Hydrol. Earth Syst. Sci. Discuss., 5, S1684–S1686, 2008
www.hydrol-earth-syst-sci-discuss.net/5/S1684/2008/
© Author(s) 2008. This work is distributed under
the Creative Commons Attribute 3.0 License.

Hydrology and Earth System Sciences Discussions

Interactive comment on "A modelling approach to assess the hydrological response of small Mediterranean catchments to the variability of soil characteristics in a context of extreme events" *by* C. Manus et al.

Anonymous Referee #3

Received and published: 2 November 2008

General comments

The paper presents an interesting and positive appeal. In particular I appreciated the approach which is more devoted to increase the understanding of main hydrological processes than to (only) reproduce the observed catchment behaviour. Also I observe that good points within the modeling assumptions are those regarding the soil behavior description which is also corroborated by good quality datasets. On the other hand a number of suggestions could be given in order to improve the quality of the paper.

A number of strong hypotheses are made practically without any verification, in particular: Lateral flow is missing; Hillslope routing is neglected; Bedrock is impervious; Flow velocity in the stream is equal to 1 m/s.

The first of these also has particular impact on the overall paper. In fact the authors state that their model is able to reproduce both hortonian and dunne type of runoff generation. Actually they assume that a Dunne type of runoff generation is obtained whenever the soil cell is saturated. I do not believe that this hypothesis is correct because a dunne type of runoff occurs whenever the water table beneath the river network intercept the soil surface. The water table level mostly depends on fluxes recharging the groundwater through lateral flow which absent in the modelling assumption.

Another lack in the paper was already raised by the editor and by the first reviewer: the model lacks of validation. The authors should fill this gap by using a gauged basin for validation, as the first reviewer suggested, or by adding more information about the observed events. For example by reproducing the hydraulic propagation of the flood wave along different sections of the critical channel reach and comparing these simulation results with traces of flooding left by water.

On the other hand also one of the most promising topic of the paper is not completely developed. It is the comparison between the use of different ptfs. While the authors show what is the difference in the hydraulic properties of soil, a discussion of the impact of such uncertainty in terms of peak discharge is missing.

Minor comments The paper would deserve some stylistic rearrangements. More than in one case there are concepts hat are repeated in different parts of the paper (page 2691, paragraph 5). The authors should check and rearrange the paper in order to be sure that all repetitions are eliminated. The heterogeneity of soil features is delineated for the entire study area, less details is devoted to the studied basins. The use of fractions of ks and tetas (page 2697 par 15) used for replacing bedrock permeability appears too empirical and not supported. The use of the Richards equation in a

HESSD

5, S1684–S1686, 2008

semidistributed model is relevant. The authors should more comment on this and in particular on the adoption of soil cells of 1 cm thickness and area equal to the soil unit area (not specified in the paper).

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 2687, 2008.

HESSD

5, S1684–S1686, 2008

Interactive Comment