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A stochastic approach to link predicted precipitation fields at different spatial scales

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The new generation Numerical Weather Predictors (NWP) are able to forecast precipitation fields at very high spatial resolution. In fact, depending on the selected spatial domain, the grid spatial resolution of the meteorological limited area models can range from a few tens of kilometres to a few kilometres. Nevertheless the implementation of these models on the finest spatial grids is still, in many real cases, too much time and energy consuming and therefore not always feasible.

In order to downscale the forecasted precipitation field obtained by NWP at a coarse resolution to a finer grid a stochastic approach might be used to synthetically reproduce the physical downscaling which would be provided by a nested meteorological model.

In this work a simple precipitation model is developed for a case study area located in Central Italy, for which several events were predicted by NWP at different scales. The forecasted precipitation field is first compared to the map of observed precipitation in order to verify the performance of the meteorological model for each case. Then the stochastic approach is used to downscale the coarse resolution predicted precipitation field to a finer grid. The performance of the model is finally evaluated with reference to both the observation map and the output precipitation field of the nested meteorological model.