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Interactive comment on "How extreme is extreme? An assessment of daily rainfall distribution tails" *by* S. M. Papalexiou et al.

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I would like to begin by congratulating the authors of this paper (Papalexiou et al., 2012), who have done a masterful job of pulling together and analysing a large body of data to study rainfall distribution tails. This is indeed a very active and important area in the field of hydrology, as it can be noticed by the rich and interesting discussion following the publication of this paper in HESSD. I would like to add a couple of comments to the present discussion.

1) Unlimited variates

In the interesting Comment by Clauset (2012), it is also stated: "In fact, there must

be a physically imposed upper limit on the largest possible rainfall, which means the extreme tail of the distribution must be truncated by finite-size cutoff"; but extreme value theory (EVT) is based on unlimited variates (Gumbel, 1958). This problem refers to the important issue that statistical variates should be consistent with our experience of the real world, and infinity transcends reality. In the classic work by Gumbel (1958), it is given an effective defence against this criticism which I endorse: "This objection is not as serious as it looks, since the denial of the existence of an upper or lower limit is linked to the affirmation that the probability for extreme values differs from unity (or from zero) by an amount which becomes as small as we wish. Distributions currently used have this property. The exploration of how unlimited distributions behave at infinity is just part of the common general effort of mathematics and science to transgress the finite".

2) Model diagnostics

In EVT, estimates are often required for levels of a process that may not have been observed yet, meaning that EVT provides a class of models to enable extrapolation from observed levels to unseen levels. However, as stated by Coles (2001): "(...) extrapolation of models to unseen levels requires a leap of faith, even if the models have an underlying asymptotic rationale". This is especially so when observed values are scarce. Indeed, it is very important to investigate the discrepancy between a large amount of observed values and the values expected under the model in question, because if the model represents badly the extreme values that have already been observed, this behaviour is likely to be greatly magnified on extrapolation. This is why I strongly appreciated the contribution of the paper under discussion, which provided the analysis of such a huge amount of observational data.

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