

Empirical based tools for prediction of US temperature and precipitation at weeks 3-4

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In an effort to bridge the gap between extended range (8-14 days) and monthly forecasts, the NOAA Climate Prediction Center (CPC) has been issuing outlooks for 2-m temperature (T_{2m}) and precipitation (P) during the combined Week 3-4 period since autumn of 2015. As part of the statistical guidance provided for this outlook, a multiple linear regression (MLR) framework has been developed to predict T_{2m} and P at Weeks 3-4 using the following predictors: 1) RMM indices to represent the Madden Julian Oscillation (MJO), 2) 2-week mean Nino 3.4 anomaly, and 3) a daily index for the linear long-term trend. Initial evaluation of the real-time performance of the MLR demonstrates skill: with respect to the T_{2m} forecasts, the skill of the MLR is highly competitive with both dynamical forecasts and the official CPC outlooks. Real-time precipitation forecasts from the MLR outperform both the dynamical models and the official CPC outlooks. While the current operational MLR has provided skillful forecasts, there is opportunity to expand this framework to consider the impact of *extratropical* climate modes on Week 3-4 forecasts. The current work seeks to expand the current MLR to include new predictors that characterize the internal modes of extratropical atmospheric variability, including the stratospheric polar vortex, a 120-day oscillatory mode, and the Arctic Oscillation (AO). Initial evaluation of the cross-validated skill of the expanded MLR using these added predictors demonstrates improvement over the original MLR, particularly during boreal autumn and winter over the eastern/south-eastern CONUS. The improvement in precipitation forecasts in the expanded MLR relative to those provided by the current MLR is more subtle.