Climate change, hydrological extremes and a multifractal analysis of a mesoscale model

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The IPPC 4th report emphasizes the question of scales and the necessity to obtain in climate scenarios much finer resolutions for hydrological processes to assess the time evolution of the hydrological extremes. The present gap between climatological and hydrological scales led to consider downscaling techniques, which are statically or/and physically based. In particular, one may exploit the scaling properties of the precipitation to downscale it either numerically by stochastic subgrid modeling or theoretically with the help of a few scaling exponents (Royer et al. C.R. Geoscience, 340, 2008).

We first discuss how these techniques can be validated with the help of a multifractal analysis of a mesoscale model. We then present the results obtained the Meso-NH model (Meteo-France/CNRM and Laboratoire d'Aérologie, Toulouse, France), a model which has been rather extensively used for mesoscale research and is partly included (its physical part) in the AROME model, the new operational meteorological model at 2.5 km resolution on France. These results are compared with the one obtained analyzing radar data.