Hydrology and Earth System Sciences Discussions

Interactive comment on "Soil moisture retrieval through a merging of multi-temporal L-band SAR data and hydrologic modelling" *by* F. Mattia et al.

Anonymous Referee #2

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The authors provide a well written paper. It demonstrates the combined use of modeled soil moisture and multi-temporal L-band SAR data. Modeled data are used for deriving a priori information on soil moisture at coarse scale to be used in a retrieval algorithm, which transforms multi-temporal L-band SAR data to soil moisture.

General comments:

In the description of the L-band SAR data, information on the spatial resolution and the radiometric properties are missing. The latter are of interest for understanding the results of the sensitivity analysis in subsection 2.2

The description of the retrieval algorithm refers to the sensitivity analysis and uses

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this to justify neglecting vegetation cover (p. 3485, line 28/p. 3486 line 1). It should be discussed, if this makes the presented approach site specific and therefore not repeatable for other test cases. Also in the description of the retrieval algorithm an exponential autocorrelation function is assumed without justification (p. 3486/ line 13). Admittedly, information on surface roughness used in an experimental assessment of the retrieval is given at the beginning of section 5. Maybe the authors could refer to this section when describing the retrieval algorithm in section 3. Nevertheless, it is not clear, if in situ measurements of surface roughness have been made or if the used roughness information is based on model results or published data from other studies. A clarification would be highly appreciated.

A more thorough discussion of scale issues would be of interest, e.g. why and how does coarse resolution scale help to derive soil moisture from L-band SAR data at fine resolution. Overall, the advantages of the proposed approach and its relation to other retrieval techniques should be discussed. Does the proposed retrieval algorithm have a potential in the context of operational and site independent soil moisture retrieval schemes?

Specific comments:

In section 2.2 there is only one subsection 2.2.1. If there is no subsection 2.2.2, the authors should maybe jointly describe the SAR data and present the sensitivity study in section 2.2.

Figure 6: In the flow chart "Preprocessing" is shown as part of the implemented SAR retrieval algorithm. This is not mentioned in the text. Especially it is not clear, what kind of filtering has been applied and what was masked in the data and why.

p.3483, line 1: Which bio-physical parameters relevant to the presented study have been obtained with the in situ measurements (even though the authors refer to a paper by Hajnsek et al. 2008, the bio-physical parameters used in the presented study should at least be listed)?

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