We thank the reviewer for the comments, which have further improved the paper.

Reviewer comment 2. Validation of RACMO melt flux:

While the authors added the comparison of melt rates from RACMO and the SEB model (e.g. reply (2)), a proper validation of the SEB model at sites above the equilibrium line is not exhaustively addressed in my opinion. I do understand that this type validation is more challenging due to not knowing the density of snow and firn, as the authors properly comment later on in their reply to my review. Despite this, if I understand correctly, the SEB model used has a subsurface module based on SOMARS (e.g. L241) which, if I am not wrong, should simulate, among other variables, snow and firn density. This can be used to compare observations of e.g. relative surface height change (which are recorded by AWS) with simulated values of melt, as it is done for sites below the equilibrium line. If for some reasons this is not possible and not presented in the manuscript, conclusions regarding these sites (e.g. accumulation zone of the ice sheet) should be presented in a more careful manner. The ablation zone and the accumulation zone highly differ in how they are affected by the surface processes described by SEB models and I think we cannot take for granted that models that work well in one region work well also in the other without proper ground truth validation.

Reply:

(1) We agree with the reviewer that evaluating melt energy in the accumulation zone is highly important, but there currently is a lack of suitable observations, and it will require enhanced observational efforts to achieve this. The reason is that melt energy in the accumulation zone cannot be reliably assessed from stake or sonic height ranger observations, because vertical motion of the snow surface can be caused by multiple processes: changing stake/AWS base depth, differential firn compaction between the stake/AWS base and the surface, and surface mass balance processes that include melt but also e.g. erosion by drifting snow. Because at the same time, the melt fluxes away from the ice margins are relatively small, these processes significantly decrease the signal to noise ratio in the accumulation zone. So even if the density of the layer that has been removed would be perfectly known, which is almost never the case, this cannot be one-on-one converted into a melt flux.

(2) For the reasons outlined above, we adopted a comparison with AWS-derived melt energy from solving the surface energy balance, which is acceptable given its relatively high accuracy. But this can only be done if the AWS measure a reliable radiation balance. For that reason, GC-Net stations, which cover most of the

accumulation zone, cannot be used, and we are limited to a comparison with the higher PROMICE stations in west Greenland. We therefore agree with the reviewer that the resulting scarcity of evaluation points in the accumulation zone warrants caution when discussing these results.

(3) We added these considerations to the manuscript (lines 270-284), marked in red:

In the accumulation zone, vertical motion of the snow surface can be caused by several processes: changing stake/AWS base depth, differential firn compaction between the stake/AWS base and the surface, and surface mass balance processes that include melt but also e.g. erosion by drifting snow. Because at the same time, the melt fluxes away from the ice margins are relatively small, these processes significantly decrease the signal to noise ratio in the accumulation zone. So even if the density of the layer that has been removed would be perfectly known (which is almost never the case), this cannot be one-on-one converted into a melt flux. For these reasons, modelled melt rate in the accumulation zone is usually evaluated by comparing it to the melt energy obtained from AWS observations. However, this can only be done if the AWS measure a reliable radiation balance, which limits the effort to the higher PROMICE stations in west Greenland. The resulting scarcity of evaluation points in the accumulation zone warrants caution when interpreting the variability of melt rates in the Greenland interior as presented in this paper.