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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Application of a model-based rainfall-runoff database as efficient tool for flood risk management" *by* L. Brocca et al.

L. Brocca et al.

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Referee 1 (blue: Referee comments, black: author replies)

The paper by L. Brocca et al. proposes a modelling framework that uses a RR model coupled to a rainfall generator within a support system for rainfall-runoff scenario building, testing and assessment in the context of flood flows.

The paper follows a nice idea and tries to answer an interesting research question: 'how simple can we be without damaging the quality of the results and hence the decision-making process?'

They tested the system over two basins in Italy. The paper is well written and well

structured. It reads very well.

I am very much in favor of such a system (building a large 'look-up' database which has been built using data and models but can be very easily interrogated by the end-user/decision-maker to issue high flow/flood warnings, who often have no direct knowledge or linkages to the underlying science of a flood forecasting system.

There is not much I am concerned about in this paper; I believe the framework presented is easily applicable to a real decision-making example and should receive a lot of positive feedback.

We are really grateful to the reviewer who perfectly catches the paper message.

Concerning the three minor comments:

- I assume the RR model has been tested in previous studies? Can you give details on past study performances of the model (section 2.3)?

The reviewer is right; the employed rainfall-runoff model was already successfully applied in several catchments in Italy (*Brocca et al., 2010; 2011a; Camici et al., 2011*) and across Europe (*Brocca et al., 2011b*). This will be specified in the revised manuscript.

- Why are the performance indices values lower in the calibration period than in the validation period for S. Lucia (Table 1)? I would expect the opposite. I feel this should be explained in section 4.2

The model performance in the calibration and validation periods is strongly dependent on the range and variability of discharge data in the two periods. For this study, we simply subdivided the two periods by considering the first 6 years for calibration and the remaining 5 years for validation. Generally, we believe that model performance is satisfactory both in calibration and in validation, mainly for high flow conditions (ANSE 0.9). As the purpose of the paper is not a full assessment of the rainfall-runoff model performance (for instance, this could be done considering different calibration/validation periods), we will keep the two periods. Anyway, a sentence will be added explaining

better the possible reasons for the slightly better model performance in validation at S. Lucia (and probably also at P. Felcino).

- Table 2 shows the number of scenario simulations run for all hydro-meteo. variables for the presented test case. Do the authors know the minimum number of runs required in order to still yield the same performances or how many runs are required before the use of a different RR model would change the results? I understand the latter part of the question is more difficult to comment on but the former (min. number of runs required?) should be fairly straightforward.

This is a good point and we will do our best to address it: (1) by identifying a suitable performance measure(s) for the database, and (2) by proposing a procedure to assess the minimum number of scenarios to be considered for obtaining reasonable performance.

As regards the second point of the question, we deem to be beyond the aim of the present work. However, considering that it's of interest for a Decision Support System definitely, a future study will address how results are affected by the use of different rainfall-runoff models as well as different stochastic generators. This will be specified in the abstract and the conclusions.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 2089, 2013.