General comments

This manuscript investigates the parameter sensitivity for a glacier surface mass and energy balance model. I'm less familiar with this model, which calculates energy balance using just temperature, precipitation, and incoming shortwave radiation as inputs, and parameterized other components, but the model is well-described. Authors perform experiments for parameter sensitivity over Greenland for two time periods: the present day and Last Glacial Maximum (LGM).

The introduction sets up the paper well. I think that the experiments in this paper, showing which parameters mass balance is most sensitive to, are important and will be useful for others simulating mass balance for glaciers and ice sheets. The presentation of results isn't always intuitive, and at times the manuscript does not clearly and accurately communicate the key messages.

Specific comments

p1 L4: Is 'invariant' the correct word? You show that the sensitivity varies by region (Fig 3).

P1 L4: Should you clarify that emissivity has, by far, the highest sensitivity (at least in present day)?

P1 abstract: Is it useful to note differences between present and LGM? The comparisons seem like a big part of the paper.

P1 L22: The use of the word 'unfortunate' here feels like an opinion. This occurs throughout the text, with words like 'rather' and 'clearly'. I think these words should be removed.

P9 Table 1: Does parameter #5 have a citation?

P9 Table 1: Parameter #8, I think a different abbreviation is used later in Fig 2 (am). Keep these consistent.

P10 L16: Lots of acronyms here. Better to say 'Present' instead of PD?

P10 L21: remove 'a slight influence of'

Fig 2: Great, this seems like a key figure. It's not clear what the difference between main and total effect are. Did I miss this in the methods? Also, as a key figure, why is the equivalent for LGM not in the main text? It seems like it would be more useful to have that figure in the text, and current Figures 1 and 5 either smaller or in the supplement.

P15 L6-7: Delete 'Due to their large size,' and 'but we include the main findings here'.

P15 L30: I'm confused here. Maybe just 'Conversely' needs to be removed?

P 16 L 5: Why pick region 5? Later you mention the ELA is within the region, maybe include that here.

Figure 6: Text says that a) and b) show sensitivity, but not c) (P16 L 10-14). But they all look pretty similar to me. Maybe labeling SMB on all axes would help.

Figure 6: Why are the lightest color vertical bars, while the 3 darker colors are continuous?

P18 L 22-25: Really hard to follow the list, adding numbers in front of each point could help (e.g. 1) The impact of …)

Figure 7: I'm a bit confused here, you're looking at the sensitivity of parameters on surface mass balance only with QL on, still for region 5 at the LGM? I would expect it to be the equivalent to Fig 6 but for LGM, but what is going on with QL?

Figure 8: This is figure 8, typo in caption?

Figure 8: Why did you choose to show parameter sensitivity by region only for Dsh?

Discussion: I found this section a bit hard to read. Some sentences might need commas to make the point clear.

P23 L12: delete 'while' and rewrite? There is still sensitivity to emissivity during the LGM.

P23 L15: what does 'though desirable' mean?

P24 L8: Change 'neither' to 'None', as you have multiple variables?

P24 L16: Do you show you improve the model with these new additions?

P24 L 23-25: Is there a previous description of the different circulation during the LGM? Having it just brought up here is missing an explanation if one doesn't know about it.

Appendix: Some plots mentioned in the text are missing, or is there also a supplement? If so, why are some in Appendix and some in supplement?