

## ***Interactive comment on “Evaluation of soil moisture downscaling using a simple thermal based proxy – the REMEDHUS network (Spain) example” by J. Peng et al.***

### **Anonymous Referee #3**

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The manuscript evaluates the downscaling of CCI soil moisture using the VTCI derived from MODIS and MSG SEVIRI, and comparing the results with in-situ observations from the Remedhus network. The authors nicely explain the downscaling methodology (which I was not familiar with) and also the background of the several remote sensing products used. The article is well structured and I enjoyed reading it. My only general remark is that the use of the English could be improved (e.g., articles are often missing, sometimes singular/plural is not used appropriately).

C3942

#### Specific comments:

P8507, line 4: "(e.g., Poporato et al., ...)"

P8507, line 13: "dynamic forces distribution" - I don't understand this term, do you mean the meteorological forcing?

P8510, line 1-3: "... like e.g., the as ..." - rephrase.

P8510, line 26: remove "can"

P8511, line 4: "products" is plural

P8512, line 11-15: "Similarly, Zeng et al, ..." - this conclusion might be different for the region under investigation here, e.g., ERA-Land was shown to often have a better global performance than CCI soil moisture (e.g., Albergel et al. 2013). It's possibly better to refer here to some of the more comprehensive validations of CCI soil moisture (e.g., see also Dorigo et al. 2015).

P8512, line 28: "modes" instead of "nodes"

P8516, line 16: who were these settings chosen?

P8517, line 20: replace "would be" with "remain"

P8518, line 5: "VTCI" instead of "VCTI"

P8519, line 26: remove "that"

P8521, line 1: "... that are required ..."

P8521, line 3: "... soil moisture that is required ..."

P8521, line 20/21: "... LAI ... can represent the status of soil moisture" - I don't see why this is true for LAI, it has very low correlation with soil moisture. Please clarify.

P8523, line 1: Mainly R seems to be better in the original CCI - do you have an idea why?

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P8524, line 3: "of R, BIAS, RMSD and ubRMSD" - Why are the numbers in Fig. 8 not consistent what you write in the first paragraph of Section 5.4?

P8524, line 5: "overestimating soil moisture," - This does not seem to be consistent with Fig. 7, where the remote sensing soil moisture is rather underestimating compared to measured soil moisture?

P8524, line 7: "present more detailed spatial details" - Can you verify this by e.g., looking at the spatial variability of in-situ vs. remote sensing products?

P8525, line 3/4: " better performance in summer and winter in terms of R, BIAS, RMSD and ubRMSD values" - Add "especially for MSG downscaled SM", as MODIS is sometimes worse than CCI.

P8525, line 11: "land use"

P8525, line 14: What is meant by "similar"? Statistically not distinguishable? This is difficult to judge from the small number of stations within the categories. Please mention within what value bounds you consider the results as similar.

P8525, line 17: "MODIS and SERVIRI have similar performance" - However, the results presented above often showed slightly better results for SEVIRI, why this difference?

P8525, line 17: "SEVIRI" instead of "SERVIRI"

P8526, line 4/5: "has slightly better performance than 0.05° soil moisture in terms of mean R, RMSD, ubRMSD values" - Quite difficult to see in the avg,std bars, and within the error bars.

P8527, line 3: change to "... method are its simplicity, the fewer required inputs and ..."

P8548, Fig. 9: Please add error bars to the bars (consistent with Fig. 6 right-hand bars).

References:

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Albergel, C., Dorigo, W., Reichle, R. H., Balsamo, G., de Rosnay, P., Muñoz-Sabater, J., Isaksen, L., de Jeu, R., and Wagner, W. (2013). Skill and global trend analysis of soil moisture from reanalyses and microwave remote sensing. *Journal of Hydrometeorology*, 14(4):1259–1277.

Dorigo, W. A., Gruber, A., De Jeu, R. A. M., Wagner, W., Stacke, T., Loew, A., Albergel, C., Brocca, L., Chung, D., Parinussa, R. M., and Kidd, R. (2015). Evaluation of the ESA CCI soil moisture product using ground-based observations. *Remote Sensing of Environment*, 162:380–395.

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