

MJO forecast with the NCEP MRF model: Necessity of the
inclusion of an interactive ocean

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Abstract: A few recent observational studies have indicated that there exist coherent variations in sea surface temperatures (SSTs) in association with the Madden-Julian Oscillation (MJO) events in the atmosphere. Modeling simulations have suggested that an interactive ocean surface is important to correctly reproduce the observed MJO with numerical models. In this study, we investigate the role of SSTs in the forecast of MJO with the National Center for Environmental Prediction (NCEP) medium range forecast (MRF) model. Two sets of forecast experiments are performed using atmospheric initial conditions of 2000 and 2001 with different settings of SSTs. In one set, experiment 1, SSTs are specified as observed climatology plus initial SST anomalies that decay with forecast time at an e-folding time of 90 days. In the other set, experiment 2, SSTs are specified as the observed values. It is found that both experiments reproduce the observed eastward propagation of the atmospheric circulation in the Western Hemisphere. In the Eastern Hemisphere, experiment 1 appears to maintain stationary atmospheric anomalies during the first 30 days of the forecast due to the use of initial SST anomalies in the forecast, while experiment 2 captures the observed eastward propagation of the MJO events. This suggests that an interactive oceanic component is necessary to correctly forecast the observed MJO activities.