9.18 BLENDING HIGH-FREQUENCY NWP PRECIPITATION FORECASTS IN AN ENSEMBLE NOWCASTING SYSTEM: STEPS-ALARO

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Since its development by the UK Met Office and the Australian Bureau of Meteorology in 2006, the ShortTerm Ensemble Prediction System (STEPS) has seen many local adaptations around the world. The success of this system lies in its accurate assessment of the uncertainty of radar-based nowcasts, that is obtained by generating an ensemble of radar extrapolation nowcasts which are perturbed by spatially and temporally correlated stochastic noise. To account for the scale dependence of the predictability of precipitation, the precipitation fields are decomposed into an 8-level multiplicative cascade, where the large-scale features evolve slowly compared with the small-scale features. Our local implementation of STEPS uses the weather radar composite of Belgium (STEPS-BE; Foresti et al., 2016). The verification of STEPS-BE in Belgium shows that the predictability of large areas of rain is lost after roughly 2 hours, while that of small convective showers is already lost after half an hour. To improve the skill of the extrapolation nowcast, blending with a forecast from numerical weather prediction (NWP) is required.

We have implemented the blending of the extrapolation-based nowcasts with precipitation fields from the NWP model ALARO. This model is run operationally at the Royal Meteorological Institute of Belgium, at a horizontal resolution of 1.3 km. ALARO uses a multi-scale package for microphysics and convection (3MT, Gerard et al. 2009). It has been adapted to produce precipitation output with a frequency of 5 minutes, the same as the radar images. In our nowcasting system, coined STEPS-ALARO, the blending of the cascade is performed level-by-level, meaning that the weight of the NWP contribution can differ between larger and smaller scales. The scale-dependent weights of the extrapolation and NWP forecasts are computed from the recent skill of the respective forecasts, and converge to a climatological value.