

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

S. M. Papalexiou et al.

smp@itia.ntua.gr

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RC: Reviewer's comments

AC: Authors' comments

We thank Salvatore Grimaldi for his kind comments and his detailed review.

RC1. *The data set description should have more details, and a table with the summary of time series properties could be useful. Time series length is important as well as the percentage of missing data. The geographical location also is important and from figure 2 I do not think it is possible to verify some curiosities (i.e. time series density per continent or type of rainfall regime, etc.) Did authors fill the missing values? 20% could be an high percentage if the extreme values are included in it.*

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AC1. We did not attempt to describe the dataset in more detail as this is not a dataset that we have compiled. All the details are given in the database site we refer to. Yet, we described all the details regarding the selection of records and the additional quality control we applied. Nevertheless, we will add a table of summary statistics and a modified map where the time series length can be seen. We did not fill any values and we think that filling in values belonging to the distribution tails (i.e. extremes) may be dangerous because any regression-type technique would underestimate the real values. Thus, in our case the missing values only affect the effective record length, Given that we have put a relatively high lower limit of record length (50 years) the resulting problem is not too serious (note that in several studies and research papers, much smaller records are typically used, e.g. 10-30 years). Furthermore, the percentage of missing values is much smaller than 20% for the majority of the records, and thus it cannot alter or modify the conclusions drawn.

RC2. *The same comment arises reading the last part of the paper. There are two sentences that surely can be better supported, like: 2a) “we believe that even in the cases where the gamma tail performed well, the true underlying distribution tail may be heavier” While in Figure 1 and 3 authors guide the reader to explain in detail and effectively the adopted procedure, at the end of the paper they were too concise to explain this point that is interesting other than important.*

AC2. Before this point, which refers to the performance of the Gamma distribution, we note that heavy tails tend to be hidden especially when the sample size is small and we provide some references. We do not have another argument to add here to further support this hypothesis. It is just a conjecture that may or may not be valid and that's why we write “we believe”.

RC3. *“The map of Fig. 7.....seem follow a random variation” The same comment for this point. From the Figure 7 is not possible to make any conclusions neither the authors conclusion. I would suggest to show only two maps with “heavy tail” and “light*

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tail" points, and give some information on the geographical distribution. Authors could not see a specific conclusion but the reader could be interested on it.

AC3. The suggestion to show two maps showing light and heavy tails is a good idea; we have prepared the two maps and we will incorporate them in a revised Fig. 7; yet, we will keep the previous four maps as we believe they are useful.

RC3. *Minor comments [...]*

AC3. We thank the reviewer for being so attentive and we will implement his list of minor corrections in the revised manuscript (except in very few cases in which we have different opinion).

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