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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Flood design recipes vs. reality: can predictions for ungauged basins be trusted?" *by* A. Efstratiadis et al.

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SHORT COMMENT

I quickly (and carefully) read the manuscript that caught my attention by reading the title and the abstract. I found the paper well written, well structured and clear. I fully agree with the authors about the large uncertainties affecting the estimation of design floods and that the use of simplistic approaches will favour arbitrary choices. Indeed, we found similar issues in the classical procedures used in Italy and I strongly supported the development of more elaborated but standard procedures for minimizing the uncertainties that are intrinsic in the estimation of the design flood values.

However, I found in the paper some issues that, in my opinion, should be addressed

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Interactive Discussion

Discussion Paper

before the publication.

1) By reading the abstract, it seems the SCS-CN method is based on field data from few experimental catchments. In contrast, the method is based on an extensive field activity, even though mainly for small agricultural fields and only in USA. As the authors well know, the main problem is not in the SCS-CN method itself, but on its application for purposes much different from the ones for which the methods was developed. This should be clarified in the manuscript.

2) In the analysis made on the paragraph 3.3 and Table 2, the different formulas for the computation of the time of concentration are compared in terms of peak discharge estimation for 32 flood events occurred across Cyprus. However, it is made implicitly the assumption that the results only depend on the selection of the time of concentration, but it is evident that also other components, mainly the selection of the runoff coefficient C, influence the values of the estimated peak discharge (as clearly described in the paper). Other factors include the rainfall duration, the selection of the areal reduction factor, the intensity-duration-frequency curves (ombrian curves), ... Therefore, I found not correct to select the most appropriate formula for the computation of the time of concentration by using this procedure. Can the authors add more elaborations on that?

3) Besides the time of concentration, we found that the selection of the initial soil moisture condition is the most important factor influencing the estimation of the design flood values in Mediterranean catchments. Specifically, the (arbitrary) selection of different antecedent moisture conditions strongly affects the peak discharge and runoff volume. Therefore, more robust methods for defining the initial soil moisture conditions should be developed. For instance, with apologies for suggesting my own references, Camici et al. (2011) proposed a procedure based on the application of the Continuous Simulation approach as a tool to deïňĄne the "design soil moisture" condition to be afterwards incorporated into the more simple Design Storm method (widely used by engineers). I believe that this aspect should be better discussed in the paper.

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Interactive Comment

4) Finally, in the paragraph 4.3 (Figure 1) it is shown that the SCS/SUH method fails in simulating flood hydrographs for two basins in Cyprus. However, this can be related to errors in the input rainfall data, or in the discharge values (e.g. in the determination of the rating curve), and not to the SCS/SUH method. I expect that the authors should show an alternative method able to simulate the flood hydrographs for which the SCS/SUH method fails.

Moreover, it is well known that the SCS-CN method works well for simulating flood hydrographs characterized by a single flood peak. Therefore, in the two events shown in the upper panels of Figure 1 (note that the time step is not reported in the x-axis) occurred in the Sarantapotamos catchment, the second rainfall pulses should be not considered. By removing these rainfall pulses, the simulation of the flood should be significantly better. For instance, Massari et al. (2013) found the SCS method able to satisfactorily reproduce several flood events occurred in the Rafina basin in Greece.

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