

## ***Interactive comment on “Stochastic daily precipitation model with a heavy-tailed component” by N. M. Neykov et al.***

### **Anonymous Referee #1**

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#### General Comments

The paper presents a stochastic model for daily precipitation with emphasis on the reproduction of the precipitation extremes. The methodology of the paper is mostly based on the study of [Furrer and Katz, 2008]. The model is validated with data from one weather station. In general the paper addresses an interesting topic with a potential of wide applicability. It is focused and precise.

#### Specific Comments

My major criticism against the paper is the lack of its generality. The paper presents indeed a quite comprehensive analysis and model validation for only one station. To what extent those results can be easily generalized is uncertain. For example the

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authors chose to reproduce the tails of the precipitation distribution using a GP model. For example, in a recent study, various distributions have been found as adequate for describing the behavior of the tail from daily precipitation records [Papalexiou et al., 2012]. I believe that this should be discussed in more detail in the manuscript. The question that is still open is the general applicability of the model (e.g. for precipitation records from different climates etc).

Moreover, the study focuses on the reproduction of precipitation at the daily scale. I believe that this choice of the authors should be further justified. The last two decades, the majority of hydrological and ecological applications, have focused on describing and resolving the relevant processes on much finer scales (e.g. hourly or even finer for urban hydrological applications). Taking this into account, the potential of the suggested model can be limiting. To my belief a comprehensive and complete stochastic model for precipitation should target on the reproduction of all the essential precipitation statistics for a wide range of scales relevant for hydrological and ecological applications. I would encourage the authors to discuss this in further detail in the manuscript.

One final remark I have for the manuscript concerns its novelty and originality. From my point of view the paper follows closely the work of [Furrer and Katz, 2008]. I recognize that there are differences in the methodology (e.g. In this paper both a gamma and a Weibull distribution are used for the simulation of the “body” of the precipitation depths), but the overall concept is very similar. I would encourage the authors to put more emphasis on the novelties they introduce in the paper, since I believe this should be the added value of the present (and in general of any) study.

#### Editorial suggestions

To what follows are some personal suggestions to the authors in order to improve the readability of the paper. The authors may adopt them if they agree or discard them without further discussion/justification.

I think Figure 1 is a bit messy and difficult to interpret correctly. The only visual dif-

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ference a reader can appreciate concerns the very rare extremes. The authors may consider a different option in order option to show those results (e.g. A table with interannual statistics, etc.).

In Figure 6 it would be nicer to plot the data points in the graph, rather than as horizontal ticks. Doing that the comparison between model and data would be more straightforward visually.

In Figure 9, due to the high skewness it is difficult to interpret the box plots, since all the boxes are very small. It would be probably better e.g. to use a logarithmic scale for the precipitation depths.

Moreover it would be useful to report a table with the basic statistics (mean, standard deviation, skewness, kurtosis etc.) of the observed vs simulated series shown the Figures of the paper.

#### References

Furrer, E. M., and R. W. Katz (2008), Improving the simulation of extreme precipitation events by stochastic weather generators, *Water Resour. Res.*, 44(12), doi:10.1029/2008WR007316.

Papalexiou, S. M., D. Koutsoyiannis, and C. Makropoulos (2012), How extreme is extreme? An assessment of daily rainfall distribution tails, *Hydrol. Earth Syst. Sci. Discuss.*, 9(5), 5757–5778, doi:10.5194/hessd-9-5757-2012.

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