Rainfall downscaling, LAM predictions and rain gauge data

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We compare the precipitation forecasts obtained from operational Limited Area Models (LAM) with the direct observations of a regional network of rain gauges. A major problem in this exercise is the inconsistency of the scales reliably resolved by the meteorological models, say at most a few tens of kilometers, and those sampled by the individual rain gauges. To overcome this difficulty, we use the RainFARM approach and we stochastically downscale LAM predictions to small spatial and temporal scales comparable to those sampled by the rain gauges. In this way, we obtain mixed deterministic-stochastic predictions that exactly preserve the LAM field above a given reliability scale (which we vary between 7 and about 100 km) and are represented by an ensemble of RainFARM downscaling fields at smaller scales. We apply this procedure to a large study area covering North-Western Italy, and address the following (related) questions: (1) what is the overall skill of the prediction, i.e., does the operational chain that includes the LAM and RainFARM correctly predict the observed rainfall, and (2) what is the choice of the reliability scale that optimizes the prediction skill.