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Hydrology and Earth System Sciences Discussions

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

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

1 - p. 3422, line 24

"one is interested in the IDF curve for a duration 3h". Reformulate this statement. There is no IDF curve if only a duration (aggregation time interval) is considered.

We changed the sentence to "one is interested in the IDF relationship for a duration of 3h". Actually, in Italy it is common practice to represent IDF curves as intensity vs. duration (so every curve corresponds to one return period) as shown in Fig.1. In Austria, for example, the IDF curves are represented as intensity vs. the return period,

i.e., every curve corresponds to one duration (aggregation level). Since we have used the Italian style in Fig.1, following your suggestion makes the text more consistent.

2 - p. 3425, lines 7-10 p. 3427 line 7

The authors should highlight the (additional) assumption that the mean number of rainstorms equals the mean number of floods per year. Flood is usually defined as a peak flow exceeding a given threshold (also on Kottegoda and Rosso, 1997, p. 455). The authors could also comment on the possible implications of this assumption and its relaxation.

In our work we consider all storm events and all the related runoff events on an event basis, so the number of storm events is equal to the number of runoff events. There is hence no need to identify floods of the population by a threshold and no need to make assumptions on the number of floods. It is the average number of events (both small and large) per year that is assumed to be a constant (in this case 40).

3 - Equations (6)

Units should be indicated for these empirical relations. Sivapalan et al. (2005) adopt a variable alpha1 to describe seasonality, which is neglected in this study instead. Also, the parameters of the empirical power laws were identified for a particular raingauge (Frenkenfels). An expected rainfall intensity that increases with storm duration is - at least in my opinion - a bit puzzling. Is the adopted value of b1 (0.01) statistically significant for the considered raingage and applicable elsewhere? The authors should briefly comment on this.

In the case of Frankenfels, the average rainfall intensity E[i] of "all" storms increases slightly with duration (b1 is close to 0, so intensity i is almost constant with duration). The extreme rainfall intensity, on the other hand, decreases with storm duration, as expressed by the IDF curves (e.g. Fig.1). For short durations, the expected value of i is relatively low but its variance is high, so that very high values of i can occur (and

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are represented by the IDF curves). For long durations the variance is low, so that the intensities are always small. b1 is probably not significantly different from zero for this station, but as mentioned above, it is the variance that contributes mostly to the shape of the IDF curve. We calibrated the model to other stations in Austria (not shown in the paper) where b1 is more different from zero (e.g. b1=-0.1 in Hopfgarten, in Tirol).

Your comment is useful. For clarity, we changed the statement "intensity decreases with storm duration" (line 15 - page 3437) with "extreme rainfall intensity decreases with storm duration".

Units have been indicated in the text.

4 - p. 3432, line 5

"the maximum difference between ... depends on the return period"; I find this statement a bit confusing. Can we state: "the maximum difference between ... depends on the considered value of Tq." instead?

This has been changed.

5 - p. 3434. line 10

"Delta_c". Do the authors mean "Delta_r"?

Yes, this is a typo and has been changed.

6 - Figure 8

A schematic that describes the main outcomes directly on a sketched Tq-Tp space would be very convenient.

Our first idea was actually to use a schematic for the results in Fig. 8, but then we decided for the mathematical notation as it is more general. Particular cases are the mapping represented in Figs. 2 to 6. We hence prefer not to change Fig.8.

7 - Lists

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Interactive Comment

Also, in my opinion a bulleted list containing all the assumptions adopted in the study located at the end of the Introduction would be convenient too. Finally, a notation list at the end of the manuscript (Appendix) would be helpful.

The bulleted list has been added in the introduction.

The notation list has been added at the end of the paper.

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

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