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Effect on the flash-floods distribution of a rainfall stochastic model in a simple rainfall-runoff model

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The rainfall-runoff models, despite their simplicity, are largely used for the short-term forecast in operational flood monitoring, especially in regions in which there is high frequency of flash floods occurrence. The main advantage of such models reside in the short computational time and in the fact that they essentially only require one input, that is the rainfall height time series (or maps series, if the model is distributed). These advantages come from the fact that almost all the slower process of the hydrological cycle (evapotranspiration, base flow, etc.) are neglected.
In this study a simple rainfall-runoff lumped model, that include the dynamic of the soil saturation, is used as test-model for a statistical analysis based on a stochastic rainfall model. Given a set of rainfall time series generated basing on hourly rainfall heights observed in different raingauges, these time series were used as input of the model (configured on a small catchment) in order to study the effects of the different input probability distribution of rainfall on the final probability distribution of discharge flows. In particular, the effect of the different rainfall regimes on the extreme flows distribution was investigated for flash-floods.
The rainfall stochastic model was based on the fit of the distributions of the rainfall height, of the no-rain interval length, and on the rainy interval length, based on a seasonal analysis.
The analysis was performed basing on the rain time series observed in the Italian raingauges network in the period 2006-2012.