Hydrology and Earth System Sciences

Discussions

HESSD

Interactive
comment

Interactive comment on "Hyper-resolution ensemble-based snow reanalysis in mountain regions using clustering" *by* Joel Fiddes et al.

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Fiddes, Aalstad and Westermann present interesting results on assimilation of remote snow cover observations in an efficient model of snow accumulation and melt over complex topography. It is not entirely true, as stated in the abstract, that "grid-based models cannot be run at spatial resolutions to explicitly represent important physical processes" – there are numerous examples in literature of models representing multiple physical processes being run on high resolution grids or triangular networks – but these models certainly are not optimal and cannot be run for large areas or long periods.

page 1, line 10

What are "surfacecheck models"? The abstract should say something about what data

are assimilated.

page 2, line 13

Data assimilation in land surface modelling schemes has been around for longer than might be suggested by citing a 2012 review. The North American Land Data Assimilation System was initiated in 1998, and the ECMWF model has had operational assimilation of snow depth observations since 1987.

page 5, line 32

Reference to Figure 1.3.1 should be Figure 1.

page 6, line 3

Ne is not explained. It is later described as a number of pixels on page 8 and a number of particles on page 10.

page 6, last line

ERA5 resolution was earlier stated as 25 km.

page 8, line 10

I don't think that Vögeli et al. (2016) says anything about the open availability of the airborne snow height retrievals.

page 10, line 14

A positive bias of high wind velocities is not very apparent in Figure 2.

page 11, line 15

Because fSCA contains no information about HS after it reaches 100%, the method might be expected to fail for the very highest accumulations.

page 12, line 14

This first reference to Figure 8 is out of sequence.

page 16, line 23

Delete "data was obtained from"

Table 1

Means and variance lack units

Figure 2 caption

Delete "simulated" in the first sentence. The second sentence is ungrammatical and needs to be rewritten.

Figure 3

Why is there a point with LW close to zero in (D)? STATION should be explained in the caption.

Figure 4

The green dots described by the caption are black crosses in the figure, and there are no red dots. Are there any HS observations that would help to resolve the disagreement between the posterior and the last fSCA observation?

Figure 7

Why do all of the distributions extend to negative snow depths? "The observed distribution is better captured by the posterior"

Figure 8 caption

There are no vertical dashed lines in the figure.

Labels on several of the figures are too small.

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37, 2019.