

An assessment of the accuracy of global rainfall estimates without ground-based observations

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This paper presents a novel approach to estimating surface precipitation using retrieved soil moisture. The authors then apply their soil moisture estimates to understanding the uncertainties in satellite rainfall estimates, and indicate which potential rainfall products perform better in different regions of the CONUS and globally. The applicability to the hydrologic modeling community makes it appropriate for publication in HESS. I recommend publication with minor revisions, many of which deal with adding additional clarification for the reader.

1. Page 3, Line 5: certainly not certainty
2. Page 4, Section 2.1.2: I think that the flow of the paper would be improved by including the description of SM2RAIN with the description of ASCAT (or as a subsection to it) as opposed to the current arrangement of describing the instrument here and the product several sections later.
3. Page 4-5, Section 2.1.3: Readers familiar with the 3B42 product will recognize that you are using the “Real Time” rather than the “Research” version. In the CMORPH description you mention using the raw version that lacks gauge information, this justification should be included as to why you use 3B42RT as well.
4. Page 5, line 8: SSM/I instruments are operated by the US Department of Defense, not NOAA.
5. Page 5, line 23: 1st
6. Page 6, Line 11: should the second i in the square root also be subscripted?
7. Page 9, Line 19: “use” instead of “have utilize”
8. Page 9, Line 24: You indicate that equation (8) is only valid for liquid precipitation, and in the concluding remarks mention that the SM and combined satellite products are less reliable in cases of frozen precipitation/snow cover/frozen surfaces. Are you using the entire 2012-2015 time period, or only the warm seasons? If you are using the entire period, how are you dealing with the winter months?
9. Page 9, Line 28: Remove the word “values”
10. Page 10, Line 19, “are”, not “ae”

11. Page 10, Lines 27-28, and Page 12, Line 3: This may be arguing semantics a bit, but the results don't indicate that not using SM2RAIN yields unreliable results. The results indicate that not adhering to the assumptions of the TC method (specifically with respect to having estimates with uncorrelated errors) produces unreliable results. Table 1 indicates that triplets D and E do just as well without SM2RAIN.

12. Page 10, Line 32: Sentence needs revising

13. Page 11, Lines 15-21: It would be nice to have some context as to why the statistics for the multiplicative error are different from the additive. This comes up a bit later (line 32), but could be more up front.

14. As a general comment, it might be interesting to look at the CMORPH and 3B42 with gauge-adjustment in the global comparison. Presumably this would improve their results in data-rich areas and result in no change in data sparse regions. Comparing triplets using the same product both with and without gauge adjustment might also provide some indication of how much improvement the gauge adjustment provides.