

## ***Interactive comment on “Generating spatial precipitation ensembles: impact of temporal correlation structure” by O. Rakovec et al.***

### **Anonymous Referee #2**

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Comments on:

Generating spatial precipitation ensembles: impact of temporal correlation structure

The manuscript presents a methodology for generating ensemble rainfall fields using conditional sequential simulation. The manuscript fits the scope of Hydrology and Earth System Sciences. However, I cannot recommend publication in its current form. My main concern is that the presented approach is not validated rigorously. The manuscript could be published pending a major revision by the authors. More specific comments are available below:

–The simulated ensembles and the conditional simulations are not validated rigorously. Presenting the mean and standard deviations of observations and simulations cannot be considered as a thorough validation. The authors could leave a certain number of gauges out of simulations and use them to cross-validate the conditional simulation. This is a very common practice in most geostatistical papers, some of which cited in the manuscript. Alternatively, the bootstrap technique can be used to evaluate the representativeness of the simulated ensemble.

–Parameter estimation: no information on the representativeness of the proposed variogram is provided. Also, it is not clear how the parameters are estimated. This is an important part of the manuscript, as simulations depend on the choice of variogram. Include a discussion on parameter estimation and explain how the goodness-of-fit is evaluated.

–The purpose of the synthetic simulations is not clear at all. In my opinion, the authors should focus on the “real-world” experiments and conduct a rigorous validation. That, in my opinion, would make the manuscript acceptable for publication. I urge the authors to eliminate the synthetic simulation all together (see also the next comment).

–Apparently, the authors use the spherical variogram to generate the synthetic scenarios. Then, the same model is used for simulations. In a sound synthetic analysis, the synthetic rainfall generator should be independent of the model used for simulations. Such synthetic analyses cannot be used for validation and verification purposes as the same model is used for both data generation and simulation. For this reason, I think the presented synthetic analyses do not provide much insight into the methodology. Neither do the analyses lead to more information on applicability and/or validity of the model. For the reasons mentioned in the above two comments, I suggest removing the synthetic analyses part.

–Figure 2 is not discussed in sufficient details. Explain the presented boxplot including the solid black lines and the bounds.

–Indicate how the data in Figure 2 is used in simulations, and discuss the limitations of deriving autocorrelation coefficients from just few events.

– Figure 3 seems to present a general example of experimental and spherical variograms. General examples are already available in standard textbooks. Either eliminate the figure or revise the example and use real data from the gauges used in this study (identify the events, and discuss representativeness of the fit).

–References:

(I) Reference to Krajewski and Smith 2002 on radar bias and error.

Krajewski WF; Smith JA, 2002, Radar hydrology: rainfall estimation, *Advances in Water Resources*, 25 (8-12), 1387-1394.

(II) P3: Germann et al. 2009 present an ensemble radar simulator and not gauge adjusted radar precipitation fields for bias.

Germann, et al, 2009: REAL-Ensemble radar precipitation. . . ., *Q. J. Roy. Meteorol. Soc.*

(III) P4 Parag. 10: Acknowledge studies on rainfall ensemble simulators using conditional simulation (e.g., Grimes and Pardo-Iguzquiza, 2010, AghaKouchak et al., 2010,

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Clark and Slater, 2006).

Grimes D., Pardo-Iguzquiza E., 2010, Geographical Analysis, 42 (2), 136-160.

AghaKouchak A., Bardossy A., Habib E., 2010, Conditional Simulation of Remotely Sensed Rainfall Fields Using a Non-Gaussian V-Transformed Copula, Advances in Water resources, 33 (6), 624-634.

Clark M.P., Slater A.G., 2006, Probabilistic quantitative precipitation estimation in complex terrain Journal of Hydrometeorology, 7(1), 3-22.

–P8: “additionally on a number of previously simulated hours of the corresponding realization.”

The statement “A number of previously simulated hours” requires more explanation. It is not quite clear what the simulation is conditioned on.

–Figure 6: 10x10km (not km<sup>2</sup>) or a 100km<sup>2</sup> grid

–P11: 100×100 km with a 10×10 km (instead of 100×100 km<sup>2</sup> with a 10×10 km<sup>2</sup>)

–P12: “The empirical variogram is estimated very well by the fitted spherical variogram model.” It is not clear on what basis the empirical variogram is estimated “very well” by the fitted spherical variogram. Avoid descriptive statement and include quantitative measures of goodness-of-fit.

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