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Spatial dependence and correlation of rainfall in the Danube catchment and its role in flood risk assessment.

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The possibility that multiple catastrophic events occur within a given timespan and affect the same portfolio of insured properties may induce enhanced risk. For this reason, in the insurance industry it is of interest to characterise not only the point probability of catastrophic events, but also their spatial structure.
As far as floods are concerned it is important to determine the probability of having multiple simultaneous events in different parts of the same basin: in this case, indeed, the loss in a portfolio can be significantly different.
Understanding the spatial structure of the precipitation field is a necessary step for the proper modelling of the spatial dependence and correlation of river discharge. Several stochastic models are available in the scientific literature for the multi-site generation of precipitation. Although most models achieve good performance in modelling mean values, temporal variability and inter-site dependence of extremes are still delicate issues.
In this work we aim at identifying the main spatial characteristics of the precipitation structure and then at analysing them in a real case. We consider data from a large network of raingauges in the Danube catchment. This catchment is a good example of a large-scale catchment where the spatial correlation of flood events can radically change the effect in term of flood damage.