Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2017-437-RC2, 2017

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Censored rainfall modelling for estimation of fine–scale extreme" *by* David Cross et al.

Anonymous Referee #2

Received and published: 9 October 2017

General comments.

The research work presented in the manuscript develops a new methodology to estimate fine-scale rainfall extremes. Although there has been a substantial amount of work done, by many authors over the years, on stochastic point process models for rainfall, most of the models proposed tend to underestimate the rainfall extremes at fine-scales. Estimation or reproduction of extreme rainfall at hourly and sub-hourly scales is a well-known problem. In this context, this paper attempts to address this problem by using a censored approach to model rainfall extremes. This is in a way similar to the Excess Over Threshold (EOT) method commonly used in extreme value modelling, but here a stochastic mechanistic model is used along with this idea. Application of this novel idea of censured modelling approach is illustrated in the estimation

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Discussion paper

of fine-scale rainfall extremes from two different regions to provide an improved representation of extremes.

The paper gives an excellent coverage of the history of work carried out in this area to convey the rationale for the need to study or explore alternative methods for fine-scale extremes.

The success of this new approach, of course depends heavily on the choice of the censor level and, hence, emphasis was placed on finding appropriate value of the censor for the application. If the estimation of extreme rainfall is the main objective of the study then using this censored approach is certainly a useful tool and worthwhile addition to the existing methods.

One drawback in the proposed approach might be the amount of fine-tuning required to get the best set of potential estimates for the extreme rainfall with respect to model, its parameterisation, censor, statistics used in fitting as well as aggregation levels. This level of tweaking or fine-tuning might prove to be a lot to generate sufficient interest amongst practitioners. The rationale behind the need to make these choices, however, has been explained in the manuscript though. Specific comments.

Line 257: Would be useful to give a reason for the assumption of rain cells starting at the storm origin.

Line 316-319: Can appreciate the reason given for the choice of fitting statistics used for model calibration, but the question now is that how do the parameter estimates compare when the same fitting stats are used for uncensored fitting? Has this been explored?

Line 358: Perhaps you need to explain what you meant by behavioural parameters for the readers.

Line 358: 95% confidence intervals: unless you are using the standard errors of the estimates, I am not sure whether “confidence” interval is the appropriate terminology

here. Simulation bands?

Line 396: Not sure why your validation for Atherstone was based on 0.6mm censor which seem to contradict your statement on lines 375-380. Some insight/explanation would be useful to the readers.

Line 396: Table 2. Different censor for different sites is understandable. However, why do you need to use the same sensor at 3 different aggregation level for Atherstone while using different censors for the 3 levels of aggregation for Bochum?

Fig 8: row 2. The nice seasonal pattern observed in the mean rainfall for Atherstone at 5 and 15 minutes has become less prominent or disappeared at 60 minutes. Can you comment on why? No observation or comment was made about this.

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