

## ***Interactive comment on “Estimating Annual Water Storage Variations Using Microwave-based Soil Moisture Retrievals” by Wade T. Crow et al.***

### **Anonymous Referee #2**

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The paper describes an analysis to use microwave based surficial estimates of soil moisture for annual water storage variations in medium scale catchments. The paper is very well structured, has a strong methodological set-up, written very clearly and scientifically novel. Furthermore, I liked the focus on the applicability of the current RS products for water resources research. To me, the main conclusion is that microwave based soil moisture seems a very good product to downscale GRACE water storage variations measurements to use in 10-fold smaller catchments then currently feasible.

I think the paper is thorough and the authors deserve compliments for their open, critical, step-wise analysis. I think the paper is ready to publish with only a few minor points to address. - Title: I think the title is somewhat too broad. I would prefer the title also states you are looking at medium scale catchments (just add in medium-scale catchments to the title) - Although you make several remarks on the use of a calendar year

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instead of a hydrological year and discuss it in section 5, I think especially this parts could benefit from some extra details. Maybe you could add some of the “Preliminary sensitivity analysis . . .” (P17L5) data to the paper. Maybe even a complete sub-section under section 4. Your approach (eq.4-6) is fully empirical, testing a pseudo-hydrological year and e.g. using less months (or add one month with more vegetation but with lower weight factor) seems so logical. - You clearly show the value of microwave soil moisture for downscaling GRACE information. Can you discuss whether there are other downscaling possibilities to have the same effect on GRACE derived storage variations?

Minor edits: P1L18: “contain significant” maybe it is more accurate to say “contain statistically significant” P2L5: certain regions: please specify P2L12 steam > stream P2L19: Q and P are not products but ground based data. Please rephrase P7L18: closure of (1). For me it would be easier if you insert ‘equation’ between “of (1)”. P9L20: snow/could > snow/cold P11L9: suggestion to remove ( ) around “credible”

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