

## **A Framework for Spatiotemporal Stochastic Weather Simulation**

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Gridded daily weather simulations are key features of downscaling, hydrological and agricultural models, as well as climate impact studies. Typically, spatially consistent weather simulations are required across a domain at locations without observational data, and are difficult to produce in regions of complex orography due to terrain driven nonstationarities. We introduce an approach to daily weather simulation relying on multivariate Gaussian processes. In particular, we discuss daily maximum temperature and minimum temperature simulation, and consider modeling approaches that allow the relationship between variables to vary across the simulation domain. A two-part model ensures locally accurate, as well as spatially and temporally correlated, simulations. The method is illustrated on a relatively dense network over the challenging terrain of Colorado, USA.

**Keywords:** Nonstationary; Multivariate; Stochastic Weather Simulation; Temperature