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# A study on the scale-dependence and spatial heterogeneity of the predictability of precipitation using the Short-Term Ensemble Prediction System (STEPS)

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The Short-Term Ensemble Prediction System (STEPS) is a probabilistic very-short term precipitation forecasting (nowcasting) scheme developed at the Australian Bureau of Meteorology in collaboration with the UK Met Office. In order to account for the scale-dependent predictability of rainfall structures, the radar field is decomposed into an 8 levels multiplicative cascade using a Fast Fourier Transform. The cascade is advected using a velocity field estimated with optical flow and evolves stochastically according to a hierarchy of auto-regressive processes. The uncertainty in radar rainfall measurement and the unknown future development of the velocity field are also considered by stochastic modelling in order to reflect their typical spatial and temporal variability. The ensemble precipitation nowcasts will be used for uncertainty propagation into hydrological models to nowcast urban inundations over Belgian cities within the PLURISK project (http://www.kuleuven.be/hydr/plurisk).

The talk focuses on the implementation and verification of STEPS forecasts at the Royal Meteorological Institute of Belgium. The spatial distribution of the nowcast errors (bias, RMSE as well as categorical skill scores, e.g. the equitable threat score) is analyzed to estimate the accuracy of the nowcasts, the limits of rainfall predictability and to understand the uncertainty of the input radar observations. The reliability and discrimination ability of the probabilistic nowcasts are also verified using reliability diagrams and Receiver Operating Characteristic curves. The flow-dependence of the predictability of precipitation and of its scaling behavior in connection with the presence of orographic features is also illustrated using data from the radar composite of Eastern Victoria, Australia.