



## **A stochastic point rainfall model of design storms based on 2-copula and dimensionless hyetograph**

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In this study a stochastic model to derive synthetic design storms at a point is presented. Generated rainfall events are totally stochastic but with characteristics in terms of shape, duration and average intensity have to satisfy the parameters derived by statistical analyses of the available historic records. The main advantage of this kind of approach is its applicability when few years of sub-hourly rainfall records, not necessary continuous, are available. The events are derived on the basis of a fixed inter-event time, and selected if their average intensity is bigger than a critical fixed one. In order to characterize the shape, dimensionless events are considered. The probability function to describe the hyetograph shape chosen in this study is the Beta cumulative distribution. Storm duration and average intensity of the observed events are modelled separately by fitting several probability distribution and selecting the best one using several statistical criteria. Finally, their correlation is modelled using the Frank Copula.

In order to test the methodology, two sites placed in Sicily, Italy, where sub-hourly rainfall data were available, have been analyzed. The considered raingauges stations are: Monreale, placed in North-West part of Sicily, and Palazzolo Acreide, placed in South-East part of Sicily, where 10 minutes recorded rainfall data were available. The good performance of the model has been tested by comparing the statistics of the simulated events with those of the measured data, and the obtained results confirm the effectiveness of the methodology.