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Multifractal analysis of rainfall change in a climate scenario

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In this presentation the scaling properties of rainfall time-series generated by a climate model are analysed by means of a multifractal characterization based on the "universal multifractal" formalism. The analysed data are the rainfall daily time-series over France and neighboring regions computed in a simulation over the period 1860-2100 by the climate model CNRM-CM3 of Meteo-France in a coupled IPCC climate scenario (A2). We quantify the scaling variability of the simulated rainfall series by means of the Double Trace Moment (DTM) method which allow to compute two multifractal exponents characterizing the intermittency and multifractality of the field. The opposite trends found in the evolution of the intermittency and multifractality exponents produce antagonistic effects on the evolution of higher moments and extremes. A detailed analysis based on the notion of the maximum singularity confirms an effective increase of rainfall extremes for the next hundred years in this scenario. The multifractal parameters determined by the DTM technique take into account the entire scaling range, and are thus more robust and stable than empirical extremes. This study, limited to a limited geographical region, has shown promising results for application of the multifractal formalism to the analysis of time-series in climate change simulations, and its extension to other regions and simulations will be particularly interesting.