More useful and practical extended-range forecast guidance on temperature extremes in Taiwan

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Abstract

This study applied Ensemble Model Output Statistics (EnsMOS) and Ensemble Kernel Density MOS (EKDMOS) to perform bias correction and downscaling for extended-range forecasts of temperature extremes in order to provide more useful and practical forecast guidance for users in Taiwan. Compared with the EnsMOS, the EKDMOS provides more reasonable ensemble spread, higher reliability, and better discrimination for probabilistic forecasts of temperature extremes.

In addition to probabilistic forecasts, a more practical forecast guidance on temperature extremes was developed through the conversion of probabilistic forecasts into Y/N forecasts and the application of temporal relaxation method. We provide this new forecast guidance because the general public usually have difficulty in making decisions based on probabilistic forecasts. Besides, forecasts systematically drift toward model climatology due to truncation, and the EKDMOS tends to produce lower forecast probability for longer lead times. However, it does not mean the possibility of extreme events will decrease with forecast lead time. Forecast evaluation shows that the forecast guidance on cold extremes has better performance than warm extremes, which may result from an obvious trend of climate warming in Taiwan and the current warm events are much extremer than the past ones. This practical forecast guidance detects almost all cold extremes. The forecast lead time that is able to detect the signal of a cold extreme is longer as the intensity of the cold extreme is stronger and its duration is longer. When a temporal window of one day was applied, the forecast guidance on cold extremes displays good accuracy and a high probability of detection with a slight degree of over-forecasting.

Keywords: extended-range forecast, temperature extremes, temporal relaxation