

Comment on hess-2022-70

Anonymous Referee #1

Referee comment on "Technical note: Modeling spatial fields of extreme precipitation – a hierarchical Bayesian approach" by Bianca Rahill-Marier et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-70-RC1>, 2022

The manuscript "Modeling Spatial Fields of Extreme Precipitation – A Hierarchical Bayesian Approach" by Rahill-Marier et al. introduces a hierarchical Bayesian model for modeling spatial rainfall for extreme events of a specified duration which can be considered in regional hydrologic models to perform a regional hydrologic risk analysis. The spatiotemporal dependence is modeled through multivariate normal with partial pooling for the marginal parameter (μ). The proposed model is used to model the spatial field of rainfall at all 9 stations in New York City. The proposed framework and its application to New York City are interesting and well presented. I have some (minor) comments and technical corrections, especially concerning the ability of the model to capture the spatial dependence structure.

- I would like to see further analysis about why the empirical quantiles for Staten Island (SI) are consistently underestimated. For example, authors could analyze whether the correlation between SI and other stations is overestimated or not. That could explain the overestimation of the magnitude. In Figure 1, SI shows lighter colors pattern for different durations, which is the opposite of the Central Park pattern.
- I suspect that it is the first one but would be good if the authors mention which model (partial pooling or no-pooling model). was used to generate figures 3 and 4
- L129: Event?
- L155: The authors say, "Fifty-four models (one for each duration and each site)", but they did not mention which specific duration we consider. Please, specify this.
- L158-159: μ and Σ are leftover.
- L165-166: Authors already mentioned it in L 160-161
- L193: overestimated?