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Two step blending for a seamless forecast from short-term to medium-term range.

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The number of methodologies for weather forecasting, and more specifically rainfall prediction, are constantly increasing, however they may be divided into several approaches depending on the degree of detail achievable determined by the length of the forecast period. For short lead-times, attention is focused on obtaining an accurate picture of the present situation, and then deducing the future from extrapolation of the current radar field (as in INCA). For much longer lead times, the use of the primitive equations representing the dynamics and thermodynamics of the atmosphere by means of numerical weather prediction (NWP) model is the optimal solution. These NWP models can be focused on large-scale features (ECMWF) or try to solve full non-hydrostatic equations representing features of the weather on smaller scales of tens to hundreds of kilometers (AROME). For these models, the initial conditions play a key role in the quality of the forecast in the very and short term range and for this reason Data Assimilation methods are fundamental (AROME-RUC).

A seamless forecast is, based on information theory, a combination of the different sources of information in an optimal way so that the limits of predictability of the atmospheric system are aimed. To achieve this goal a two step blending is introduced. First, the NWP models are merged by a three weight flow-dependent approach obtaining an optimized background model based on the evolution of the atmosphere. Then, the output of the previous steps is blended to the rainfall extrapolation (INCA). The technique used takes advantage of the persistence of the latest error to merge both forecasts in a location dependence framework.

The final seamless forecast is verified for two different periods; July 2016 and January 2017, against the original nowcasting from INCA and the different NWP models. A global climatology-weights blended forecast is also introduced in the verification in order to highlight the advantages of this two step technique.