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Development of a high resolution (2km) precipitation forecast ensemble with a range of several days

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In the Met Office, precipitation forecasts are generated by a variety of nowcast and NWP models with varying spatial and temporal resolutions. The Environment Agency, responsible for flood forecasting and warning in England and Wales, requires precipitation forecasts with a horizontal resolution of at least 2 km over a time period spanning several days. At present, no single model can satisfy this requirement, and products must be compiled by compositing outputs from a range of nowcast and Numerical Weather Prediction (NWP) models with different resolutions and performance characteristics.

Consequently, there is a need to develop a method for integrating nowcast and NWP model precipitation outputs to produce a single, high resolution (2 km), seamless precipitation forecast product with a range of two days. This product must quantify and integrate the uncertainty in the component forecasts and convey this to the user consistently and coherently over the time span of the forecast. An ensemble modeling approach is proposed, based upon outputs from the regional (North Atlantic and European – NAE) configuration of the Met Office Global and Regional Ensemble Prediction System (MOGREPS), and the Short Term Ensemble Prediction System (STEPS).

Outputs from STEPS and MOGREPS ensembles will be blended with deterministic, convective scale NWP forecasts to produce an optimal, seamless forecast suitable for driving hydrological models for flood forecasting and warning. A cascade modeling framework, as employed in STEPS, will be used to blend the component models on

a hierarchy of spatial scales. MOGREPS NAE ensembles will be used to evaluate large scale parameters that characterize the uncertainty in precipitation systems, whilst the stochastic noise generator in STEPS will be employed to characterize the chaotic variability within these systems.

This poster reviews the performance characteristics of the component models (UK 4km configuration of the Unified Model, MOGREPS and STEPS) and presents a viable modeling framework and possible formulation for the generation of a 2km, composite ensemble forecast.