

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

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Reviewers summary: A relatively simple approach for downscaling soil moisture, based on high spatial resolution remotely sensed vegetation and surface temperature data, was presented. A number of different satellite based products and product combinations from various sensors were used and the resulting soil moisture datasets were evaluated against the Remedhus network located in Spain. The particular downscaling approach is not entirely new, there are several studies presenting a similar approach.

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However, this approach is relatively simple and still yields results in line with much more complicated approaches. Other interesting findings relate to the relative performance of polar orbiting and geostationary satellites and to the different vegetation products that were used. Overall, the manuscript is well organised, reads well and is very relevant for regional scale hydrological studies. I only have a few minor comments to further improve the manuscript (see below).

P8510, L1: Correct the text, 'like e.g. the as'

P8510, L4: Geostationary data is indeed not widely used for surface soil moisture retrievals but Hain et al. 2011 (and its references) might be an interesting example to mention here. They successfully developed the ALEXI model that uses the observed land surface temperature gradient from geostationary satellites and uses this information, together with additional information, to estimate surface soil moisture conditions at a relatively high (3x3 km) spatial resolution.

P8510, L9-L11: A study that already inter compared the performance of geostationary (ALEXI model, see previous) and orbit satellites (ASCAT & AMSR-E sensors) is Parinussa et al. 2014. An intercomparison study of remotely sensed soil moisture products at various spatial scales over the Iberian Peninsula. However, the highest spatial resolution evaluated in their study was 10x10 km meaning that this study can push this forward.

P8512, L12: Remove the word 'popular' or replace by 'commonly used'.

P8519, L21: Please use 1:30 am/pm instead of 13:30 am/pm.

P8522, L23, L24 & P8524, L3 & P8525, L7-L8-L11-L20: Typo's.

P8524, L9-L10: That's obvious if VTCl is perfect, but I suggest to rewrite/remove this line.

General comment 1: Make sure that all figures are referred to in the main text, and also pay attention to the order.

General comment 2: This is more a general comment regarding the biases that were found, and particularly those of the ESA CCI product. To me, this is not a relevant topic. Firstly, owing the production chain of this dataset in which the original remotely sensed products are scaled to adopt an alternative mean and amplitude. And second because there should be a bias at all times as remote sensing and in situ represent a different vertical layer. Finally, most applications are blind for biases. Nonetheless, presenting the results regarding this metrics would be fine with me - but I would never draw (major) conclusions on those.

General comment 3: As was indicated in the text, several coarse(r) scale remotely sensed soil moisture products are available at the global scale. Over the recent years, a number of verification techniques were developed to evaluate their quality, some of them were also applied at the global scale. An important finding of these studies is that the global quality can widely vary for an individual product, and that there are usually clear relations with climatological conditions and performance. Based on this knowledge, readers should be aware that it's very likely that the developed approach will perform (very?) differently under different climatological conditions than those at the Remedhus network. Applying the developed method and evaluating it in other regions in the world could therefore simply be suggested as a follow on study, or as the other reviewer suggest, extending the current study area. Most important is to make the reader aware that obtained results are likely unique for the Remedhus and comparable climatological conditions.

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