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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Accounting for rain type non-stationarity in sub-daily stochastic weather generators" *by* Lionel Benoit et al.

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Dear Editor and Reviewers,

Thank you for your detailed comments and suggestions about our manuscript entitled "Accounting for rain type non-stationarity in sub-daily stochastic weather generators".

To capitalize on your propositions of improvement, we suggest to:

(1) Better explain how the proposed rain type simulation approach fits within the framework of stochastic rainfall simulation.

(2) Give more details about the selection of meteorological covariates.

(3) Better justify the 10% threshold selected to define a rainy radar image.

(4) Keep only the non-parametric model in order to ensure unbiased results, and to simplify the method section.

(5) Reinforce the validation section by adding a split-sampling test that demonstrates the ability of our model to handle climatic signals.

To this end, we consider to modify the plan of the paper as detailed hereafter. The content of the new sections is introduced together with our point-by-point responses to the comments of the reviewers, which are available in attached files. When several reviewers raised the same issue, we repeat our reply in each point-by-point response.

Hoping that our responses address your concerns, and that our propositions of improvements will fulfil your expectations,

Best regards,

Lionel Benoit, Mathieu Vrac and Gregoire Mariethoz.

General overview of the proposed changes:

Considering the comments and recommendations of the reviewers, the outline of the paper will be amended as follow:

Non-stationary stochastic rain type generation: accounting for climate drivers [new title]

1. Introduction [new figure to contextualize our approach]

2. Example dataset of rain type time series and related meteorological covariates

2.1. Rain type time series [new material to justify the 10% threshold]

2.2. Meteorological covariates [new material to justify the joint use of covariates]

3. Stochastic rain type model [keep only the non-parametric model]

4. Model assessment

4.1. Cross-validation

4.2. Sensitivity to climate variability [new material]

5. Application to RCM downscaling

6. Concluding remarks

6.1. Discussion

6.2. Outlook

Appendix A: Cross-validation when accounting for low rain coverage [new material to support Sect 2.1]

Appendix B: Selection of meteorological covariates [new material to support Sect 2.2]

Appendix C: Markov-chain-based model of rain type occurrence [moved from Sect 3 to appendix]

Appendix D: RCM bias correction and performance of associated rain type simulations

Please also note the supplement to this comment:
https://www.hydrol-earth-syst-sci-discuss.net/hess-2019-562/hess-2019-562-AC3-supplement.pdf

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