Hydrol. Earth Syst. Sci. Discuss., 6, C3596–C3598, 2010
www.hydrol-earth-syst-sci-discuss.net/6/C3596/2010/


Hydrology and Earth System Sciences Discussions

# *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

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Received and published: 12 November 2010

1) The references were updated. More discussion concerning more recent publications was added in revised version. However, there is no recent work that could have an important impact on the methodology of this study. 2) The answer contains two parts: a) Particular case: in this study, both soil moisture and soil roughness for image acquisition dates are approximately the same and this fact was approved by ground truth and weather condition verification. b) General case: this is a practical limitation of the proposed algorithm. This limitation was discussed in conclusion section of the first



version. Moreover, more discussion has been added in Results and Discussion section in the revised version of the manuscript. However, this limitation cannot completely prevent the applicability of the algorithm. For instance the case study was realized over the worse study area on the score of neglect but for many other areas such as arid or semi-arid area this limitation has a negligible impact. 3) More information about the MDM model was added to the manuscript. 4) As the referee mentioned, the IEM is one of the most applied models. However, this model, such as the other models, has a validity range. This model can be applied for smooth to medium roughness surface (for instance ks < 3 cm, for C band the condition is s < 2.7 cm). The roughness of study area is very high. Therefore, we cannot use the IEM in this study. This fact also is more discussed in the revised version of the manuscript. 5) The explanation about Newton-Raphson was revised.

Page 209 Line 13: It was corrected. Page 209 Line 14-15: The phrase was revised. Page 210 Line 15-20: As it is shown in the equation of the selected models, none of them uses the correlation length. Therefore this parameter did not presented in this work. Page 210 Line 20: Beulieu et al. was added in the reference list. Page 211 Line 4: The requested change was done. Page 211 Line 22: More information was added. Page 212 Line 15-20: "Optimal" was replaced by "best" Obtaining the best or the worst results depends on the different configurations and the data acquisition conditions. As mentioned in this paragraph, due to previous studies realized by Chanzy et al. (1998) and Sahebi et al., (2001 2002) the different configurations were discussed. In this work we used the results of these studies which have been already validated. Page 215 Line 5: The correction was done in line 6. Page 217: By adding a new title the problem is solved (there are two sections: 4-1 and 4-2). Page 217 and 218: The description about MDM was added Page 218 Line 25: The correction was done Page 219 Line 1: The paragraph was revised Page 219 Line 5: As added in the revised manuscript, the distance was measured by Euclidean distance. It is true that unites of the axes are different, but they have the same weight and the results for comparison are reliable. Also with normalizing the axes, the same results were

obtained. Page 219 Line 13-16: The paragraph was revised. Page 220: Structure of the manuscript was changed. This point is discussed in conclusion. Due to this explanation, the maps can be used for operational activities. Page 220 Line 13: This conclusion was done by comparing the maps with ground truth and field observation. The exact position of ground measurement was identified by GPS and measured soil surface parameters were compared with the map values. Page 220 Line 15-18: Only one part of the delineation was done manually and other parts were performed by the authors' developed program in C++. As we did not have access to eCognition software, we could not test the proposed idea. Page 220 Line 20: The correction was done Page 220 Line 27: It is correct that by applying filter, we lost some information; however for creating homogenous zone, we should apply the filter. We have tested both methods (averaging with and without filter) for creating homogeneous zone and the results were compared with ground truth. The accuracy of filtered method was higher than the method without filter, because of the existence of speckle. It should be noted that due to the expectation accuracy of homogeneous zone, this lost has no significant influence on the results. Page 221 Line 5: Sobel filter that was mentioned in the revised manuscript Page 221 Line 10-12: This point was discussed above. Page 221 Line 20-21: The phrase was revised. Table 1: About the correlation length was already discussed. Figure 9: This point was explained above.

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/6/C3596/2010/hessd-6-C3596-2010-supplement.pdf

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 207, 2009.