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Three dimensional Hurst-Kolmogorov process for modelling rainfall fields

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A three-dimensional (3D) stochastic simulation model is presented, which is a direct extension of the 1D simple scaling process (fractional Gaussian noise).

The 3D process can generate time-varying 2D rainfall fields through a rather simple procedure, as well as other time-varying 2D spatial geophysical fields, consistent with the observed 2D long-term spatial persistence over time (3D slowly decaying autocorrelation over scale).

Moreover, the differences between 1D (generating rainfall time series at a point), 2D (generating rainfall fields for specific time steps) and 3D (generating spatio-temporal rainfall fields) scaling processes are also being investigated through some applications based on observed rainfall fields.