Hydrology and Earth System Sciences Discussions

Interactive
Comment

Interactive comment on "On the role of storm duration in the mapping of rainfall to flood return periods" *by* A. Viglione and G. Blöschl

A. Viglione and G. Blöschl

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

The papers approaches the problem by assuming a strongly simplified world. On the one hand, these strong simplifications make the analyses possible and allow insight into the relationship between rainfall and flood return period. On the other hand, they are a serious drawback, since it is not clear to which extent the conclusions of the paper are useful for "real-world" hydrology. Although there may be some misgivings, if future, extended analyses can finally reach a state where the assumptions are appropriate for "real-world" problems, the approach is certainly valuable.

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The aim our work is to understand the relationship between rainfall and flood return periods. In this first paper we start from the very basic case. The conclusions of the paper are useful for the following analyses, where more complexity will be added to the system. Some conclusions have been obtained that are significant for hydrological practice at this stage, for example, the fact that the critical storm duration that maximizes TQ/TP (to be used in the design storm procedure) is not simply related to the basin (i.e. = time of concentration) but also to meteorological forcing (distribution of storm durations). The follow up paper will relax the assumption of constant runoff coefficients, and there is a third paper planned that will deal with complex hyetographs.

It would be good if the authors could check the paper for spots where hydrological interpretations of their findings could be strengthened. For example, at page 3435, line 28 they point to the importance of selectiveness of the exponential and rectangular filters. Could this result be "interpreted" in view of hydrological processes?

This is a good point. The exponential filter represents, to some degree, hydrological processes in that it is a summary description of the non-linearity of surface and near surface runoff (velocity depending on depth), so the rising limb is always steeper than the falling limb of the hydrograph. In contrast, the rectangular filter that is used to construct the IDF curve is commonly chosen for convenience and tradition. It would indeed be possible to construct IDF-like curves with exponential filters which would assist in clarifying the TQ-TP relationship. We added the following sentence on page 3427, line 17. " The exponential filter represents, to some degree, hydrological processes in that it is a summary description of the non-linearity of surface and near surface runoff (velocity depending on depth), so the rising limb is always steeper than the falling limb of the hydrograph. In contrast, the rectangular filter that is used to construct the IDF curve is commonly chosen for convenience and tradition."

- page 3425, line 20, and page 3426, line 11: choice of parameter values (betaR, deltaR, a1, b1, a2, b2): I would like to see some justification for the choice of these values.

These are "reasonable" values. Most of them were fitted to data from a raingauge station in Sivapalan et al. (2005), Frankenfels in northern Austria.

- page 3427, line 2: I suppose that the "." in the distribution function should be replaced by "i" -> (i|tr)

The point means here the storm intensity that produces the flood peak qp. We used the point for brevity in order not to have to rewrite $\Pi_Q^{-1}(q_p, t_r)$ as in Equation (9).

- page 3430, line 4: comma after "...in the same way..."

Done

- page 3432, line 23: please specify short and long storms

The storm duration - grey scale correspondence can be read off Fig. 3.d

- page 3435, line 8: "higher probability" instead of "more probability"

This change has been done.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 3419, 2008.

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