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Analysis of the uncertainty in rainfall forecasts obtained with a probabilistic nowcasting technique

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Nowadays different methodologies have been developed for very short-term precipitation forecasting based on radar observations. When the advection of precipitation explains a significant portion of the temporal evolution of precipitation, the Lagrangian persistence is the most appropriate method. Unfortunately, in convective precipitation episodes it does not occur like this because the growth and decay of precipitation is generally fast and advection provides little information. It is then necessary to introduce probabilistic nowcasting methods that allow to characterize the uncertainty associated with the temporal evolution of precipitation.
SBMcast (Berenguer et al., 2011) is an ensemble nowcasting algorithm based on Lagrangian extrapolation of recent radar observations. It generates a set of future rainfall scenarios (ensemble members) compatible with the observations and preserving the spatial and temporal structure of the rainfall field according to the String of Beads model. The parameters used to generate a member of the ensemble model are the time series of a set of variables that model the rainfall field at two levels: at global and at pixel scale. We have analyzed these two components of SBMcast with the aim of identifying the role that each component has in the resulting forecast uncertainty. The final objective of this analysis is understanding the expected impact of the use of additional information to constrain each part of the algorithm.
Conventional scores have been used to compare SBMcast with two reference algorithms: deterministic Lagrangian extrapolation, and the probabilistic "Local Lagrangian" technique [the one that demonstrated the best skill, among those analyzed by Germann and Zawadzki (2004)]. The results have been obtained for a set of rainfall episodes in the vicinity of Barcelona, Catalonia (Spain) using the observations of the Catalan Weather Service radar network.

References

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