# A seasonally coherent calibration (SCC) model for post-processing numerical weather predictions

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Calibration models are often employed to post-process forecasts from numerical weather prediction (NWP) models to reduce bias, produce reliable ensemble spread, and ensure coherence, that is, forecasts are not worse than climatology forecasts.

Calibrated forecasts should reflect seasonal variation in climatology and performance of the NWP forecasts. This may be achieved by establishing calibration models separately for individual months. In practice, however, establishing separate models for individual months is often not feasible because archives of NWP forecasts are too short (1-4 years). A common practice is to use just one calibration model for all year round. This can lead to calibrated forecasts that lack seasonal variation in climatology, especially when the underlying skill of the raw NWP forecasts is low, such as at long forecast lead times. Such calibrated forecasts are clearly unacceptable for locations where there is strong seasonality in climate. When used for hydrological forecasting, they could lead to poor hydrological forecasts.

In this study, we introduce a seasonally coherent calibration (SCC) model that can work with short NWP forecast data and yield calibrated forecasts that have observed seasonal climatology, regardless of the underlying skill of the raw NWP forecasts. We present the theory of the SCC model and demonstrate its efficacy using a case study of post-processing precipitation forecasts at a rain gauge in northern Australia.