

This study evaluates a two step assimilation method to create snowpack simulations operationally. The topic is highly relevant to the journal. Congratulations to the authors for this strong piece of work. The paper is very interesting and well-written. I just have a few minor comments and questions listed below.

L148: I don't understand how you upscale the precipitation multiplier from 25m resolution to 250m.

L205: I get that the choice of lower and upper bounds is already explained in another paper. However the rest of the section is very well explained and it feels weird not to get why the bounds are chosen. 20 cm in particular seems to be a small snow depth for an upper bound. I suggest you add a sentence to explain this range.

L225-227: Either you already explained that or this sentence is unclear to me. Maybe precise which assimilation step you are talking about.

L235-237: Does this mean that the 36 particles of the prior simulations in the flat grid cells are the same ? So after step 1, you "lose" the uncertainty of the posterior simulation and recreate no perturbations in all the flat grid cells of your domain ?

L240-250 I think it is very interesting for an operational point of view and rarely pointed at so I definitely think that you should keep this comment. But it could be misleading for some readers. With every new observation taken into account in the assimilation process of the PBS, the posterior simulation is updated over the whole period and propagates backward in time (and potentially increases in accuracy). My point is that at the end of June the simulated snow depth in March might not be the same as the simulation made in March with only the observation from January to March because you do not have the same list of

$$\frac{SCF_{obs}^t - SCF_{sim}^t}{\sigma_{SCF}}$$

. Therefore this sentence in particular could be misleading "This equivalence implies that the presented results would be unchanged if the parameters were updated sequentially as new observations become available, which is how the method would be applied in an operational nowcasting context, as discussed in Section 4. "

L250-260: Add this step somehow in Figure 2, or add another figure in section 2.6 to show the whole method of the operational setup. I really believe the paper would benefit from showing the whole operational method at once.

L260-280: This question is linked to the one I 235-237 because I don't fully understand. With the first assimilation step you correct the meteorological forcings. However, I guess that you do not have snow depth stations in the highest elevations of the catchments and therefore the meteorological forcings at high elevations could be biased by the lower elevation parts. I do not get why the precipitation multiplier of the flat grid cells needs to be one ? It could correct biases that were not corrected in the first assimilation step. I guess it is linked to the "goal of correcting only non-systematic, small-scale error" L368 but I do not get the rationale behind the goal.

L332-335: If the LOO method also included a LOO snow depths data in the first assimilation step, could you have evaluated the results in terms of snow depths as well ? I am not saying to redo the whole experiments but perhaps you could discuss that these evaluations only take into account the SCF while the end goal of such operational simulations often include access to the SWE, snow depth, etc...

L367: you could add the correlations in supplementary or appendix.

Fig 4 & 6 : the forests are not taken into account in your analysis and I think that the green of the forest is too visible compared to the actual evaluation. Perhaps put the forest in white when you are showing the difference of SCF ? In general, in the places where you didn't do the evaluation (glaciers, water etc...) I think that the grey (of what I guess is no data) is too close to the grey of the 0 % difference in SCF which makes it hard to fully understand the figures.

L400-405: Have you tried other SCF parameterizations ?

L500: I don't get why you end with this sentence when you said L450-455 that it is not a solution in your setup.