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Bivariate return period for design hyetograph and relationship with T-year design flood peak

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This study focuses on the return period evaluation for design hyetographs, which is usually estimated by adopting a univariate statistical approach. Joint return period (JRP) and copula-based multivariate analysis are used in this work, to better define T-year synthetic rainfall patterns. Specifically, a T-year Design Hyetograph (DH) is assumed to be characterized by its peak , at the chosen time resolution , and by the total rainfall height , cumulated on its critical duration , which has been a priori fixed. As stated in Shiau (2003) and Serinaldi (2015), the choice of the expression for T depends on which event is critical for the investigated system. If both variables must exceed a certain magnitude to achieve critical conditions, then can be adopted. On the other hand, if at least one variable must be greater than a threshold, then is more suitable. should be used when critical conditions are induced by all the events with a joint CDF greater than an assigned probability threshold.
Authors investigated the relationship between multivariate T-year design hyetographs and T-year design flood peak, and moreover how the latter can be influenced by key factors such as the shape of the rainfall temporal pattern and the parameter set used for the adopted rainfall-runoff model.

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