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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.

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The manuscript entitled "Stochastic rainfall analysis for storm tank performance evaluation" by I. Andreas-Domenech et al. presents an interesting formulation and application of a model to determine the optimal size of stormwater detention tanks. My overall impression on the manuscript is very positive, since the results are novel and interesting. However, some points are not fully clear in my opinion, as detailed in the list below.

1) The Authors analyze three different variables in their analysis of rainfall time series, namely inter-event time s, rainfall depth v, and event duration d. However, I was not able to understand how the information on the duration of the events d is used in the analysis. In fact, both the volumetric efficiency and the overflow reduction efficiency, which are the two indices obtained in equation (20) and (21) to characterize the per-

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formances of the design method, do not seem to depend on the event duration d. If this is the case, it is not clear why the Authors also consider the probability distribution of event durations (see Table 3 and 5) in their analysis. If in contrast the event duration plays a role in the design method, this should be explicitly mentioned somewhere. Moreover, in this case the Authors should provide some justification on the fact that they neglect a significant cross correlation between rainfall volume and duration (page 1862, 21-26).

2) A main result of the paper is in the fact that the probability distribution of the rainfall depths is found to significantly deviate from the exponential. The Pareto model is found to be more appropriate in this case. Determining the best probabilistic model to reproduce the statistical behaviour of a given sample is a delicate issue, which is usually approached by resorting to model selection techniques. In the present paper an approach based on goodness-of-fit tests is adopted; however, some details are missing with the effect that the obtained results are not fully convincing. For example, it is not clear why the Authors use different tests for different distributions (page 1863, line 8-13), while for example the Cramer-von-Mises test is available for all of the considered probabilistic models (e.g., D'Agostino and Stephens, 1986); also, the p-values are reported only for the Pareto distribution in Table 3 (the results for the Gamma-2 and exponential model in Table 3 are for the event duration?); finally, the empirical distribution function to be used in the Kolmogorov test is simply i/n (not Hazen plotting position, page 1856, line 7), see D'Agostino and Stephens (1986), page 101.

3) Some results in the paper are based on the derived distribution theory, applied to censored variables. However, in many cases it is not clear if the Authors refer to the censored or to the uncensored variable in their analyses. For example when considering the expected value of the runoff volume r (equation (12)) and the spilled volume w (equation (19)) it is not clear if the case r=0 (w=0) is accounted for in the expectation. If this is not the case, the equations should be modified by dividing the expected value for the probability of having a non-null r (or w) value. A similar comment applies at page

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1856, line 4: the CV of the bounded exponential distribution is indeed equal to 1 if one considers the censored variable s-s_crit, as done in standard applications.

Minor points:

- page 1855, line 22: please change “of a Poisson process” to “of the interevent times” (the Poisson process does not have a CV)

- page 1857, line 3-4: what are the Anderson limits?

- Page 1858, line 13: the implicit relation for v is the one given in equation (5)? If this is the case it is a quadratic (invertible) relation

- Page 1859, line 6-8: in case v is above P_ 01 but below P_02 (and similar cases) the summation in eq. (12) extends to 3 (or less) addends? Please specify

- Page 1856, line 17, page 1858, line 2, page 1860, line 12 etc.: please change “accordingly” to “according”

References:

D’Agostino, R.B. and Stephens M.A. (1986), Goodness-of-fit techniques, Marcel Dekker, Inc., New York

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