

Interactive comment on “Influence of cracking clays on satellite observed and model simulated soil moisture” by Y. Y. Liu et al.

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The authors evaluate two global soil moisture products; one simulated using a state of the art LSM and one retrieved from AMSR-E brightness temperatures. From the difference between the simulated and retrieved soil moisture during the dry season in Australia, they conclude that cracks in the clay soils are responsible for the lower retrieved soil moisture. It might be possible that the cracks in clay soils are responsible for an underestimation in the retrieved soil moisture, but given the fact that the authors are only using global products a more detailed analysis is desired in my opinion. A major revision is, therefore, recommended.

Comments:

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P. 908 L23-25. Some references would be in place here.

P. 909 L6-9. The authors refer here to the validation of soil moisture retrievals against the simulated soil moisture, but is not it the best way to validation retrievals against measurements. Please rephrase the text a bit.

P909 L10-13. I don't know of any study that looked at the for a specific soil type. Retrievals over peat soils could, for example, be having complete different characteristics. Maybe it is better to put into a broader context.

P909 L201-203. It is not clear what the authors mean with “soil moisture dynamics in vertisol” is the temporal or spatial or the dynamics in the vertical direction.

P909-910 –L11. This portion of the text is a bit vague, but could easily be more quantitative by showing retrieved and simulated sm time series. Also the percentage clay for the areas in Australia could be informative.

P910 L12-16. In this part and P909 L21-23 both explain what the authors are going to do in the text. I think it would be nicer to merge them into one. Further, there is no method applied to circumvent the soil moisture underestimation due to cracking soils and the potential impacts of cracking soils on hydrological components are not shown; only vaguely discussed.

P912 L18-19. What do the authors mean here by the “convert to volumetric soil moisture”? How?

P912 L20 – P914 L914. The authors discuss, here, how soil texture, vegetation and rainfall influence the soil moisture retrievals. - This is, in general, an interesting discussion but I am missing the real quantitative measures. For example, a constant soil texture is used, but what was the value of the fixed texture and how much are the change in soil moisture relative to the change in soil texture. - Also the discussion about the NDVI and optical depth relationship, sm and rainfall correlation could better visualized by the showing time series with the data. For me that is much more convinc-

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ing. - An important variable affecting the retrieved soil moisture is surface temperature, but is missing in the analysis. As I remember correctly VUA product is derived using a linear relationship between the V-polarized 37 GHz TB. The clay cracks could also be responsible for a change in 37GHz emissivity and as such causing the low soil moisture retrievals. Maybe the authors could comment also on this issue.

P914 L10-12. The conclusion that cracks in the clays are causing the underestimation of the soil moisture retrievals because other explanations can not be found is a bit an weak argument. The authors should find more quantitative prove of the cracks in clays maybe through photo's. Then the shrinking and swelling of the clays should also be observable in the difference between the AMSR-E and CLM soil moisture.

P914 L12-18. Figure 5 is a nice illustration, but based on what source were availed to create this figure. Then where do the numbers for the soil moisture and soil porosity come from?

P915 L7-L9. How should the surface roughness change?

P915 L12-17. What will be the minimum soil moisture content for your vertisols? And How do these soil moisture values relate to the minimum soil moisture contents retrieved.

P917 L13-16. This statement is a bit difficult and I don't if it is really for your manuscript.

P917 L16-20. Why do the authors not show in the manuscript how difference between CLM and AMSR changes over time?

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