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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.

C. Manus et al.

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Important preliminaries :

This document contains one Table which is difficult to upload properly through the HESSD website procedure. Please refer to the pdf document available at the following address : http://ltheln21.hmg.inpg.fr/PagePerso/anquetin/Access.html

Referee : The paper describes the application of a new model in 4 ungauged basins in France, where only rough estimations were available of peak discharge of a storm

event in 2002.

Authors : The reviewer is right to underline the rough; nature of the discharges estimates derived from post event field investigation. However, as stated in the general comments, extreme discharges are only available through indirect observation, as direct gauging is too dangerous to be performed. For instance in France, only 10% of the gauging sections have been gauged for discharges greater than the 10-year return period discharge.

Referee : The model concepts as such are combinations of already existing approaches, based on a Richards equation approach with hydraulic characteristics based on Brooks & Corey. The estimation of some parameters is done using a few more recently developed methods. Validation is based on single peak discharge estimates of a single storm for these basins. To justify the procedures used, and to justify publication in a scientific journal, I believe the study would need the testing/validation of the used model and methods in a gauged basin as well with a good data time series. Have the authors considered this? Could they still carry this out? If not, why not?

Authors : We agree with the reviewer comment that a validation is necessary. As stated in the general comment, such a validation is difficult to perform for extreme events, due to a lack of relevant data. Given the context and the aim of our study (extremes and small scales watersheds), we propose a validation procedure (see general comments) based on the simulation of several peak discharges estimated from post field investigation on several small catchments. The results of these validations are added to the new version of the paper.

Referee : The assumption of a constant flow velocity of 1 m/s in the river network in the model assumes relatively slow-medium flow; What is the basis of this assumption? In my opinion, the value is likely to be larger during these kind of flash flooding. Application of a larger velocity will likely seriously influence the simulation of peak discharge. Since validation is solely based on single peak discharge estimates of a single storm,

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this could have serious consequences. What do the authors comment on this.

Authors : In the general comments, we have added some results of sensitivity studies using a constant velocity of 2, 3 and 4 m s-1 and the use of a kinematic wave approximation of the St-Venant equation. The results are moderately sensitive to this choice. The sensitivity range is of the order of magnitude of the uncertainty range of peak discharge estimations from field survey. In the revised paper, we use the kinetic wave approximation of the St-Venant equation to simulate the velocity in the river network. The simulated velocities are found to vary around 2.5-5 m.s-1 at the outlets. In conclusion, the choice of 1 m s-1 was clearly inadequate but relatively insensitive on the peak discharge estimates, given the size of the watersheds.

Referee : Have they evidence for the 1m/s assumption?

Authors : In the validation section of the revised paper, we added the simulation of 17 catchments investigated during the post flood survey. For these catchments, the velocities corresponding to the peak discharge in the river bed and in the floodplain have been estimated from the slopes of the water surface and the ground and from the roughness. This information had not been exploited in the initial version of the paper. In Table 3 below, the computed values confirm that a velocity of 1 m s-1 was inadequate and that a value of 3 m s-1 is more in agreement with observation (keeping in mind that the values provided in Table 3 are maximum values). In the revised version of the paper, we have chosen to use the kinematic wave approximation that simulates more plausible velocities. It, therefore, avoids a subjective choice for the flow velocity.

(PLEASE REFER TO THE TABLE AVAILABLE AT : http://ltheln21.hmg.inpg.fr/PagePerso/anquetin/Access.html)

Referee : If a chapter on a gauged basin is added, the paper will serve as providing a nice method for ungauged basins.

Authors : The authors appreciate this encouraging remark. We hope that our approach

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will prove to be useful for risk assessment on small dispersed ungauged watersheds.

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December, 11th, 2009, Grenoble, France

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