manuscript to create a more coherent narrative. Following the suggestions of both referees, we decided to omit section 3.3.1 and instead focus on the novel initialization aspect and the impacts of the initialization on the projections, as well as to expand on the analysis of the historical period. Furthermore, we will adjust our introduction and conclusion accordingly and highlight how our results complement existing studies like InitMIP and ISMIP6.

Comment: (4) Some conclusions are presented without evidence. For example, the mesh convergence study was conducted and suggested 16km resolution is enough, but no figure to present this. I'm happy that the authors have done mesh convergence study to ensure a proper numerical setup, but I'd like to see these results presented (maybe in supplementary).

Response: We will carefully go over all conclusions, and check whether these are addressed in the results. We will also add further information to present the results of our mesh convergence study.

Response to specific comments: We thank the referee for their specific feedback and suggestions for improvement of the manuscript. We will include a more in-depth explanation of the setup and clarify the parts suggested by the referee (parameterization of SMB-height feedback, outlet-glacier retreat forcing, applied SMB). Moreover, we will include an analysis of the grid dependence of our results.

We believe these revisions address the reviewer's concerns and will significantly enhance the clarity and focus of our manuscript. We thank the reviewer again for the valuable feedback.