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Progress towards post-processing high-resolution gridded NWP rainfall forecasts

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Deterministic rainfall forecasts often require post-processing before they can be used in other models, for example to generate flood forecasts. Calibration methods are available to correct biases and quantify forecast uncertainty, but these are frequently applied separately to individual rain gauges and lead-times without considering temporal or spatial relationships between model parameters (Shrestha et. al., 2015). Developing calibration methods to produce high-resolution gridded rainfall forecasts demands more efficient and connected modelling of spatial and temporal relationships.

In this presentation, we describe recent advances in characterising parameter variation with lead time and time of day in an established calibration method (Robertson et al. 2013). We test these advances by post-processing rainfall forecasts from the Bureau of Meteorology's ACCESS-R NWP model in coastal Queensland. The post-processed ACCESS-R rainfall forecasts are shown to have significantly lower bias than the raw ACCESS-R forecasts and increase forecast skill by up to 80%. We show that by explicitly modelling the lead time dependence in model parameters the bias reductions and skill gains achieved through post-processing less sensitive to the length of NWP records than previous inference methods. We discuss the prospects of future work to explicitly account for spatial relationships.