



## **Rainfall fields in southern Italy: spatial and temporal variability of scaling properties and correlation structure**

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The spatial and temporal variability of scaling properties and correlation structure were investigated, by considering a dataset of rainfall time series, aggregated over different temporal resolutions, and observed in 70 rain gauges across Basilicata and Calabria regions (Southern Italy).

Two types of random cascade model, namely Canonical and Microcanonical models (Over and Gupta 1994, Molnar and Burlando 2005) were tested with different hypotheses concerning dependency of parameters on time scale and rainfall height.

In details, with respect to Microcanonical model, a new class was proposed, which is characterized by parameters (related to intermittency) that depends on scale and rainfall height of coarser resolution, while dependency on time scale for the parameter of the breakdown process can be allowed for selected temporal resolutions only. The goal is to improve the evaluation of the main features of rainfall time series, such as frequency distribution and extreme values, especially for areas where the rainfall fields preserve some characteristics into a particular range of temporal resolutions, and exhibit a variability into other temporal ranges.

As regards extreme values modelling, the best performances are obtained by the proposed new class of models. Moreover, validation results are consistent with the climatology of the study area. In detail, the summer months are characterized by convective phenomena which originates heavy rain that preserves this property at finer temporal levels. For this reason, a modelling which considers the breakdown process as similar as for a set of finer resolutions improves the reconstruction of this feature. On the contrary, frontal storms occur in the winter months and there are shorter values of rainfall amount: therefore, models with the breakdown process dependent on scale are more suitable.