Clim. Past Discuss., 9, C2466–C2469, 2013
www.clim-past-discuss.net/9/C2466/2013/

Climate of the Past
Discussions

Interactive comment on "Assessing the impact of Laurentide Ice-Sheet topography on glacial climate" *by* D. J. Ullman et al.

D. J. Ullman et al.

dullman@coas.oregonstate.edu

Received and published: 30 October 2013

Response to Mark Siddall

The authors would like to thank Dr. Siddall for his review of our manuscript. His comments, particularly regarding the structure of the paper, are very helpful for revision of the manuscript. It was our attempt to be thorough in our description of model results and comparisons with data in section 3, but we understand that this may serve to be a barrier for readers in getting to the "meat" of our findings. Since the focus of this paper is primarily related to the differences that arise due to a change in Laurentide Ice Sheet (LIS) boundary conditions, we agree that concentrating the paper on section 4 and later discussion is a valid suggestion. We plan on shortening section 3 to contain a shorter description of the LGM and 14 ka results, to generally summarize the model

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

strengths and limitations (as suggested by Anonymous Referee 2). Since we feel much of the detailed results in section 3 are still useful to report, we will move much of this description to a supplementary section, as suggested by Dr. Siddall. We hope this will make the paper much more succinct, helping readers reach our main findings sooner.

Regarding the detailed comments:

1. clearly distinguish results from discussion sections, e.g. in the titles of sections 3 and 4 include the word 'results' and group the discussion sections (5,6,7,8,9) as 5.1, 5.2, 5.3 etc

We agree that this section header formatting is a good way to distinguish between the results and discussion sections and will implement in an updated manuscript.

2. greatly expand the conclusion section to include the issues developed in the discussion

Yes, we will expand the conclusions section to highlight the major changes in atmospheric circulation and summarize their impacts on simulated climate as discussed in the text.

3. prioritise the key information in the expansive results sections around discussing the ice sheet boundary conditions. Currently the comparison of both simulations with the control is an entire results section of its own and is distracting. Much of section 3 is effectively a repetition of other LGM modelling papers. Section 4 is the key original material, which is much more exciting and needs highlighting. Regarding point 3, I think the authors have a few options: option A) Splitting this into two papers, one the LGM to control comparison, on the comparison between the two different BC runs. This may not work because the LGM to modern control comparison would not be very original. option B) Put the discussion of LGM climates into supplementary information. option C) Is there a way of dealing with the LGM to control comparison in a summarized tabular form? This gets around that the issue that this material is less original (LGM simula-

tions are relatively common) while allowing the reader to evaluate how meaningful the simulations are.

As stated above, we intend to choose “option B” by transferring much of LGM/control comparisons to supplementary information.

4. P3242 and elsewhere - I suggest Andre Ganopolski’s work on dust forcing in CLIMBER requires a mention. This could be in the context of a note on the importance of these issues also for EMICs

We will add Ganopolski et al. in the use of CLIMBER to assess dust forcing at the LGM. Upon review of this section, updated references from Mahowald et al. are necessary with regard to dust at the LGM.

5. P3243,L5-please check that Abe-Ouchi has no more recent results that are relevant here

We are unaware of a more recent reference from Abe-Ouchi regarding the influence of ice sheets on atmospheric circulation at the LGM. A more recent paper (Abe-Ouchi et al., 2013, Nature) aims to determine the effects of LIS size on LIS mass balance in relation to the 100 kyr cycle, but any discussion of a “stationary wave feedback” is largely contained in Abe-Ouchi et al. (2007), as referenced in our paper.

6. P3245,L1 - does this migration of the coast allow for GIA?

To create LGM topographic boundary conditions, we added the topographic anomalies from ICE-5G (21 ka minus 0 ka) to the base (0 ka) GISS model topography. These topographic anomalies from ICE-5G are built on a model for GIA for the reconstructed ice sheets. Therefore, GIA is included in the boundary conditions and migration of the coast. However, we did not modify GIA due to the lower Laurentide ice volume of the Licciardi et al simulations in order to avoid small coastal idiosyncrasies between the two simulations at each time slice. We can be more explicit about this in the text.

7. P3245,L8- suggest you write ’Bab al Mandab (Red Sea)’

Will use ‘Bab al Mandab (Red Sea)’ as noted.

8. P3245,L25 - why use maximum reconstructions when your aim is to get a lower bound?

We use the “max” reconstruction of Licciardi et al. (1998) because they concluded it to be a better representation of the LGM LIS, in comparison with other ice-sheet reconstructions and relative sea-level records. The “min” reconstruction is the LIS after the ice lowering of a Heinrich event (i.e. H2) from enhanced sliding of the ice sheet through Hudson Strait (e.g., Hostetler et al., 1999, JGR). We therefore choose the “max” reconstruction as the ice sheet that best represents the LGM by definition. As it happens, this reconstruction is a lower bound, relative to ICE-5G and PMIP3 LIS reconstructions.

9. P3268L29 - should be in conclusions

Will move this description of the need for Northeast Asia and North Pacific proxy data in the conclusions, as suggested.

10. Conclusions - mention changes in atmospheric circulation and in particular the polar jet. You need to summarise what is affected by the different ice sheet BCs and what isn’t (just as important to know). In each of the discussion sections (5,6,7,8,9) you draw out important information, summarise that here.

As stated above, we will elaborate more on the changes in atmospheric circulation and the polar jet as well as a more explicit summary of the impacts of Laurentide Ice Sheet elevation.

Interactive comment on Clim. Past Discuss., 9, 3239, 2013.