Blending NWP corrected forecasts and radar-based nowcasts

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1. Abstract

Different methodologies of very short-term and short-term quantitative precipitation forecast (QPF) have been developed in the past. One of them is based on the extrapolation of radar reflectivity field, another one would be the mesoscale numerical weather prediction model rainfall outputs. A number of blending techniques have been proposed to try to take advantage of different features of these predictions to improve the final merged rainfall field forecast. The aim of this study is developing a suitable blending technique to combine NWP and radar-based rainfall nowcasted fields in order to obtain a single and optimized QPF at each lead time.

Two consecutive procedures are developed to address this objective. Firstly, a model correction is applied to reduce the errors due to positioning and shape-pattern of precipitation structures. Once this objective is achieved by applying a shift-vector correction, the blending technique is applied. To merge the radar-based nowcasting and model correction both fields are straightforwardly weighted. These weights are computed dynamically by comparing previous rainfall field with observations and introducing spatial dependence of weights as distance function to rainfall structures. This kind of object-oriented technique is introduced to avoid losing information of new precipitant areas coming from the NWP outputs but maintaining the position and shape information of previous precipitating areas which comes from the radar-based nowcasting.

This method of blending different sources of prediction is verified for different types of episodes (convective, moderately convective and stratiform) and using data from the Meteorological Service of Catalonia and Meteoswiss. Therefore, the method is tested in different meteorological situation and in region characterized by steep orography as the Alps. Preliminary results are promising for implementing it in an operational and dynamic way.