

Review of Accounting for rain type non-stationarity in sub-daily stochastic weather generators by Benoit et al.

The paper presents a rain-type simulator conditional to meteorological covariate applied over central Germany. Two methods are compared and the authors show that the non-parametric approach outperforms the parametric one. In addition, the simulator is used to project changes in rain-type frequency and seasonality in future by application to RCM under RCP8.5.

I find the paper interesting, well-written and well-structured. My comments mainly touch some methodological issues and ask for some clarifications.

1) Rainy images are considered those with > 10% rainy pixels (what rain intensity threshold was applied to set a pixel as rainy?). I wonder if the selection of 10% as a threshold is important and may affect the conclusions? For example, if there is a distinct rain type with a small coverage area (<10%) we totally miss it. I understand a threshold needs to be set, but it should be clarified that there is no high sensitivity to this definition.

2) Radar data are not gauge-adjusted – this may affect the indices, especially the intensity indices. For example, the “Mean rain intensity over all rainy pixels” index is obviously affected by biases in the radar data that could be corrected with gauge adjustment. It can be claimed that such biases will be consistent and therefore will not affect classification, but biases in radar data could change along the years and thus the inter-annual frequency of rain types may be affected. I suggest addressing this point in the paper.

3) Rain type duration: please explain how is it computed? is it simply derived from consecutive maps series with the same type and does a single map with a different type end this series?

4) Long and short dry duration: is the 24h long/dry duration necessarily defined over days (i.e, midnight to midnight) or is it 24h with an arbitrary starting point? if the latter, how dry periods are split between “long” and “short” intervals?

5) It would be helpful to indicate the percent of rain amount out of total amount for each rain type, as well as for “dry” time-steps (i.e., with <10% rainy pixels).

6) Figure 2A: please indicate months so seasonality can be better realized

7) It would be helpful to mention statistical significance for the comparisons presented in Figure 3.

8) Eq. 1: I think that it should be written as: $P(St=j|St-1=i,x)=\dots$ if not, please explain what is the source of index j on the right side of the equal sign.

9) Page 9, Lines 9-10: can you explain why different data are used for determining the Sigma and Mue matrices?

10) Fig. 6: can you explain the systematic negative bias in rain occurrence frequency for the two models?