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Interactive comment on "Evaluation of soil moisture from CCAM-CABLE simulation, satellite based models estimates and satellite observations: Skukuza and Malopeni flux towers regional case study" *by* Floyd Vukosi Khosa et al.

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"While my primary concern is that soil depth for in situ observations is not well consist with either model- or satellite-based soil moisture estimations. Uncertainties from the preprocess as Equ(1) are hard to be assessed, due to propagating surface soil moisture information to deeper soil layers is a very complex procedure and relies on such as soil texture. Given these artificial errors, readers may hard to build their confidence in this study"

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The propagation of surface soil moisture to deeper soil layers is very complex and we fully acknowledge that soil texture plays a major role in the propagation of moisture to deeper levels. Equation 1 calculates a vertically integrated weighted mean soil moisture value using the thickness of the different soil layers (horizons) expressed as a ratio of the total depth. The soil texture changes throughout the soil profile at both the flux tower sites and we selected a slightly more advanced method to calculate a representative soil moisture value than merely calculating an arithmetic mean. "The authors indicate that this is due to lack of publically available in situ observations in Africa (Lines 81-83, Lines 130-131), yet at least International Soil Moisture Network may provide more abundant observations in Africa. Thus, the authors may want to narrow their study in South Africa, and then revise the related introductions accordingly."

Generally in situ data for soil moisture is lacking for most of the regions in Africa, especially in South Africa, this is evident from both the FLUXNET (with two sites) and International soil moisture network (ISMN) with no sites in South Africa and three sites on the African continent. However, we agree with the reviewer that the current study should be delineated for South Africa, as shown in figure 1. A revised version of this manuscript will clearly articulate this in the introduction as well. "Data availability for ESA-CCI product is very low before 2008. While Coverage fractions for model-based simulations are basically 100%. Will data availability differences have impacts on the results?"

The data is averaged to monthly, reporting only cases where the daily data availability is at least 80% . Furthermore, comparison between modelled data and in situ observations is only done for periods where 80% of in situ data is available (i.e., the periods that have missing data or <80% are not considered in the analysis). We acknowledge that the evaluation metric value will change when more data points are available. However, we are not intercomparing products (Figures 5 and 6) but we are evaluating how each product compares against in situ observations (Figure 7). We would like to refer the reviewer to lines 447-456 where we acknowledge the issue of different sample sizes

used to compute the evaluation metric. The results only provide an indication of how each product compares against the in situ observations.

“why evaluations are focused on monthly time series?”

On very short times scales such as hourly to daily time scales, local effects can lead to a pronounced noise of the observations however such noise is anticipated to lead to compensating effects upon long term averaging. In this paper we focus on much longer time scales when the soil moisture signal is well developed.

“Lines 191-195, indeed ESA-CCI is not the unique blended soil moisture product. The Soil Moisture Operational Products System (SMOPS), for example, also provides an operational global blend of all available microwave soil moisture retrievals on a daily basis (Yin et al., 2015).”

We thank the reviewer for this comment and for pointing us to other data products. The ESA-CCI datasets however, were selected as they currently presents highly data coverage spatially as it merges data from different satellites, individual data products are likely to have low data coverage spatially over time. “Section 2.2: which version ESA-CCI data was used in this paper? Line 174-175, CDF-matching to what? Lines 179-186, passive observations are based on radiometer, while it does not indicate passive sensors are only able to take measurements during daylight hours. Besides, whether satellite signals may penetrate clouds fog, vegetation mainly rely on wavelength, rather than what kind of sensors (Wang et al., 1987; Jackson et al., 1989; Wagner et al., 2013).”

Version 03.2 of the ESA-CCI dataset was used in this study. We thank the reviewer for raising this comment and we will clearly indicate the version of the data used on the updated manuscript. CDF is used to merge the data from active and passive sensors using vegetation cover as described in L177-178. We thank the reviewer on pointing the differences between passive and active sensor, we will precisely discuss these in the updated manuscript.

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