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Hydrology and Earth System Sciences Discussions

Interactive comment on "On the role of the runoff coefficient in the mapping of rainfall to flood return periods" *by* A. Viglione et al.

A. Viglione et al.

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We would like to thank J. Skøien for his positive review and his useful comments which are addressed in the following (line numbers refer to the original manuscript).

I find the results and discussion regarding the runoff coefficients giving a 1:1 correspondence of TP and TQ quite essential for this paper, as the authors are searching for the conditions that will correspond to the general assumptions when applying the design-storm-procedure. Although the authors emphasize the complexity of finding the correct runoff coefficient in the discussion, I think it can be expanded with a short paragraph discussing more directly the consequences of the current practice with respect to possible over- or underestimation of TQ.

We believe that this is a very important comment. The practical question about the

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consequences of the application of the design storm method should be discussed in more detail. To address more closely this point we added a new section (4.3) and a new short table (Tab. 1). The section, entitled "Biases in the design storm method when assuming TQ=TP and the median rc", answers to the question: how far is the T-year flood peak quantile from the flood peak obtained by applying the design storm method assuming TQ=TP and choosing the median flood producing runoff coefficient as design value? The biases of the flood peak estimates are calculated for a sample of the systems analysed in the paper (dry–wet, no-threshold–threshold) and are reported in Table 1. We also added some comments on the relation between the return periods of the input and the output of the design storm procedure when using different pre-selected runoff coefficients (see response to A. Castellarin).

P629, L13: Change "unless for very" to "except from very".

We changed it to "except for very"

P629, L22-24: The sentence appears a bit clumsy, consider rewriting.

We changed "In hydrological modelling, it represents the lumped effect of a number of processes including antecedent evaporation, rainfall and snowmelt on the catchment soil moisture state and hence runoff." to "In hydrological modelling, it represents the lumped effect of a number of processes on the catchment soil moisture state (including antecedent evaporation, rainfall and snowmelt) and hence runoff."

P635, L23: There should be a comma after "occur".

Comma added.

P637, L1 Change "to have" to "of having".

Changed.

P646 L14: Although there is a reference to Sivapalan et al. (2005) on P632, it could be repeated here.

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Reference added.

P648 L18, P650, L11 I think "greater than or equal to" should be "smaller than or equal to".

Corrected.

Multiple places "space" could several places be exchanged with "parameter space".

We have changed "space (i, tr, rc)" to "(i, tr, rc) space". In our paper i, tr and rc are not called parameters but variables.

Fig 2 a) and b): The key could include the envelope curves

We think that this inclusion is not needed. The caption explains what the curves are.

Fig 3: I think the main part of this figure is from Merz and Blöschl (2009), a reference could be added to the caption.

Reference added.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 627, 2009.