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Hydrology and Earth System Sciences Discussions

Interactive comment on "Stochastic rainfall analysis for storm tank performance evaluation" *by* I. Andrés-Doménech et al.

Anonymous Referee #3

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The paper proposes an analytical approach to assess volumetric and overflow reduction efficiencies of storm detention tanks for sewer systems. In particular, regarding the stochastic representation of rainfall, it is shown that distributions other than the exponential (i.e., Pareto and Gamma) should be used to model rainfall characteristics (storm duration, depth and interarrival time) in two locations in Spain.

I enjoyed reading this paper, which is nice, sufficiently concise and well written.

The paper has already been reviewed by other two reviewers and I essentially agree on the points raised by them. In particular, I deem the seasonality issue raised by reviewer #1 as very interesting and I appreciate the additional "seasonal" analysis performed by the authors, which has to be inserted and discussed in the final version of the paper. I add hereafter some additional (minor) comments that should be considered by the

authors.

page 1851, lines 1-12: in this paragraph the distinction between analytical and simulation methods is explained. I would add a couple of sentences on what are the different purposes of the two types of methods and what are their advantages and drawbacks. For me, the analytical methods have the advantage of being simple and allow to quickly screening a wide range of possibilities (e.g., what Fig. 8 of this paper shows). The simulation methods, more time consuming, are then used to refine the analysis on few possibilities (or a reduced range of them) chosen using the analytical ones.

page 1851, lines 19-29: here the authors discuss the use of exponential distributions in literature to describe interevent time, rainfall duration and rainfall depth in derived distribution approaches. Indeed, other distributions have been used in similar works, for example the Weibull and Gamma distributions in Sivapalan et al. (2005), even if not specifically for storm-tank studies. In that paper, seasonality is incorporated in the derived distribution approach (this relates to the main point of Reviewer #1) and the dependence between storm duration and intensity is taken into account. This reference could maybe be used when discussing the additional seasonal analysis performed by the authors.

page 1862, lines 15-18: where is it shown that the autocorrelation coefficients for rainfall depth and duration are not significantly different from 0?

page 1862, lines 20-26: The correlation between rainfall duration and depth is indeed significantly positive. It is said that, however, this does not affect the results of the analysis. Could be this point expanded? How the effects of the correlation have been/could be analysed? Is there a reason for which it doesn't matter? Reviewer #1 suggests to model storm intensity instead of depth, but I guess that negative (non-linear) correlation would be found in that case. Could you plot Figure 5 in the reply to the Reviewer #1 (Scatterplots of v/d versus d for the Valencia 2 raingauge) in a log-log scale?

page 1863, lines 10-15: goodness-of-fit tests are applied for rainfall depth and duration

and are reported in Tab. 3. It is not clear to me how the results of the tests have been used to state that rainfall depth is better described by the Pareto model and the rainfall duration by the Gamma model. Table 3 shows the results of the tests only for some of the distributions checked. Please consider to add also the other distributions.

page 1863, line 19: Palermo in northern Italy?

page 1863, line 24: how does table 5 show that the Pareto distribution is the best model? Please consider to add a table similar to Tab. 3, again showing results of GOF for all the considered alternatives.

page 1864, lines 1-9: the difference between the results obtained in Valencia and Santander are discussed. I would suggest to add here two sentences on what distinguish the Pareto distribution from the Gamma, i.e., the Pareto distribution is more heavy-tailed than the Gamma. Is there a rationale (e.g., climatic reasons) of why the distribution of storm durations is of these two different types in the two locations?

Table 3: I would not indicate the test statistics with the term p-value, which reminds me of a probability level.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 1849, 2010.