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Discussions

Interactive comment on "The impact of near-surface soil moisture assimilation at subseasonal, seasonal, and inter-annual time scales" *by* C. Draper and R. Reichle

Anonymous Referee #1

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The paper investigates the benefits of data assimilation of remotely sensed soil moisture in the Catchment land model on three different time scales and therefore fits within the scope of the journal. The authors find that assimilation significantly reduces errors at every study site for all time scales, in particular also for long-term events. Further analysis on observation-bias correction parameters shows, that the estimation of rescaling parameters from only one year of data record will not considerably reduce the average benefit, but can increase local errors.

The paper is well-written and in general well organized, but a more detailed description of the study approach would make the paper easier comprehensible:

1) It does not get clear in the Introduction and in the Methods if the decomposed soil moisture was assimilated into the model separately, or if the soil moisture time series were assimilated and the results decomposed afterwards for analysis.

2) It would greatly improve clarity to describe the two methods of rescaling (CDF and linear) in the Methods section, as in the current draft the linear rescaling is first mentioned in section 3.4. Furthermore, a short explanation on the rescaling experiment with short data records in the Methods section would be useful.

3) It would be good to give the definition (for example the one of page 7985, lines 26-28) and an equation for the ubMSE in the Methods section.

More information about the dealing with scaling differences between the soil moisture datasets would be interesting, as differences in the results might be influenced by differences in spatial scaling.

1) ARS sensors: Which and how many sensors were used for each study site? What is the size of the respective areas covered by the sensors?

2) How many grid cells of AMSR-E and the Catchment model did you use /are surrounding each site? How did you deal with differences in the number of grid cells and their resolution (0.25° vs. 9km)?

3) If more than one grid cell was used for each site, how were the single time series for each site created?

Specific and technical comments

Eq. 1: ak and bk are not defined

P. 7987-7988, lines 28/1-2: "...differences that are addressed by the CDF-matching..." You used linear rescaling for the Ayy results, is that right? Then this formulation might be confusing. The same applies for p. 7992, line 8

Page 7989, line 25: Delete one "significantly"

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References: Most references give the numbers of the pages on which they appear in the text after the year. However, this has not been done consistently.

Fig. 6: Which method of decomposition was used for these time series? Would there be a difference to the other decomposition method (eventhough Fig.2 did not show significant differences)?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 7971, 2015.