

Interactive comment on “Instability of Northeast Siberian ice sheet during glacials” by Zhongshi Zhang et al.

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This study examines the possibility of growth of a large glacial ice sheet in Siberia, and the mechanisms behind it. The authors perform a unique set of simulations of the NH ice sheets asynchronously coupled to a GCM that represents atmospheric stationary waves well. They conclude that indeed certain glacial configurations favor growth of a Siberian ice sheet, which then leads to conditions that favor its demise. This is an interesting study, and certainly serves to advance our understanding of continental-scale ice-sheet dynamics. I recommend publication with only minor revisions, as described below.

First, several feedbacks were mentioned in the introduction and experimental design

C1

(so-called “ice-vegetation-atmosphere-ocean dynamics”), however not much analysis of the vegetation effect was provided other than a few sentences in the Discussion, nor any figures. Does the growth of tundra versus something else mainly cause a temperature impact via albedo? What drives the growth of different vegetation biomes to start with?

Second, is there some justification for the Pb-experiment topography changes, besides that it helps to grow the Barents ice sheet (like this is closer to what the glacial topography would actually look like)? Or is it a correction for model bias? Since the main figures all rely on Pb experiments, this should be made clear.

Third, some description of the simulations using GRISLI, as well as a brief model description should be added more clearly. Now references to these aspects of the study seem very ad hoc and out of place.

Finally, I was also surprised to see the omission of several key papers from the literature. I expect this will be improved following the short comment already posted.

== Minor comments =====

Page 1, line 19: has been => is [?]

Page 1, lines 1-2: Northeast and Northwest should be lowercase. Also, I believe NE and NW are standard abbreviations, no need for definition.

Page 2, line 12: was => has been

Page 2, line 16: studies => evidence

Page 3, line 18: PISM or GRISLI?

Page 3, line 23: ocean model or parameterization?

Page 5, line 21: State somewhere that “pi” is for normal topo and “pb” is for the modified Barents Sea.

C2

Page 9, line 12: behind => behind them

Page 9, line 20: "in the order" . . . of what?

Page 10, line 25: this sentence is not so clear. The feedbacks allow switching from on ice sheet configuration to another. But what determines in the first place whether you will start with the circum-Arctic or Laurentide-Eurasian configuration? Consider revising.

Page 11, line 20: Already said this way, consider rephrasing.

Page 11, line 20: neglect => fail

Interactive comment on Clim. Past Discuss., <https://doi.org/10.5194/cp-2018-79>, 2018.