Review of the paper

Accounting for rain type non-stationarity in sub-daily stochastic weather generators

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The method of clustering rain types was presented in a previous paper. It is based on radar images, and thus not on real rainfall. Radar images are notoriously weak in quantifying precipitation amounts, which can lead to mismatches. Are the on ground rainfall characteristics really related to these types? The 10 % wet pixels for the rain classifications means that the beginning and the end of the events are neglected. This leads to a reduction of the durations. Wouldnt it be reasonable to apply a space time classification?

The choice of the meteorological covariates is not convincing. The seven variables seem to have weak relationships with the rain types. Are these variables really better if they are combined? A scatterplot of the variables with the indication of the rain types would be necessary to see if the variables are likely to explain the occurrence of the different rain types. Would not a similar typing of the spatial patterns of these variables be a better alternative to find a relationship? Another specific problem here is the use of daily covariates. Rainfall is often related to short time changes in temperature and air pressure. The suggested disaggregation procedure cannot cope with this and practically relates 10 min precipitation types to daily covariates through a pre-defined daily cycle. This of course reduces the possible influence of the covariates. Present observations could be used to see whether the covariates are better if available on higher resolution. The variable with the clearest signal is temperature, which may be the only reason why changes are detected in the RCM scenarios.

Simple year by year cross validation is not enough to show the applicability of the model for climate model downscaling. Instead a split sampling into dry and wet years and warm and cold years could help to know if the model is likely to handle climatic signals reasonably.

In my opinion the systematic bias of the parametric model indicates that it was not set up properly. Therefore, it would be important to modify it and remove the bias. I would certainly not try to apply a model which is biased.

Minor remarks:

1. Figure 2 upper panel: One cannot guess the fluctuations of the frequencies of the individual rain types except for type 1. I suggest to show individual lines instead.

2. Figure 7 (c): due to the very high dry transition probabilities the other transitions cannot be judged from this presentation.

In summary I think this paper contains a lot of interesting ideas, which deserve publication. On the other hand there are a lot problems which should be discussed before accepting it for publication. Therefore, I suggest a major revision.