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Geoscientific
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Interactive comment on "

A new coupled ice sheet-climate model: description and sensitivity to model physics under Eemian, Last Glacial Maximum, late Holocene and modern climate conditions" *by* J. G. Fyke et al.

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Interactive Comment

Response to Anonymous Referee 2 regarding: A new coupled ice sheet-climate model: description and sensitivity to model physics under Eemian, Last Glacial Maximum, late Holocene and modern climate conditions

Jeremy Fyke, on behalf of the authors

We thank Referee 2 for his/her valuable comments to the manuscript. Replies to these comments are below.

1. The request to provide sub-ice-shelf melt rates and calving prescriptions in more detail is also mirrored by the other reviewer. Accordingly, we have included a fuller description of the melting/calving parameterizations, along with a clear reference to the Pollard and DeConto (2009) paper in which a complete description exists.

2. During model development, the coupled model was integrated asynchronously to equilibria for multiple millennia, for each climate state, and through multiple iterations of model development (as development proceeded). We therefore do not have in our posession a single time-dependent simulation that starts at modern or LGM equilibrium conditions and runs to Eemian conditions, that would give an

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indication of model response time in this case. However, we note that a supporting simulation (not described in the manuscipt) of an ice-accelerated simulation from the Last Glacial Maximum to the present day resulted in a quasi-equilibrium GIS by approximately 5000 years BP, suggesting that in this transient case the model response time is reasonable.

3. We thank the Referee for clarifying the SLR contributions of Otto-Bliesner et al. (2006). We have also noted in the manuscript the important point, that the model result of extensive Eemian ice in the south appears to conflict with the marine core results of DeVernal and Hillaire-Marcel (2008).

4. We appreciate Referee 2 directing us to the results of Greve et al. (2011). We have now included this reference in the manuscript to bolster support for our pattern of ice retreat during the Eemian, and note that further modelling work is required to better constrain the regional location of GIS ice loss during this period.

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