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Hydrology and Earth System Sciences Discussions

Interactive comment on "Soil moisture active and passive microwave products: intercomparison and evaluation over a Sahelian site" *by* C. Gruhier et al.

Anonymous Referee #3

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The presented paper discusses the soil moisture data from various platforms via a intra-platform and also intra-algorithm comparison. The study has been undertaken over a region in the Sahel region with stations from the AMMA project as reference. I recommend this paper to be published after a number of major revisions.

My major criticism is actually that this study does not sufficiently reflect on what previous studies have concluded from their respective analyses and consequently it is not entirely clear what the new contribution of this paper is. Eg. what is the relevance of comparing AMSR and ERS data to yet another dry region when Draper et al. and Wag-

ner et al. have already done so? Moreover, Draper et al. compared 4 different AMSR products over a much larger domain with many more monitoring sites over a similarly dry region. Draper et al. and Rudiger et al. also show that there is a significant lack of response in the AMSR-E/NSIDC data, but that when normalized to standard values, those data actually had a good response to rain events (as the current paper underlines). Additionally, Rudiger et al. compared both active and passive observations. I think that it is critical that the authors add a good explanation as to why this new study is relevant and what it adds to the previously published studies. This could easily be achieved by summarizing what those other studies are lacking, compared to the current. This would also answer some of reviewer #1's comments, as it would include some discussion with respect to the application to other regions in the world (which, I agree, should be included).

I also miss more detailed discussions of the results themselves. This would greatly help this paper support its relevance as a significant contribution, rather than reading like a simple data comparison.

As my two fellow reviewers already suggested, a discussion about the limitations of applying the current retrieval algorithms to the Gourma site is necessary. Eg. what may be the issue of the ERS-TUW data, in terms of its already normalized character. Did it ever reach saturation and if not, what does that mean for this study? Or what is the issue of passive MW retrieval algorithms for SM values below wilting point?

Technical Comments:

1. p. 5307, l. 3: what is the scientific justification for not looking at the other monitoring regions of AMMA?

2. p. 5307, l. 25: so why did you not consider the other stations? Some discussion/analysis of the representativity would support this.

3. section 2.2.1: which AMSR-E-VUA algorithm is LPRM v03? Rudiger et al. say

in their paper that they encountered problems with some sort of saturation. Was that resolved in the v03 as it is suggested there (p.442)? If not, could you briefly discuss this?

4. section 2.2.2: the descriptions of both retrieval algorithms of ERS-scat should receive some more attention. In particular the second is unclear. The years 1992-2000 in line 14 seem to be rather short. I thought that this was increased to 2007!?

5. How did you normalize your data? In the recent past, I have seen three different ways to deal with this for various data sets: Pellarin et al. (2006), Gruhier et al. (2008), Draper et al. (2009), and Rudiger et al. (2009). I assume you followed the Gruhier et al method, but given that W Wagner is co-author on three of those papers, it should explicitly be stated (and the method described), to avoid any confusion.

6. The largest MRD of your data is 0.008 m3/m3! This is very small. Even smaller than the retrieval accuracy of 3-6% presented in previous studies. Is this still a significant difference we should be worried about? Come to think of it, the MRD should be dimensionless!

7. p. 5314, l. 15-16. I don't think that the AMSR-E/NSIDC threshold is necessarily responsible for the lack of response at 0.05 m3/m3. All other studies have shown that these data have a severe lack of dynamics, unless a significant rain event passes through the area.

8. are the correlations shown R or Rˆ2?

9. p. 5321, l. 3-5: how do you propose to improve the SMOS retrieval from these results?

Editorial Comments:

1. The introduction reads a little bit like a list of dot points of studies that have done this and that. I recommend, you add some text after each discussing what the respective studies have done/found/concluded. Eg. p.5305 lines 1-3, p.5306 lines 2-4,

2. p. 5305, l. 24-29: What is the relevance of this study for SMOS/SMAP?

3. p. 5306, l. 9: state clearly what the reference to the website is there for

4. p. 5306, l. 18-21: rather than saying what follows on, briefly state what you have found and what results should be expected.

5. Fig. 1b: would it be better to use a false colour image on which one could clearly distinguish between the dunes (red?) and the denser vegetation?

6. p. 5310, l. 18 (and throughout the manuscript). only use pure SI units. "28% m3/m3" can be misleading it should be "0.28 m3/m3"

7. p. 5310, l. 18-20 should read "These absolute values were only determined from sandy soils, which [...]. A further ERS-soil ..."

8. p. 5315, l. 8-9: " ... used for these two products cause gaps in the data set, which are based on the different criteria applied to ERS ..."

9. p. 5316, l. 6: Fig. 6 and Table 4 may be based on the same data, but do not show the analysis results. You should discuss those values in a bit more detail.

10. Fig. 6-10: change the font on these figures, as they are very hard to read, when printed.

11. p. 5316, l. 17: delete the "very"

12. p. 5317, l. 12: "... relatively good ..."

13. p. 5317, l. 23: which de Rosnay paper? 2009a or b?

14. p. 5318, l. 1: "... expressed as (a) volumetric and (b) normalised data ..."

references: Pellarin, T., J.-C. Calvet, and W. Wagner, 2006: Evaluation of ERS scatterometer soil moisture products over a half-degree region in southwestern France. Geophys Res. Lett., 33, L17401, doi:10.1029/2006GL027231.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 5303, 2009.