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A comparison of precipitation downscaling methods

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High-resolution precipitation fields are needed for some applications; in particular, they can be used as reference in simulation studies. A possible way to obtain them is using real observations measured by an instrument as base of the downscaling process.

Downscaling techniques, when synthesizing precipitation fields with higher resolution than observed, face many challenges due to the complexities of the rain, and they do not reproduce properly the variability and the autocorrelation of the rain at all scales at the same time.

This work compares two traditional downscaling techniques: (i) one based on the "String of Beads" model (Pegram and Clothier, 2001a; 2001b) that imposes a model for the spectrum of the field, and (ii) an implementation of a cascade model using wavelets (similar to the one proposed by Harris and Foufoula-Georgiu, 2001). The comparison of these two models is done over disdrometer rain series and over series of 2D radar precipitation fields. Therefore, the comparison between the fields produced by both techniques and the original fields is done at the same scale, allowing us to determine which technique reproduces better the properties of the original rainfall data.

In a first approach a "cross-comparison" of both techniques has been carried out, that is, the ability of the fields generated with one technique to reproduce the assumptions of the other. Secondly, generated fields have also been analysed in terms of their generalized fractal dimension and multifractal spectrum.

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