Hydrology and Earth System Sciences Discussions

Interactive
Comment

Interactive comment on "An inversion method based on multi-angular approaches for estimating bare soil surface parameters from RADARSAT-1" *by* M. R. Sahebi and J. Angles

Anonymous Referee #1

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This paper investigates the possibility of using multi-angular SAR data for retrieving soil moisture.

A major remark I have with this document is that it only refers to quite old literature (the latest reference is of 2002!), whereas a lot has been published in the last years on SAR and soil moisture and soil roughness. At least these recent results should be included in the paper and also used in the discussion!

The weak point of this paper is that both images (acquired at a different day) need to have more or less the same moisture content. If this is not the case, than this methodology wouldn't work...

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In the paper, the Modified Dubois Model is mentioned, but since the original document where this model was introduced is hard to retrieve, it would be good to have a decent introduction in the paper: what images (type, number, ...) were used to calibrate this model? How many images, points, ..., were used to validate the model? How good were these validation results? I hope that the images used in this paper were not the same as the ones used to calibrate the model upon? If that would be the case, then it is quite obvious that the MDM performs best!

Since all information is available to run the Integral Equation Model, which is one of the most applied backscatter models, I would appreciate to also include this model in the analysis.

The explanation on how the Newton-Raphson method works can be removed as this can be found in standard mathematical handbooks.

Page 209 line 13: it should state microwave remote sensing (as optical or thermal remote sensing of soil moisture is not related to the dielectric constant)
Page 209, lines 14-15: ´´On point measurements, remote sensing...´´: bad sentence
page 210, lines 15-20: comment on the effect of profile length and roughness parameters, also on the quite large sampling interval: this has concequences on the roughness parameters! Is this sampling distance smaller than 0.2 times the correlation length (this measure was suggested by Oh, Y. and Hong, J-Y. Effect of surface profile length on the backscattering coefficients of bare surfaces. IEEE Trans. Geosci. Remote Sens. 2007, 45, 632-638) in order to have a good estimation of the roughness parameters. Since correlation length was measured, why don't you give it?
page 210, line 20: Beaulieu et al is not in reference list.
page 211, line 4: remove the 12% relative error and only mention the absolute 1.8% error.
page 211, line 22: give more info on ´´nearly the same moisture content´´.
page 212, lines 15-20: In the paper, only the ´´optimal´´ results are presented. Prob-

ably they are not ´´optimal´´ but rather the best results, and second: I am extremely interested in the worst results. This should definitely be added to the paper such that the reader could get a better feeling with the overall capabilities of the model. It is scientifically not fair only demonstrating the best results!

page 215, line 5: mention that all images should have the same dielectric constant.

page 217: there's a 4.1 but no 4.2

page 217 and 218: it should be clear whether the images used in the analysis are different from the ones used to calibrate the MDM.

page 218, line 25: not clear what you mean with this sentence (´´where their respective functions are positive to negative´´)

page 219, line 1: what do you mean with ´´zero contours´´?

page 219, line 5: what do you mean with ´´closest point between the two curves´´? How do you calculate this ´´distance´´? The x- and y-direction in your graph have different units, so calculating a distance would have different units depending on the direction you measure!

page 219, lines 13-16: some further literature study should be done. Lately there have been some papers published that try to answer this.

page 220: there is a 5.1 but no 5.2. In this paragraph, it is not clear why one would apply such technique: is this only to get nicer images, or are there any benefits from it (from a hydrological point of view)?

page 220, line 13: you mention that the ´´pixel scale maps are more accurate´´: how did you validate this?

page 220, line 15-18: this delineation was done manually, wouldn't it have been better to use specific software such as E-cognition for this purpose?

page 220, line 20: reference here to figure 15 instead of at page 221 line 11.

page 220, line 27 - page 221, line 4: I would suggest not to use the speckle-filtered images, but rather average backscatter of the original image in the homogeneous zones that were defined. This also acts as a low-pass filter, and omits that you twice filter out the high frequency components.

page 221, line 5: what filters were used for the edge detection?

page 221, line 10-12: as said before: averaging corresponds to low pass filtering

page 221, line 20-21: ´´in this paper we demonstrated...to decrease these types of errors...´´: where was this demonstrated?

Table 1: RMS height instead of height rms + include correlation length

Figure 9: why is the ´´closest´´ point between both curves located where it is shown (see also comment hereabove!)

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