

Interactive comment on “Accounting for seasonality in a soil moisture change detection algorithm for ASAR Wide Swath time series” by J. Van doninck et al.

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We will here address the main comments of four reviewers on the discussion paper. Minor comments and technical issues are included in the revised paper.

Comments refer to:

1-Validation of the hydrological model. 2-Derivation of the seasonal angular correction coefficient and discussion 3-Comparison with low resolution soil moisture products

Replies:

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1-Data of the five in situ stations in Calabria have been incorporated in the revised manuscript. To this end, the hydrological model was run over a depth of 30 cm. Comparison of modelled and in situ soil moisture at 30 cm (Fig. 1) shows that the model strongly overestimates the dynamic range of soil moisture, which is mainly because the model provides an average over the 30 cm top layer, while in situ measurements provide soil moisture at a depth of 30 cm without integrating soil moisture of the layer above. There should however be no problem in using the modelled soil moisture as validation for remotely sensed soil moisture, since modelled soil moisture is strongly correlated to in situ soil moisture and modelled soil moisture is rescaled between 0 and 1, as is ASAR soil moisture.

While re-plotting the figure of the validation of soil moisture at 10 cm, we observed that a different result was obtained than presented in the discussion paper (Fig. 2). This is because the original figure was derived using a previous version of the hydrological model. The validation of the remotely sensed soil moisture products was, however, performed using a more recent version (both in the discussion paper and in the revised paper), so the following results remain unchanged. A separate sub-sub-section was added to the manuscript for the validation of the hydrological model (separate from the sub-sub-section discussing the model structure and inputs). Remotely sensed soil moisture was validated using the modelled soil moisture at 10 cm, and not at 5 cm as suggested by a reviewer. Although we are aware that 5 cm soil moisture is more relevant for microwave remote sensing applications, we use the 10 cm product since a 5 cm product could not be validated.

2-We acknowledge that the division in a winter (October-March) and summer (April-September) half-year is rather arbitrary (although the choice of these dates can be justified as being the months with the lowest/ highest average monthly rainfall, so this selection is probably as good (or poor) as any when dividing the dataset into two fixed periods for the entire site). Reviewers correctly indicate that for cropland pixels, as the one discussed in the paper, the peak of the growing season lies in the summer

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half-year. We agree that the summer half-year cannot fully be interpreted as a no-vegetation half-year and the results should be interpreted with caution.

The discussion of the seasonality effects on the angular correction is rephrased. Additionally, we initiated more detailed research on the season variability of the ASAR angular correction coefficient, e.g. by using shorter time intervals and by defining a “high vegetation” and “low vegetation” season for each pixel separately based on vegetation index time series, but this is beyond the scope of the current paper.

3-As suggested by the reviewers, two additional low resolution soil moisture products have been included in the manuscript: the TU Wien-EUMETSAT ASCAT product and the VUA-NASA (LPRM) AMSR-E product. Both products indeed outperformed the NASA AMSR-E product (Fig. 3.). The comparison with the coarse resolution products have been moved to a separate section to the end of the manuscript, just before the conclusions. These products are also briefly addressed in the “study area and datasets” section.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 10333, 2011.

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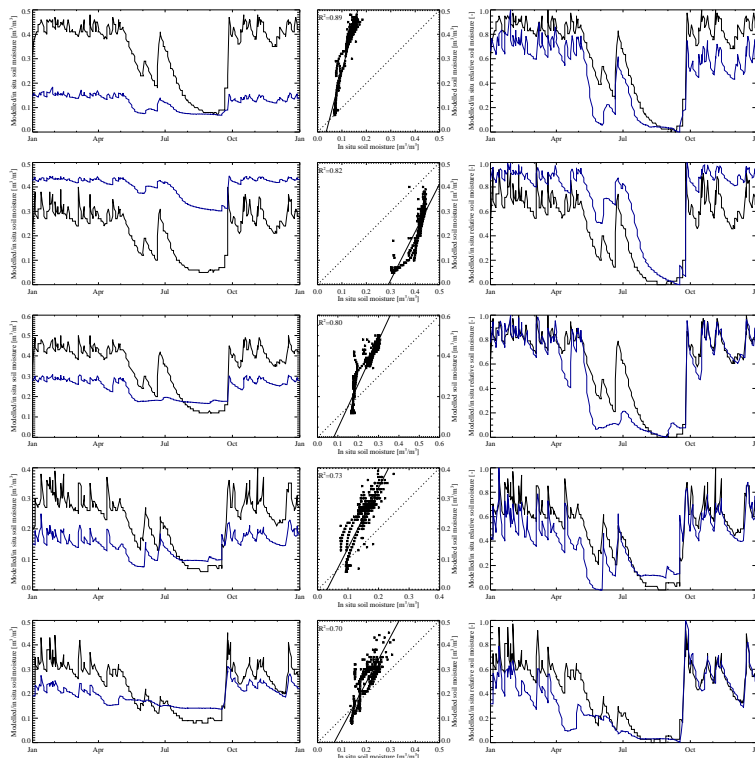


Fig. 1.

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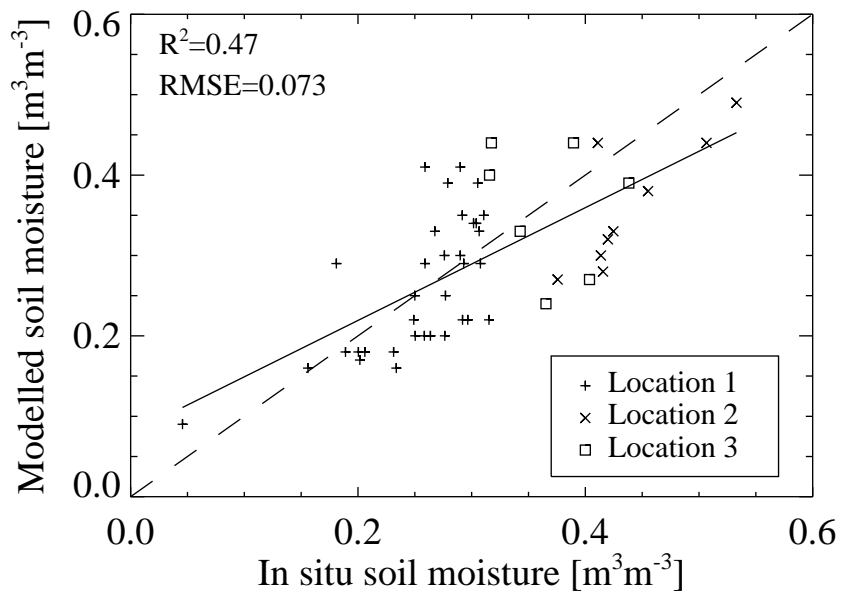


Fig. 2.

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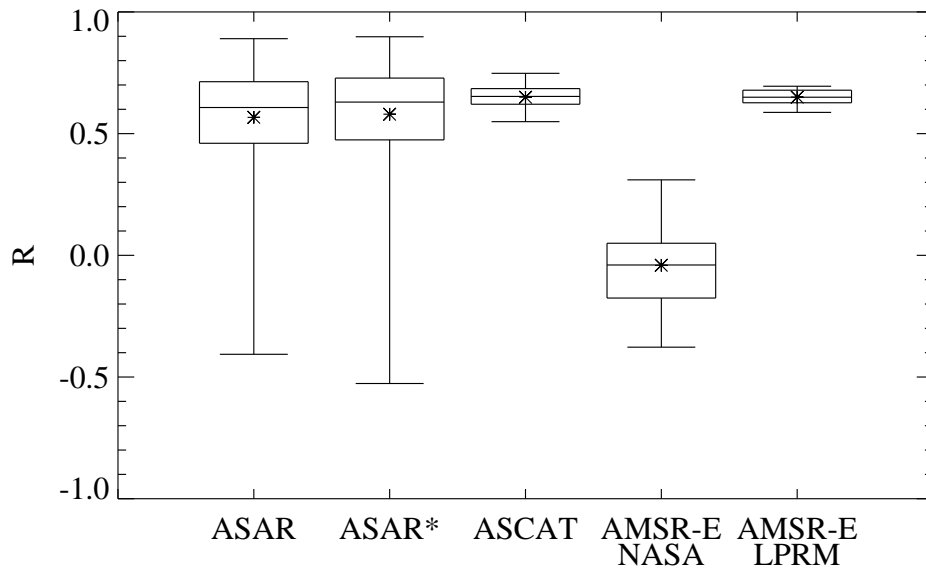


Fig. 3.

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