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Examining timing errors in precipitation forecasts from a near-convection-resolving NWP model

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This investigative work attempts to summarise the accuracy (in terms of spatial pattern) and skill of the hourly precipitation forecasts from the 1.5 km version of the Met Office Unified Model (UKV). Twelve months of UKV forecasts from July 2011 to June 2012 have been compared to the corresponding 2 km gridded hourly radar accumulations. Four operational 36-h forecasts a day were considered. A low pass filter was applied to smooth the fields to a 12 km grid. Three thresholds were considered: 0.5, 1 and 4 mm/h. Results are provided as a function of a range, with hourly offsets spanning -3h to +3h, i.e. a given model forecast hour is verified against the totals from 3h earlier to 3h later. The frequency bias and a range of categorical scores were computed to find peaks in skill. Lagged correlations were computed to establish a peak in the spatial pattern alignment, i.e. if the forecast correlates with later (earlier) radar accumulations it implies the forecast is too fast (slow).

There appears to be a 1h offset to achieve maximum correlation which persists to near 24 hours into the forecast. Beyond that forecast errors may be dominating, but there is a suggestion that the correlations slip further to 2-3h. There are month-to-month differences. Offsets are more apparent in the cold months, potentially due to the timing of frontal systems. There are run-to-run differences, with some initialisation times more prone to pronounced offsets. There is evidence of model over-forecasting in the first 6h of the forecast (for selected runs and months) as measured by the frequency bias.