Hydrology and Earth System Sciences Discussions

Interactive comment on "Reliability and robustness of rainfall compound distribution model based on weather pattern sub-sampling" by F. Garavaglia et al.

Anonymous Referee #1

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General comments:

The authors analyse the suitability of a new probability distribution model for rainfall maxima. This distribution is called multi exponential weather pattern (MEWP) distribution and represents a mixture of exponential distributions related to a set of atmospheric circulation patterns, which has been introduced in Garavaglia et al. (2010). The authors define some new criteria for assessing reliability and robustness of the MEWP distribution and to compare it against standard approaches using seasonal maxima with Gumbel and GEV distributions as well as seasonal peak over threshold

values with Exponential and GP distributions. The results show that weather pattern sub-sampling increases the estimation performance and that the MEWP distribution is robust and reliable. The presented methods and ideas are quite new and interesting. The presentation is clear and well structured. The conclusions are supported by the data and results. I have only some minor comments for improvement of the paper (see below).

Detailed Comments:

1. Abstract: The reference to the SCHADEX method at the beginning of the abstract is somewhat misleading, since this method is not the core of the paper (see also below).

2. p. 6760, line 2: Again, a reference to the SCHADEX method is made mentioning, that the MEWP distribution will be combined with continuous hydrologic modelling. This requires continuous rainfall series, which cannot be provided by a single MEWP distribution. This is confusing. In addition, it seems difficult to access any English paper where the SCHADEX method is explained.

3. p. 6762, Table 1: In Table 1 the MEWP distribution is related to POT sampling, but it seems that weather pattern maxima are used (there if no reference to selected thresholds)? It also seems that only data within the "Season at risk" are used? Please, make this more clear.

4. p. 6763, line 9: I think the quantiles are related to non-exceedance probabilities and not to frequencies.

5. p. 6763, line 12: The authors use a large set of daily data. What about shorter (or longer) rainfall durations? Are in the GRADEX/ SCHADEX methods only daily rainfall data used? Can this method mitigate the problem of poor availability of long time series with a sub-daily resolution? Please discuss this issue.

6. p. 6764, line 17: Statistically it is correct to exclude stations with trends. From Table 2 it seems that a large number of stations have been excluded because of trends. So,

for practical design the question arises how to deal with that problem. It cannot simply be neglected. A brief discussion of this problem would be useful here.

7. p. 6770, Eq. (4): This equation is not easy to understand. May be it can be commented somewhat more. Is bootstrapping used here also to assess the confidence intervals?

8. Fig. 6-8: The x-axis in those figures is labelled "frequency". I think it is here referred to the "empirical non-exceedance probability" or the "cumulative frequency". Also, in the text frequency is used several times when cumulative frequency is meant.

9. Fig. 6-8: I would suggest to make it more clear, that the probability distributions are estimated from criteria obtained from all stations. This may be mentioned in the figure captions.

References:

Garavaglia, F., Gailhard, J., Paquet, E., Lang, M., Garçon, R., and Bernardara, P.: Introducing a rainfall compound distribution model based on weather patterns sub-sampling, Hydrol. Earth Syst. Sci., 14, 951-964, 10.5194/hess-14-951-2010, 2010.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 6757, 2010.