

CICS-MD Science Meeting
November 12-13, 2014
College Park, MD

Michael Natoli 1-6 Understanding Surface Variable Responses to the MJO in the CFS Reanalysis over the Americas E. Hugo Berbery, Emily Becker

This study examines the potential causes of seasonal temperature and precipitation anomalies over the Americas associated with the passage of the Madden-Julian Oscillation (MJO). Data analyzed covered the period 1979 through 2010 from the Climate Forecast System Reanalysis (CFSR). Global composites were created for eight MJO phases as it progresses eastward. The analysis focuses on statistically significant features as estimated from a permutation test.

Enhanced tropical convection associated with the MJO can also induce alterations in the subtropical and polar jet streams that translate to altered temperature and precipitation patterns at the surface. In this study, the temperature and precipitation patterns are discussed and related back to MJO modulations of the jet stream and Rossby wave activity. It is confirmed that two anomalous cyclonic circulations in the subtropics in the upper troposphere lead the MJO while anomalous anti-cyclonic circulations trail. During each hemisphere's winter season, it is found that the subtropical jet centered around 30 N or S is anomalously weak leading the MJO convection and strong trailing the convection. Conversely, the polar jet stream centered around 50 N or S is strong just leading the convection and weak on the trailing end in response to the propagating Rossby waves.

In the summer seasons, patterns correlate more to the velocity potential anomalies rather than the stream function. Instead of noteworthy jet alterations, the summer season sees enhanced precipitation in monsoon regions when the large scale upper tropospheric divergence associated with the MJO convection passes over the western hemisphere in phases 8, 1, and 2. Similarly, suppressed precipitation in these regions is observed when the large scale convergence passes over the Americas in phases 4, 5, and 6.