Hydrology and Earth System Sciences Discussions

Interactive comment on "On the use of AMSU-based products for the description of soil water content at basin scale" by S. Manfreda et al.

Anonymous Referee #1

Received and published: 22 June 2011

COMMENTS This is an interesting paper on a relevant topic that is within the scope of HESS. In this work the authors investigated the use of AMSU-A products for the characterization of soil water contents at basin scale.

The title clearly describes the contents of the paper. The abstract is concise and complete. The presentation is clear and the language is fluent and precise. The methods and assumptions are valid and clearly described and could be applied by other scientists. Nevertheless, the authors should be more explicit about the objectives of their research. Data presentation is appropriate but in some cases variable units are missing. The Results and Discussion sections are sufficient to support the conclusions, but the field data analysis should be shortened. The main part of the in situ data analysis

should be omitted because it is not relevant to the main goal of this research. The authors should use only this part for calibration/validation model purposes.

The authors should state clearly from the begining of the paper all the relevant spatial scale issues. From the beginning, the reader should know the spatial scale of the study area, of the SM modelling, and, of course, of the remote sensing data.

Specific remarks

- In the title and throughout the manuscript the authors should clearly state that the paper refers to AMSU-A products.

- Abstract, line 5: Not only satellite platforms but also airborne sensors.

- Introduction, page 5321, line 27: There are also active systems to retrieve soil moisture.

- Introduction, page 5323, lines 4-6: The reference to the paper of Dorigo et al. where the ISMN is described should be updated.

- At the end of the Introduction section, the authors should clearly state the goals of this research. In the way in which they are presented in the manuscript it is difficult for readers to understand the main goals of this paper.

- Introduction, from page 5323 line 7 to page 5324 line 3: This is Methodology, so it should be moved to section "2. Methods".

- Methods, page 5324, lines 19-20, and page 5325, line 6: In the formulas of SWI and SWVI "t" should be written instead of "z".

- Section 2.3, "Soil moisture modelling by DREAM model". The depth at which soil moisture is estimated using this model is not mentioned in the text. The authors should include it because this a critical point for understanding certain key issues of the paper.

- Section 3 "Study area and experimental setup", page 5328, lines 12-15. The authors

should include the wire length of the TDR probes. They state that "measurements were acquired at 30 cm depth" but they should explain whether the measurement depth was 0-30 cm or whether the measurements were made at a depth of 30 cm.

- Section 3 "Study area and experimental setup", page 5328, lines 16-29. The authors should clearly state whether the mean soil moisture obtained with this sampling scheme is representative of the soil moisture of the basin. They explain what they have done but they should include the reasons for selecting these specific sampling sites.

- Section 3.1 "The field data", page 5329, and Table 1: The "spatial mean" of this period ranges between 0.23 and 0.41. These are very humid conditions along the sampling period. The authors should discuss to what extent these limited conditions might influence the results and the conclusions of this work.

- Section 3.1 "The field data", page 5329, line 21. After reading several pages of the manuscript, the reader still has no information about the spatial resolution of the satellite product used. This is another important point. The authors should clearly state the spatial resolution of the satellite products used in this research as from the beginning of the manuscript.

- Section 4 "Results and Discussion", page 5330, lines 17-23: This paragraph is repetitive. This information was mentioned previously.

- Page 5331, lines 11 and 19-20: The authors should explain why they consider "high correlations" when the coefficient of correlation is 0.5 or 0.6.

- Page 5331, lines 12-13: The authors write that "sites characterized by a dense vegetation cover (i.e. forest) show low correlation value", but very few cases are analyzed in this work to support such a statement.

- Page 5331, lines 21-23: The authors highlight that "the investigated period is characterized by a low number of significant rainfall episodes". Nevertheless, they should also underscore that the soils had high soil moisture contents throughout the study period.

C2341

- Page 5332, lines 1-2 and 9-10, and figure 4: "Model was also validated using the SM measurements during the field campaign". The simulated SM depth has not yet been mentioned. It is very important to know whether both databases refer to the same depth in order to assess that validation.

- Page 5332, lines 2-3, and figure 3: The authors should include their definition of "saturation degree"

- Page 5332, line 29: The simulated SM depth ranges from 50 cm to 180 cm while the measured SM depth is 0-30 cm (or 30 cm?). This is a very important issue and it should be clearly stated in the Methodology section.

- Page 5333, lines 15-18 and figure 7: SWI* clearly underestimates SM if the SM modelled is considered a good reference of the soil water content in the area studied.

- Page 5334, lines 1-2: "We adopted threshold values of SWVI ranging from 0.5 to 3.5..." This statement should be revised. As observed in figure 6, the SWVI data are as high as 2.5. The authors should include a better explanation, because in figure 8 the AMSU SWVI data are as high as 6.

- Page 5335, lines 13-18: Very few cases have been studied in this research work to establish such a conclusion about the relationship between measured or modeled SM with the remotely sensed data and the land cover. Another type of approach is necessary to investigate this issue and, of course, it should consider a broader variety of scenarios in terms of vegetation cover.

- Pages 5342 and 5343, Tables 1-2: Soil moisture units should be included.

- Page 5346, figure 1: The spatial scale should be included.

- Page 5347, figure 2: Soil moisture units should be included. The correlation coefficients should have at least two decimals.