



Statistical approaches for diagnosing and applying sources of forecast skill to subseasonal predictions

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Weather and climate prediction for lead times of three to four weeks presents significant challenges, yet recent work has identified potential sources of predictability that may allow us to develop extended and long range forecast products at these lead times. In this presentation, we discuss how certain statistical approaches may help to identify important sources of skill at subseasonal lead times and to provide forecast guidance that complements that of dynamical forecast models. Specifically, statistical guidance based on the initial state of the El Niño-Southern Oscillation (ENSO) and the Madden-Julian Oscillation (MJO), combined with the long-term trend, provides skillful temperature and precipitation forecast guidance over North America in weeks 3 and 4 under certain initial conditions. Although these findings support the importance of tropical convection for S2S forecast skill, another statistical approach based on partial least squares regression (PLSR) demonstrates that other factors, especially the initial extratropical state, also contribute substantially to statistical forecast skill of the dominant Northern Hemisphere teleconnection patterns, the Pacific/North American (PNA) pattern, the North Atlantic Oscillation (NAO), and Arctic Oscillation (AO), for weeks 3-4. These findings indicate additional sources of skill beyond the tropics that likely can contribute to skillful weeks 3-4 temperature and precipitation forecasts throughout the Northern Hemisphere. We conclude by discussing recent efforts to transition a statistical forecast tool based on the MJO and ENSO influences into operational forecast guidance that is currently utilized in the experimental implementation of the NOAA Climate Prediction Center Experimental Week 3-4 Outlooks.