Hydrology and Earth System Sciences Discussions

Interactive comment on "Improving runoff prediction through the assimilation of the ASCAT soil moisture product" *by* L. Brocca et al.

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Received and published: 9 September 2010

First of all we are really thankful to the reviewer for highlighting the originality of the manuscript. As the purpose of the paper is to assess if coarse resolution satellite soil moisture observations retrieved by ASCAT can be of benefit for hydrological applications, we fully agree with the reviewer that further investigations based on a larger number of catchments and/or study regions and a longer time series are essential definitely.

Concerning the few minor remarks:

1- In the paragraph 2.1 the MISDc is introduced as a continuous rainfall-runoff model,

but it is also stated that the model was developed for the simulation of flood events. Later in the paragraph 5.1 the authors say that "all the results are shown only for flood events". Could you please add few words to solve this question.

The doubt raised by the reviewer comes from a lack of clarity in the manuscript. Actually, the rainfall-runoff model used in the study is based on the coupling of a Soil Water Balance (SWB) model for soil moisture simulation and an Event-Based Rainfall-Runoff (EBRR) model for discharge simulation. However, the two models are linked through a relationship between the soil moisture values simulated by the SWB model and the initial conditions of the EBRR model (derived through experimental observations). Therefore, the model is able to simulate discharge only during flood events (not throughout the year) and that's why we showed the results only for floods. The structure employed for the model was aimed to reduce its parameterization. These aspects will be detailed in-depth in the revised manuscript.

2- If I do understood well, SWI is directly linked to the characteristic time length T; I think it should be better to complete the explanation (of paragraph 5.2) on how you obtained the parameter T.

For the computation of the SWI index (eq. 1 and 2), the value of the constant parameter T has to be assessed. For that, the optimal T parameter value was obtained by comparing the SWI derived by ASCAT with the modeled saturation degree, SD_{mod}. In the revised manuscript we will better clarify the matter.

Page 4126 Ln 18 and page 4128 Ln 28 SER should be ASS

The reviewer is right and accordingly we will modify the manuscript.

Page 4126 Ln 23 is σ_{mod} the same of $\sigma[SD_{mod}]$ of the eq 3?

The symbols should be $\sigma_{SD_{mod}}$ instead of σ_{mod}. Accordingly we will modify the manuscript.