Report # 1

Q: Line 315: It is unclear what "true" refers to. Consider removing the word "true".

Response: the word "true" is removed in the revised manuscript.

Q: Line 331: I assume the superscript ^a on the left hand side means "analysis"? Please specify.

Response: In the revised manuscript, statements in lines 328 – 331 are revised to:

The analysis equation can be expressed as (Evensen, 2003):

$$A^a(t) = A(t) + A'(t)A'^T(t)H^T\left(HA'(t)A'^T(t)H^T + \gamma\gamma^T\right)^{-1}\left(D(t) - HA(t)\right) \qquad (6)$$

where A^a is the analyzed model state

Q: Lines 350-356: The use of "dry" to refer of snow is still quite mysterious. Can "dry snow" be substituted with the more general term "snow"?

Response: The tern "dry snow" can be substituted with the word "snow". Modification of the term can be found in Lines 349, 352, and 353 in the revised manuscript.

Report # 3

I would like to thank the authors for taking into account my comments and for clarifying my open questions in the revised version of the manuscript. I am happy with the changes and can recommend the manuscript for publication.

Q: However, one question has still remained unclear to me, maybe I misunderstood something here: On line 316 you state that both the state vector and the observation vector have the dimension n=m=1. But later on you describe that you assimilate the GRACE TWS data on the 1km grid cells. I would assume that in this case the observation vector (and the state vector) would have the dimension of the number of grid cells (?).

Response: The referee is correct, it is possible to form the state vector (and observation vector) using all grid cell values and the dimension of the vector will be accordingly equal to the number of grid cells. In this case, the states of every grid cell are update together (only the variance components are used). However, we applied the assimilation cell-by-cell and so only the state vector and observation of that grid cell are involved (n=m=1). When the assimilation is applied to every grid cell (independently), the result will be identical to the approach suggested.

Q: In this same context: You say that you introduce the model output as TWS value into the EnKF (line 316). And on line 361 it is written that the distribution of the increment among the different model compartments could be directly obtained from the Kalman filter. However, I would assume that in order

to obtain this information directly from the EnKF you would have to introduce the compartments SM, UZ, LZ individually (instead of only the TWS values).

Response: The referee is correct. However, we did not use different compartments in our state vector in this study. The statement can be found in lines 361-362 in the revised manuscript:

"… Kalman filter. However, we chose to carry out the vertical distribution in the way consistent with the OpenStreams wflow_hbv model (Fig. 2). While …"