

## ***Interactive comment on “Evaluation of a multi-satellite soil moisture product and the Community Land Model 4.5 simulation in China” by B. Jia et al.***

**Anonymous Referee #2**

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This article evaluates 2 soil moisture dataset; derived from microwave remote sensing (ESA CCI soil moisture) and model simulations (CLM 4.5) using in-situ measurements over China. While the article is not particularly original and mostly a validation paper, it is certainly useful to document this effort. Some information is redundant with respect to recent literature and the analysis could have been more detailed. My main concern is about the choice of the metrics used for the evaluation. On the ESA CCI soil moisture website (<http://www.esa-soilmoisture-cci.org/node/136>, FAQ), one can read :

"Before merging the active and passive merged products into a combined active+passive product we first scale both datasets into the dynamic range of the GLDAS-

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Noah surface soil moisture fields. We perform this processing step to obtain a final product in absolute volumetric units [m<sup>3</sup>/m<sup>3</sup>]. Even though the original dynamics of the remote sensing observations are preserved, this step imposes the absolute values and dynamic range (min-max) of the GLDAS-Noah product on the combined product. As a consequence, the combined product CANNOT be considered an independent dataset representing absolute true soil moisture. Hence, the statistical comparison metrics like root-mean-square-difference and bias based on our combined dataset are scientifically not meaningful. However, the CCI SM products can be used as a reference for computing correlation statistics or the unbiased root-mean-square-difference."

So the choice of the metrics in this paper doesn't seem to be appropriate (or need to be further discussed).

Slide 5153, Introduction. "[...] moisture using remote sensing techniques (Njoku et al., 2003; Owe et al., 2008; Kerr et al., 2012) and land surface modeling (Dirmeyer et al., 2006; Wang et al., 2011; Liu and Xie, 2013)." Could be : "[...] moisture using remote sensing techniques (Njoku et al., 2003; Owe et al., 2008; Kerr et al., 2012), land surface modeling (Dirmeyer et al., 2006; Wang et al., 2011; Liu and Xie, 2013) or a combination of both through land data assimilation system (e.g. Dharssi et al., 2011, de Rosnay et al., 2013)."

Dharssi, I, K. J. Bovis, B. Macpherson, and C. P. Jones: "Operational assimilation of ASCAT surface soil wetness at the Met Office". Hydrol. Earth Syst. Sci., 15, 2729-2746, 2011.

de Rosnay P., M. Drusch, D. Vasiljevic, G. Balsamo, C. Albergel and L. Isaksen: A simplified Extended Kalman Filter for the global operational soil moisture analysis at ECMWF, Q. J. R. Meteorol. Soc., 139(674):1199-1213, 2013, doi: 10.1002/qj.2023.

L.20-21: "[...] was intended to extend the valuable heritage of AMSR-E and provide improved spatial resolution [...]" could be :

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"[...] was intended to extend its valuable heritage [...]"

Slide 5154, Introduction L.11: "[...] than that of the most recent re-analysis [...]" L.22: Dorigo et al., 2014

Slide 5155, Introduction L.1-5: "[...] has proven to be an effective tool to complement the commonly use of in-situ measurements [...]"

Slide 5156, Material and methods L.13, please add reference for MODIS

Slide 5157, Material and methods L.1-2, so it is the same dataset used for the evaluation (?), please clarify.

Slide 5159, Material and methods I am confused by the equations here, Eq.5 looks like the formula of the unbiased RMSD but you call it the centred normalised RMSD (?) and latter in the text, slide 5164, L.26 you called unbiased RMSD the RMSD on soil moisture anomalies. Please clarify.

Slide 5162, Results How do your correlations compare with existing literature ? Did you account for significance ? Do you think that le rather low level of correlation could be linked to the fact that the in-situ measurements are not taken at the same place (destructive measurements) ?

Slide 5167, Discussion Looks more like a summary/conclusion (at least to me) L.26, I do not feel necessary to mention that data assimilation is beyond the scope of the study.

Slide 5168, Discussion L.6-9, information that could be useful earlier in the manuscript.

Slide 5176, Table 2 An averaged value of number of valid measurements might be more useful (?)

Figs. 6 - 7 - 9 : having the same y-axis might help.

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