This manuscript provides valuable insights into the response of the Greenland Ice Sheet (GrIS) to different warming thresholds using the coupled MAR-PISM model. The study effectively highlights the critical temperature thresholds (e.g., +1.4°C and +2.3°C) for GrIS stability and emphasizes the importance of both the magnitude and duration of warming. The results align with previous research and contribute important findings on GrIS behavior under future climate scenarios, with implications for sea level rise projections and policy decisions. The manuscript is well-structured and well-written. Pending minor revisions addressing the comments below, I support its publication.

General comments

While the study uses the coupled MAR-PISM framework to assess the GrIS response to warming thresholds, it lacks sufficient discussion on the added value of incorporating the MAR model. Although SMB processes are briefly addressed in Section 3.1, I would like to see deeper insights into how MAR contributes to projecting future GrIS SMB--especially given your finding that future SMB plays a more critical role than ice dynamics. Clarifying MAR's specific contribution would strengthen the manuscript and better support your conclusions.

In the Conclusion section, comparisons with other studies would be more appropriately placed in the Discussion. The Conclusion should focus more clearly on summarizing your key findings and highlighting the main insights regarding future GrIS responses to different warming scenarios.

Specific comments

L28-29: There seems to be a syntax issue with the phrase “in more a recent study.” It should likely be “in a more recent study.” Please revise for clarity.

L35: Replace “Greenland Ice Sheet (GrIS)” with simply “GrIS,” as the full name has already been introduced earlier

L56: The term “enhanced SMB estimations” is ambiguous in this context. If you are referring to the MAR model’s improved representation of SMB processes, please state this more precisely. As written, “enhanced” could be misinterpreted as implying increased SMB.

L68: Glacial Isostatic Adjustment ---> glacial isostatic adjustment

L75: Greenland Ice Sheet (GrIS) ---> GrIS

L76: The phrase “we randomly sampled the ten years until 2200” is unclear. Please specify the time period from which these ten years were randomly selected.

L84-85: The sentence "We did not correct the contributions to sea level rise (SLR) by this control run…" is somewhat confusing. As I understand it, you chose not to subtract the model drift (+5.75 cm by 2200 in the +0.2°C run) from the SLR estimates in other scenarios. If this interpretation is correct, I recommend rephrasing for clarity.

Page 5, Figure 2: I recommend repositioning the panel labels (A–F) from the y-axis labels to within each panel—preferably in a consistent location such as the upper right corner—for improved clarity.

L119: Greenland Ice Sheet (GrIS) ---> GrIS

L129: What do you mean null? zero or nan?

L131: Can you be more specific about this threshold temperature?

L140: change "darker bare ice albedo" to "darker bare ice"

L152: It would be helpful to quantify this change—how much is the albedo reduced, and over what area or time period

L154: Is the model assuming that if the ice sheet surface becomes flat, meltwater is stored locally without draining away? Is this behavior explicitly represented in MAR?

L177-178: surface mass balance ---> SMB

L178: "the mass balance twenty years later"? Do you mean that the mass balance becomes positive after 2180? Can you clarify this?

L182: Figure 2 and 3 ---> Figures 2 and 3

L211: "This limits the absorption of additional liquid water should the climate warm up again". Correct this sentence.

L241: Reverse ---> reverse

L275: forcing ---> forcings

L284: The phrase “under certain conditions” is too vague—could you specify what conditions are required for the GrIS to stabilize after exceeding the temperature threshold? Providing more detail would strengthen the conclusion.