Geophysical Research Abstracts, Vol. 9, 04456, 2007
SRef-ID:

Verification of ensemble precipitation fields simulated by downscaling models by means of Rank Histograms.

G. Mascaro (1,2), R. Deidda, E. Vivoni (2)

(1) Università degli Studi di Cagliari, Italy, (2) New Mexico Institute of Mining and Technology, New Mexico, USA (gmascaro@unica.it / Fax: +390706755310)

Multifractal models for precipitation downscaling are able to reproduce statistical properties observed in real-word precipitation events over a wide range of space and time scales. Starting from information at coarse spatial and temporal scales, such as those resolved by meteorological models, downscaling models generate ensemble of high-resolution precipitation fields suitable for hydrological modeling. Other features that make attractive the use of downscaling model in a meteo-hydrological forecasting chain are the small number of parameters and the simplicity for generating a large number of ensemble members with minimal effort. Nevertheless, the verification and uncertainty estimation of the ensemble precipitation fields predicted by downscaling models is still challenging because of the high dimensionality of the problem. The Verification Rank Histogram is among the methods currently used in applied meteorology for evaluating ensemble forecasts. It is capable of verifying the reliability of the ensemble and detecting the presence of errors in the ensemble mean and spread. Although the Verification Rank Histogram is conceptually simple, previous studies have shown how its uncritical use can lead to the misinterpretation of the ensemble model performance.

In this study, we first propose a generalization of Verification Rank Histogram to verify the ensemble precipitation fields forecasted by statistical downscaling models. Using the proposed procedure, we calculate rank histograms from spatiotemporal precipitation fields synthetically simulated by a multifractal downscaling model based on a Log-Poisson generator with 2 parameters (c and β)p. We then analyze how the method used to estimate the model parameters influences the shape of the histograms. The results show that if we generate the ensemble members using the values of c and β estimated on each verification event, the sampling variability is not adequately taken into account and the resulting rank histograms can be misinterpreted. Previous studies demonstrated that calibration relations, estimated on the whole set of the available observed events, can be found between model parameters and meteorological observable at the coarse scale, such as the large scale rain rate. We show that the adoption of such calibration relations reproduces better the sampling variability and allows a correct evaluation of the ensemble model performances.