

MEDIUM RANGE FORECAST ERRORS ASSOCIATED WITH ACTIVE AND BREAK EPISODES OF THE MONSOON

Hendon, H.

Climate Diagnostics Center, University of Colorado, U.S.A.

Systematic forecast error associated with active and break episodes of the Indian monsoon is examined using 5 years of dynamical extended range forecasts from the National Centers for Environmental Prediction (NCEP) reanalysis model. Active and break episodes of the monsoon are identified based on the leading two EOFs of intraseasonally filtered outgoing longwave radiation. These two modes together describe the well-known Madden-Julian oscillation (MJO), the dominant mode of intraseasonal variability during northern summer. The MJO exhibits distinct poleward propagation from the Indian Ocean into the monsoon, which is associated with breaks and active episodes of the monsoon, and also less pronounced eastward propagation along the equator towards the western Pacific. Forecasts initialized prior to an active episode of the MJO are found not to capture either the poleward or eastward propagation of the tropical precipitation and circulation anomalies associated with the MJO. Rather, the MJO-induced anomalies of precipitation and winds are forecast to systematically weaken and even retrograde. These systematic errors in the Tropics fully develop by about 7-10 days and are generally opposite to, but with the same amplitude as, the observed composite anomalies for the MJO. An associated systematic error of the extratropical 200 mb streamfunction also fully develops by about 7-10 days and is also generally opposite the observed composite streamfunction anomalies produced by the MJO. The development of the extratropical streamfunction error is argued to result from the error of tropical divergence forcing and, thus, the improper Rossby wave source as the MJO evolves.

An empirical forecast of active and break episodes of the monsoon, based on linear regression onto the leading two EOFs of intraseasonally filtered OLR, is shown to have better extended range skill than the dynamical forecasts. Comparison of forecast skill during episodes of large intraseasonal activity and episodes of small intraseasonal activity suggests that the episodes of large intraseasonal activity (i.e. strong active and break episodes) are potentially more predictable.

Key words: monsoon, medium range forecast, Madden-Julian oscillation