Bias-corrected ensembles and probability forecasts

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The New England High-Resolution Temperature Forecast Project (NEHRTP) afforded a unique opportunity to evaluate new methods to post-process model data to improve forecasts of surface variables important to the end user community. Throughout the experiment, a relatively large and varied ensemble of short-range forecasts was produced. This ensemble included the short-range ensemble from the National Centers for Environmental Prediction (NCEP), special runs of the Rapid Update Cycle (RUC), Weather Research and Forecast (WRF) model, and a modified version of the Eta Model. A bias-corrected ensemble (BCE) method was developed, that evaluates the past 12 days of forecast performance to adjust the forecasts for the next 48 h period. This approach yields ensemble mean values of 2-m temperature and dewpoint temperature that are an improvement over any of the present operational Model Output Statistics (MOS) products, and ensemble mean values of 10-m wind speed that are as accurate as MOS. However, the BCE method also produces probabilities, and these are found to be both reliable and lead to an economic savings when evaluated in a simple cost-loss problem. Thus, the application of the BCE method to an ensemble yields results that are better than or comparable to MOS, and yet can be applied to a new model ensemble system within a few weeks after the first model runs begin and does not require a lengthy data archive.