

Title: Risk of flooding for ungauged basins: a general mathematical framework

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Abstract

We characterize the distribution of runoff and discharge for an arbitrary watershed under random rainfall. The dynamics are obtained as linearizations of the mass balance equation throughout the river network. Rainfall process is assumed to be a marked Poisson point process of constant intensity but arbitrary mark distribution. The process is characterized as a piecewise deterministic Markov process of the Ornstein-Uhlenbeck type. We give expressions for the Laplace transform of the unique invariant density, and the n -th moments of the runoff and streamflow at every stream of the watershed. The results are of application for the estimation of the risk of flooding under highly uncertain climate.

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