

I believe you have done a very good job addressing the reviewers' comments. Furthermore, I find the manuscript of high quality and the model to be a valuable contribution to the field. However, there are still a few improvements that I believe should be made before publication, listed below.

P 7, line 18, Eq. 7 and subsections: A minor point, but consider ordering the terms homogeneously here in the text, in Eq. 7 and in the subsections beneath for simplicity and easier reference.

A- Done, including table 1.

Eq. 7: I agree with Mario Krapp concerning the lack of a latent heat term in this equation. Later it is stated that the latent heat of refreezing can only occur below the surface, however melting – and thus it would seem the latent heat of melting – can only happen at the surface. In other words, if  $Q_{lh}$  (when negative) appears in the energy balance of Eq. 7 in the model, it should appear in the equation. And if this is not the case, this should be made much more clear in the description of how this is treated. Is Eq. 7 applied to the surface boundary of the first grid box, for example, while negative  $Q_{lh}$  is applied within the box itself?

A- We have now included the latent heat term in equation 7, and moved the description from section 2.3.2 to 2.3.1. We also corrected a mistake in the description of the shortwave radiation, which is the net radiation, not downwelling.

P 12, line 20: These two sentences sound contradictory and is related to my previous comment: "Melting only occurs at the surface and the corresponding amount is added to water mass of the uppermost box. However, during one time step more than one snow layer may melt and the vertical grid is adjusted accordingly." Does melting only occur at the surface, or also within the snow layers – please clarify?

A- We have rephrased the second sentence.

P 13, line 1: After 5000 model years, the snow model is in equilibrium. => The snow model reaches equilibrium after 5000 model years. [Current formulation is a bit roundabout]

A- Done

Fig. 7 & Table 4: Figure 7 should come before Table 4, both in appearance and in the text. Fig 7 is more general and serves to introduce the individual metrics (A, T, and m), and these abbreviations should also be introduced in the text (around the paragraph on p 16, line 10).

A- We respectfully disagree that the order of figure and table needs to be changed. The abbreviations are now introduced in the text.

P 19, line 23-24: Surface melt should be a positive quantity.

A- This has been changed in the text but we prefer to keep melt as a negative quantity in corresponding figure 11.

P 20, line 15: RMSE with subscripts (RMSE<sub>A</sub>, etc)?

A- This has been changed as suggested in the text and in figure 7.

P 20, line 17-18: I would move this first sentence to the end of the next paragraph, as the latter is more introductory to the section. Or generally modify this part. Otherwise it is missing a direct link into stating the BESSI experimental setup in the subsequent paragraph.

A- done

Fig. 5: The colors used are not particularly printer/reader friendly. At a minimum, please change the yellow to a darker variant. I would suggest using a colorblind safe palette, such as can be found here: <http://colorbrewer2.org/>, among others. This comment applies to other figures as well (mainly those with time series or lines).

A- The palette of figures 5, 11, and 13 has been changed. The green shade now contains a fair amount of blue to make it colorblind safe. We also corrected a minor inconsistency between figures 5 and 6 by interchanging the colors of the two curves in the latter.