A conditional simulation model of intermittent rain fields

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Abstract. The synthetic generation of random fields with specified probability distribution, correlation structure and probability of no-rain areas is used as the basis for the formulation of a stochastic space-time rainfall model conditional on rain gauge observations. A new procedure for conditioning while preserving intermittence is developed to provide constraints to Monte Carlo realisations of possible rainfall scenarios. The method addresses the properties of the convolution operator involved in generating random field realisations and is actually independent of the numerical algorithm used for unconditional simulation. It requires only the solution of a linear system of algebraic equations the order of which is given by the number of the conditioning nodes. Applications of the methodology are expected in rainfall field reconstruction from sparse rain gauge data and in rainfall downscaling from the large scale information that may be provided by remote sensing devices or numerical weather prediction models.

Keywords: Space-time rainfall; Conditioning; Stochastic models

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