

Bridging the scale gap: Obtaining high-resolution stochastic simulations of gridded daily precipitation in a future climate

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Response to Referee 2

We thank the reviewer for his/her positive comments on the manuscript. Below is our response to the issues raised in the review.

General comments

This manuscript is very interesting for the topic of rainfall fields at hydrological scales.

My comments only regard suggestions of minor revisions, in order to slightly improve the quality of this interesting manuscript.

Reply: Thank you for your positive evaluation of our work. We will modify the manuscript following your suggestions.

Comment 1

In the introduction, Authors should enrich the state-of-the-art of stochastic models, by mentioning Neymann-Scott and Bartlett-Lewis families, also available for transient versions (Burton et al., 2008, 2010; Cowpertwait et al., 2002; De Luca et al., 2020)

References:

Burton, C.G. Kilsby, H.J. Fowler, P.S.P. Cowpertwait, P.E. O'Connell, RainSim: A spatial-temporal stochastic rainfall modelling system, *Environmental Modelling & Software*, Volume 23, Issue 12, 2008 <https://www.sciencedirect.com/science/article/abs/pii/S1364815208000613>

Burton, A., H. J. Fowler, C. G. Kilsby, and P. E. O'Connell (2010), A stochastic model for the spatial-temporal simulation of nonhomogeneous rainfall occurrence and amounts, *Water Resour. Res.*, 46, W11501, doi:10.1029/2009WR008884

Cowpertwait, P. S. P., Kilsby, C. G., and O'Connell, P. E., A space-time Neyman-Scott model of rainfall: Empirical analysis of extremes, *Water Resour. Res.*, 38(8), doi:10.1029/2001WR000709, 2002.

De Luca, D.L.; Petroselli, A.; Galasso, L. (2020). A Transient Stochastic Rainfall Generator for Climate Changes Analysis at Hydrological Scales in Central Italy. *Atmosphere*, 11(12), 1292. <https://doi.org/10.3390/atmos11121292> (<https://www.mdpi.com/2073-4433/11/12/1292>)

Reply: Thank you for your suggestion. We will add a paragraph in the introduction to give a proper review of these state-of-the-art stochastic models.

Comment 2

In Section 3, I suggest to insert a flow chart in order to make clearer for a reader the several steps of the proposed procedure.

Reply: This is indeed a very good point. We will add a conceptual graphic, see Figure 1 below, to outline the different components of the proposed procedure.

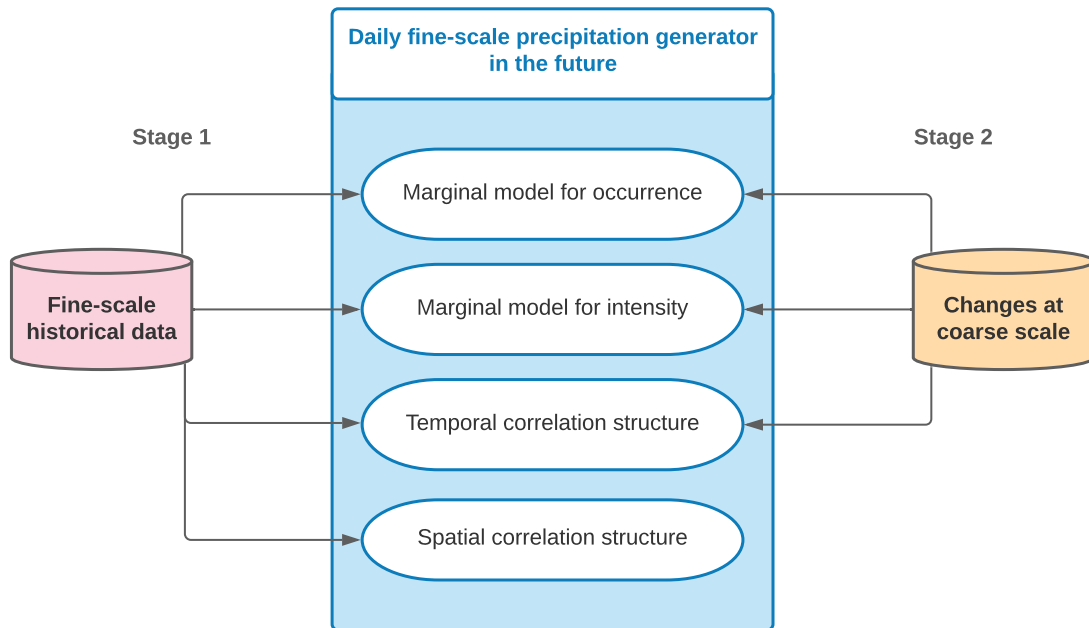


Figure 1: The proposed two-stage weather generator approach for simulations of fine-scale daily precipitation in a future climate.