

Interactive comment on “Estimating root zone soil moisture using near-surface observations from SMOS” by T. W. Ford et al.

Anonymous Referee #2

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The key contribution of this paper is the use of the existing methodology, the exponential filter, to estimate root-zone soil moisture from surface soil moisture data obtained from SMOS. The authors have shown several results to confirm other findings from previous work; and it is worth noting that results seemed consistent at different hydro-climatic areas. However, there is a lack of focus on the key contribution of this paper, which is to determine whether satellite soil moisture (in this case the SMOS soil moisture) can in fact be used to reliably estimate root-zone soil moisture. This question has not been adequately addressed in this paper, as the content of the paper seemed detached from its title. For the right reasons, the authors have illustrated the level of accuracy of using surface in-situ soil moisture to estimate the root-zone soil moisture. An in-depth level of evaluation is needed to illustrate how the SMOS soil moisture was

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used to estimate the root-zone soil moisture.

Several points need to be clarified on how the SMOS soil moisture was used to estimate the root-zone soil moisture.

- a). How was the difference in spatial resolution resolved?
- b). When comparing the SMOS derived root-zone soil moisture to the in-situ estimate, was the in-situ estimate considered for a monitoring station by station, or as an area average of all monitoring stations which overlap with the SMOS footprint?

Other clarifications are also needed for the in-situ data analysis.

- c). Include the configuration of the SMOS footprint or the DGG on the study area map in Figure 1 – this will help to know which monitoring stations are located in which SMOS grids.
- d). In Tables 5 and 6, you showed the results for the evaluation measures when estimating root-zone soil moisture from surface soil moisture data. The RMSE values for some stations are as high as 0.18, 0.21, 0.19; and I believe these are in m³/m³? These errors are very high to be considered an accurate estimation. Given that the RMSE is an estimate of the overall error across several time periods means that other individual time steps would be worse than these values. I believe the authors need to clarify the performance of the exponential filter in light of these values.
- e). In figure 2, you have the legends covering the plots; please correct these.
- f). Page 8329, line 10: change ‘are’ to ‘were’
- g). Page 8332, lines 28-29: begin the numbered points with small-caps.

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