

Interactive comment on “The penultimate deglaciation: protocol for PMIP4 transient numerical simulations between 140 and 127 ka, version 1.0” by Laurie Menviel et al.

Anonymous Referee #1

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As one of the reviewers of the original submission of this manuscript for 'Climate of the Past', I have already evaluated the paper once before transfer to GMD. My advice was publication with minor revisions. Reexamining the paper now, I confirm this judgment and note that the few suggestions I had, have all been addressed in the present version of the manuscript. I came across a few more minor points that can be addressed without the need for me to see the paper again.

Minor points:

P1 L2 Consider defining an abbreviation for "penultimate glacial maximum", which occurs several times throughout the manuscript (p8, p20, p25). Note that in one instance

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it is referred to as "(MIS 6)".

P2 L21 The interglacial states are different, which is an important motivation for your experiment. Consider reformulation: Each of these long glacial periods was followed by relatively rapid multi-millennial-scale warmings into consecutive interglacial states*

P2 L22 Consider explicitly adding 'deglaciations' here instead of line 24-25: These glacial-interglacial transitions, also called deglaciations, represent the largest natural global warmings and large-scale climate reorganisations across the Quaternary.

P2 L23 Avoid confusion with term "climate sensitivity": Hence, they provide a great opportunity to study the interaction between the different components of the Earth System and climate*s* sensitivity to changes in radiative forcing.

P2 L24 "radiative forcing". At this point in the text, it has not yet been made clear that glacial-interglacial transitions are forced by orbital changes. So this comes a bit unexpected. Consider reordering.

P2 L30 Consider moving (Fig. 1) reference to the end of the sentence to avoid triple brackets.

P2 L32 You are back to discussing five deglaciations, but we are looking at figure 1 now. Consider revising.

P3 L4 Add 'concurrent' after "supported by the".

P3 L11 "in the *Northern* North Atlantic".

P3 L19 "Antarctic sea ice cover *change**"

P3 L24 "the last five deglaciations" or "the last two deglaciations".

P4 L16 You may want to somehow distinguish between the left and the right side in figure 1 to make your references more specific.

P4 L21 Replace 'find no evidence' by 'provide no evidence'.

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P4 L27 Suggest to change the order in this sentence to: The eustatic sea-level during MIS 6 is estimated at 90-100 m lower than present-day (Rabineau et al., 2006; Grant et al., 2012; Rohling et al., 2017), with a relatively large uncertainty range (Rohling et al., 2017). This compares to >130 m lower than present-day during the LGM (Austermann et al., 2013; Lambeck et al., 2014).

P4 L30 I don't think you have already establish that the Holocene follows the last deglaciation?

P5 L19 This sentence suggests that climate, vegetation and carbon cycle respond to changes in the oceanic circulation, but they also respond directly to ice sheet disintegration. Suggest to remove "and thus".

P5 L22 add 'forcing' after 'external' and 'dynamics' after 'internal'. Remove 'forcings'.

P6 L6 Remove 'the' before 'the'.

P6 L8 Reformulate " in concert with paleoclimate records"

P6 L9 Add "with coupled AOGCMs" after 140 to 127.

P6 L9 Suggest to start a new sentence: "This experiment provides a link" ...

P6 L11 Clarify why the forcings at 127 are different. Maybe this should be explained earlier on.

P6 L11-13 Consider adding section numbers to this manuscript overview.

P9 L13 Remove "shallow" here as it is mentioned in L14.

P9 L16 Reference Payne 1999 is undefined. Maybe Payne, A.J., 1999, A thermomechanical model of ice flow in West Antarctica : Climate Dynamics. 15, p.115 - 125. However, if this is a Weertman type sliding law, a reference to Weertman seems more appropriate, especially because Payne 1999 is for an Antarctic case. Please also check all the other references once more.

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P10 L18 Still unclear what the first 240 ka model run looks like and why that is needed. Is it identical to the first run?

P10 L21 Add "a" before '2-way'.

P10 L30 "Greenland loses its glacial grounded ice volume" is still confusing to me. It is not really possible to spatially distinguish glacial ice from the rest. I think you try to say that in this period the GrIS loses the ice mass in excess of the total present-day value and more. Maybe "In this simulation, the main phase of Greenland deglaciation occurs between 130 and 127 ka, during which Greenland first loses an ice mass of 2.9 m sle in excess of the total pre-industrial value, and then an additional 1.5 m sle."

P27 Data availability

I would reserve this section to information on where the forcing data can be accessed and move the instruction for the participating groups to elsewhere (e.g. section 8.4). I am not sure if a wiki page is acceptable as data source for GMD under the new editorial, but leave it to the editor to negotiate that.

P45 Table3

- Is it clear which variables are XY, XZ and so on, or should this be clarified in the table?

P50 Fig 1

- Is it necessary to clarify that the summer solstice happens at different moments in SH and NH?

- Could you clarify in the text what motivates the relative alignment of these time windows?

- "Unless specified *differently*, all ...".

P54 Fig 5

- Correct some plotting artefacts:

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- Close the grounding lines, e.g. in the NE in b)
- What does an inland closed circle GL mean? Does the calving flux go into a lake?

P55 Fig 6

- Can the plotting artefact at the date line be avoided?
- remove '0' label on the grounding line contour.

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2019-41>, 2019.