

## Responses to reviewer's comments: **Contrasting the Penultimate and Last Glacial Maxima (140 and 21 ka BP) using coupled climate-ice sheet modelling**

"First of all I would like to thank the authors for their considerable efforts in responding to my comments. Notably, the manuscript contains now some important clarifications concerning the choice of the SST forcing, the ice mask update methodology and a physical meaning of the model parameters. All these clarifications help to understand the model results. I also appreciate the stronger focus to the choice of the initial ice sheet and its impacts."

The authors would like to thank the reviewer again for the time they have put in to reviewing this manuscript and their constructive comments that have helped improve this work. We are pleased that the changes we have made have been accepted with minor revisions and have clarified the results. We have provided a point-by-point response to the minor comments below and updated the manuscript accordingly.

"I only have a few more comments:

- The specificity of the coupling that you now clarify L189-196 answers my main interrogation during my first review. I thank you for this addition. However, if I understand it correctly, this feature looks like a bug – or at least like a current model limitation. It certainly limits the ice sheet retreat for unfavourable conditions. If it is really the case, perhaps you can explicitly mention that it will be (is?) fixed in the future."

- **This issue has been fixed in the model and we have mentioned this in the manuscript L199-200**

"- Tab. 2 it is true that the ice thickness is not available for the PGM (as explained in L. 286) while it is for the LGM, that is why you can more easily start for GLAC-1D reconstructions at the LGM. However, Glimmer needs presumably internal initial conditions such as temperature. Where does it come from in experiments V\_1 and Vc\_1?"

- The initial conditions that Glimmer requires are; topography, ice thickness and bedrock softness. The internal temperature evolution of the ice sheet is described by equation 19 in Rutt et al., 2009. For all simulations, the surface temperature boundary condition is set to the mean annual surface temperature up to a maximum of 0°C. The basal temperature is determined by the geothermal heat flux (which is  $-5e^{-2}$ ) and friction from sliding. **We have added a sentence explaining this in the model description section, L109-112.**

"- L.87-88 "...this study uses a coupled climate-ice sheet model (FAMOUS...)": replace by coupled atmosphere-ice sheet model."

- **This has been changed**