Responses to Reviewer #1, Minor revisions

We thank the reviewer for their additional feedback on the revised manuscript. In the following, Reviewer's comments are shown in black, whereas the Authors' responses are shown in light blue.

Specific comments:

L60: Since this is the first appearance of the term NWP, please spell it out in full.

    Done.

L80: The word Regional may be unnecessary. As shown in the table in the appendix, the experiments appear to have been conducted either at the point scale or at the global scale.

    Done, removed the word "Regional".

L172: Please clarify what type of snow has a density of 315 kg m−3. It would be helpful to provide an explanation similar to that for 280 kg m−3 (if possible).

    We have added the following text to clarify what type of snow has a density of 315 kg m-3: *"(for relatively older snow)"*

L193: "aging".

    Done.

L204: Please specify the value used as emissivity.

    This sentence has been modified as follows: "The surface temperature is derived from the upwelling longwave radiation assuming a constant emissivity of 0.97 (Fausto et al., 2021)."

L265: The experiment name "CLIM" is somewhat unclear. I recommend changing it to a name that indicates the difference from the "E5" experiment—perhaps something reflecting the glacier mask.

    The setup of the different experiments is reported in Sect. 2.4.1. We consider changing the experiment identifier at this stage potentially risky, as it could introduce inconsistencies throughout the manuscript. For this reason, we have retained the original identifier. To improve clarity, we have added the following note to the caption of Table S1: *"See Sect. 2.4.1 for a detailed description of the experimental setups."*

L308–309: The sentence "The average lapse rate for ..." is difficult to understand. Why is the unit given in °C when referring to a lapse rate?

    We have modified this sentence to clarify its meaning: *"The average lapse rate **correction** for the low, upper and accumulation sites is 0.29 °C, 0.15 °C, -0.13 °C, respectively. "*

Figure 1: The purple color is hard to distinguish from red or blue. Please consider using a different color for clarity.

Table 1: The entry "None" for the ice physical properties in CTL is not sufficiently descriptive. Please clarify what these mean. In CTL, were the physical properties of bare ice assumed to be identical to those of snow after the snow layer disappeared? It would also be informative to indicate the CTL model version and corresponding references in the table. Moreover, please include the layer thicknesses used for the Ice thermodynamics in GLA.

We have amended Table 1 following the reviewer suggestions (see below). We have replaced the entry "None" with a more descriptive text; included the model version into the Table caption; include the layer thicknesses in the "Ice Thermodynamics" entry of the Table. We think adding references in the table would make this table confusing to read and a reader can find the relevant references into the main text.

Table 1. Summary of the glacier and ice sheets processes represented in the current model version (CTL, ecLand CY49R1) and the new "glacier" parameterisation (GLA, ecLand CY50R1). See Sect. 2 for more details.

Parameter / Parameterisation	CTL	GLA
Sub-grid ice tile	No explicit ice tile; dominant ice points prescribed with 10 m SWE	Explicit ice tile with sub-grid fraction
Ice Thermodynamics	Not considered, assuming only snow with no underlying ice	4-layers ice scheme with layer thicknesses of 0.07 m, 0.21 m, 0.72 m and 9.86 m
Ice Albedo	Not considered, assuming only snow with no underlying ice	Fixed, set to 0.4
Ice Melting	Not considered	Included (bare-ice exposure)
Snow Mass Balance	Fixed to 10 m SWE	Dynamic and capped to 10 m SWE, see Sect. 2.2.2 Snow Mass
Snow Albedo	Fixed, 0.82	Dynamic, see Sect. 2.2.2 Snow Albedo
Snow Density	Fixed, 300 kg m^{-3}	Dynamic, see Sect. 2.2.2 Snow Density
Snow liquid water	Not allowed	Allowed, with percolation and refreezing

Figure 6: The legend item lwcs could be mistaken for a new experiment name, and obs is also potentially confusing. Consider renaming these to indicate both the variable and the dataset (e.g., Temp. (GLA-OBS) or Lwcs (GLA-OBS)).

Done.

Figure 8: It would be clearer if panels (b) and (d) were expressed as Glacier minus Obs. Currently, panels (a) and (b) show CTL minus OBS, whereas panels (c) and (d) show Glacier minus CTL, reversing the sign convention for CTL and potentially confusing readers.

The panels (b) and (d) show the difference in the absolute biases of GLA and CTL, against the Observations. This represents the change in the magnitude of the bias, with negative values indicating a reduction and positive values indicating an increase in the bias magnitude. We have clarified the labels of panels (b) and (d) to better reflect this point.

Supplementary Material: To distinguish supplementary tables and figures from those in the main text, Table 1 should be labeled as Table S1 (and other supplementary materials renamed accordingly).

Done.