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Understanding the role of the extratropical stratospheric circulation in subseasonal prediction of temperature within a multiple linear regression framework

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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 (T2m) 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 T2m 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 T2m 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. Emphasis is placed on assessing the added skill of including indices that characterize variability in the stratospheric polar vortex. These indices include Empirical Orthogonal Functions (EOFs) of stratospheric geopotential height anomalies but we also the skill of adding indices that describe coupling between the stratospheric and tropospheric coupling. 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 United States.