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# Need of a rain displacement parametrization in space-time rainfall simulation

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This study contributes to the theoretical and practical construction of a rainfield simulation model. As we target hydrological applications, it is only expected that the simulator will yield reliable statistics of simulated rain over a given range for space and duration.

The basis for simulation is the geostatistical turning bands method, that provides three-dimensional fields with an isotropic structure and a gaussian type distribution. In order to generate rainfall values with positively skewed distribution, a transform function is applied to the simulated fields, including care about changes induced by the transform function into the field spatial structure. It is thus possible to generate independent 2D rain fields as 3D simulation restricted to horizontal planes. The results obtained are encouraging as rainfall correlation structure and distribution are correct and enable a variety of useful rainfall hazard characterizations.

To simulate entire rain events, one can consider a " 3D simulation " as a "2D + time simulation ". The first parametrization step consists of adjusting the anisotropy on the third axis, in order to reproduce the temporal correlation observed on the rain data. To validate the simulation model it is necessary to warrant that aggregated fields do reproduce the statistical properties of the data at different durations. To achieve this, we interestingly had to introduce a rain displacement parametrization, a cinematic component that was not targeted by our preliminary plans.