

Review of Parinussa et al.

General comments:

I think this is a good paper dealing with an important issue concerning soil moisture retrievals from the current SMOS satellite and the future SMAP satellite. It compares two recent techniques to evaluate soil moisture retrievals, and assesses their performance. Results from this comparison and the attendant discussion will be of interest to the hydrological sciences community. I recommend eventual acceptance and publication in HESS, but once the authors address a number of general and specific issues, itemized below.

From a general point of view, the paper needs a number of improvements, namely: (i) quantification of statements; (ii) clarification of statements; and (iii) clarification of technical points. Details are provided in the specific comments. A number of style comments also need to be addressed (see below).

Specific comments:

P. 6684, L. 15: I would have thought that as well as re-analysis data, analysis data from operational centres could also be used. If so, please amend here and elsewhere in the paper.

P. 6684, L. 25, 26 and 28: Please quantify the statements made regarding improvement in retrieval quality. This should be done elsewhere such statements are made (e.g. in conclusions and outlook section).

P. 6685, L. 1: The statement about “high degree of consistency” is vague. What do you mean? Good agreement in the patterns and/or magnitudes of the fields compared?

P. 6685, L. 13: I suggest the Kerr et al. (2001) reference could be updated to:

Yann H. Kerr, Philippe Waldteufel, Jean-Pierre Wigneron, Steven Delwart, François Cabot, Jacqueline Boutin, Maria-José Escorihuela, Jordi Font, Nicolas Reul, Claire Gruhier, Silvia Enache Juglea, Mark R. Drinkwater, Achim Hahne, Manuel Martín-Neira, and Susanne Mecklenburg, 2010: The SMOS Mission: New Tool for Monitoring Key Elements of the Global Water Cycle, Proceedings of the IEEE, Vol. 98, No. 5, May 2010, 667-687.

P. 6685, L. 15: Given the history of delays in the launch of satellites, would it be better to say: “and currently scheduled”?

P. 6692, L. 4: Provide a reference for ASCAT.

P. 6687, L. 22: I think you are discussing “CDF-matching”. If so, mention this term, as it would help the reader identify what you are talking about.

P. 6692, L. 21: If I understand correctly, the time periods for the TC and Rvalue methods are different. Could you comment on the likely effects of this difference on results?

P. 6694, L. 20: I understand the calculation of soil moisture errors as $P_{sat} - P_{gauge}$ comes from Crow et al. (2007). Is this result empirical or based on theory? Could this be identified in the paper? In my view, this would help clarify this part of the paper.

P. 6695, L. 17: It is not clear to me from the text what version of the Rvalue algorithm you use. Is it the one adapted by Crow et al. (2010)?

P. 6696, L. 9: What method is used to do the rescaling?

P. 6697, L. 25: I understand “vertical support” means the variation in the vertical. Is this correct? If so, could this be mentioned to help the reader?

P. 6698, L. 9: Why are these standard deviations used?

P. 6701, L. 3: I suggest you comment that as shown by Fig. 7, the TC and Rvalue results are roughly inversely correlated.

P. 6702, L. 10-11: Does decreased vegetation water content imply increased vegetation density?

P. 6705, L. 17: I suggest you write: “...their validity to evaluate soil moisture retrievals”.

P. 6708, L. 32: Is there an update for the Parinussa et al. Reference?

Style comments:

P. 6684, L. 4: I suggest you use “current” instead of “modern” when referring to SMOS. This should be changed in other places as well.

P. 6686, L. 20: I do not think you need “unfortunately”. I suggest you use something like “Because the newly designed...are single frequency and lack an instrument band...”.

P. 6687, L. 7: I think it would be better to say: “As a result of this feedback...”.

P. 6688, L. 3: To help the reader, remind them that the first technique under discussion is that of Rvalue verification.

P. 6689, L. 7: It would be helpful if at the end of section 1 you indicate what each section of the paper deals with.

P. 6690, L. 19: I suggest these references should be introduced earlier in section 2.1, when you first introduce the AMSR-E and Windsat sensors.

P. 6691, L. 16: To help the reader, I suggest you write: “...are also utilized: P_{sat} and P_{gauge} . P_{sat} is based...”.

P. 6693, L. 1: To help the reader, identify the lowest resolution.

P. 6693, L. 7: Identify the 6 classes or refer to Table 1.

P. 6698, L. 11-12: Are words missing? Should it be: "...radiation as it originates..."?

P. 6700, L. 21: I suggest you replace "strikingly" with "very" (and suggest the same should be done elsewhere in the paper).

P. 6702, L. 23: I suggest you replace "number" by "values" in both instances.

P. 6704, L. 9: Do you need the words "resulting changes in"?

P. 6705, L. 6: I think this should be: "Since the MERRA LST estimates do not...".

P. 6705, L. 13-14: I suggest you replace the term "novel" with "recent" and identify the techniques as TC and Rvalue. Perhaps replace the term "traditional" with "commonly-used"?

P. 6712, Fig. 2 caption: I suggest you indicate that red/blue colours indicate low/high values of optical depth.

P. 6713, Fig. 3 caption: I suggest that reference be made to Table 1.

P. 6714, Fig. 4 caption: I suggest you indicate that blue/red colours indicate low/high values of the Rvalue output.

P. 6715, Fig. 5 caption: I suggest you indicate that blue/red colours indicate low/high values of the TC output.

P. 6716, Fig. 6 caption: I understand different phase-shifts relate to different depths in the soil. If so, please indicate in the caption. Also, I suggest you identify the line styles/colours in the caption.

P. 6718, Fig. 8 caption: I suggest you identify in the caption the different symbols used.

P. 6719, Fig. 9 caption: I suggest you identify in the caption the different MERRA scenarios. I suggest that reference is made to how the positive values/negative values are measured, i.e., how are improvement/degradation identified.