

Interactive comment on “Glacial Inception on Baffin Island: The Interaction of Ice Flow and Meteorology” by Leah Birch et al.

Anonymous Referee #2

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General Comments:

This is an interesting paper concerning initiation of glaciation on Baffin Island by combining a regional atmospheric simulation with a straightforward ice flow model using a slightly modified contemporary year favorable to inception. The need for high spatial resolution is emphasized. My comments focus on the key aspect of this paper, namely the anticyclonic-cyclonic couplet that causes the warming that limits the ice growth. Is this real or an artifact of the WRF simulation? The reason I raise this question is that it is well known that regional models can develop anomalous circulations within their domains while matching conditions specified on the lateral boundary (e.g., Glisan et al., 2013: Effects of spectral nudging in WRF on Arctic temperature and precipitation simulations, *J. Climate*). Even if the couplet is not artificial a somewhat

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different orientation/intensity could lead to different advection conditions, decreasing or even eliminating the warm air advection. So: 1. When you simulated the present-day climate was there any evidence of the above couplet compared to ERA-interim? 2. Rather than the differences in Figure 8, what do the full 500-hPa height fields look like for iterations 2 and 10? 3. Can you develop more compelling arguments for the reality of your circulation results?

More generally, the lateral boundary conditions for your model could be very different than what you specified due to climate system feedbacks as a result of reduced summer insolation so nesting a regional simulation in a GCM simulation for inception time might be the best next step in your modeling. Yet another rendition of the altered environment around 115k yr ago is Otieno et al. 2011: Atmospheric circulation anomalies due to 115k yr BP climate forcing are dominated by changes in the North Pacific Ocean. *Clim. Dyn.*

Interactive comment on *Clim. Past Discuss.*, <https://doi.org/10.5194/cp-2018-5>, 2018.

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