

The Long Arm of the Madden-Julian Oscillation: You Can Run But You Can't Hide

Adrian Matthews

University of East Anglia
Norwich, United Kingdom

Abstract

The impacts of the Madden-Julian Oscillation (MJO) extend well beyond the core region of the main tropical convective anomalies over the warm pool. The response to the latent heat release in these convective anomalies includes an equatorial wave response that transmits the MJO signal throughout the tropics. This dynamical signal can then induce convective anomalies, modulating remote monsoon systems such as that over West Africa during northern summer. The divergent outflow from the warm pool MJO heating also interacts with the subtropical jets to produce an extratropical Rossby wave response that can then impact on the annular modes (e.g., SAM, NAO). Given the predictability of the tropical MJO, these global MJO impacts raise the prospect of enhanced predictability in selected regions worldwide. The MJO also has a global response on the world oceans. Oceanic equatorial waves are forced by MJO tropical wind stress anomalies. These are instrumental in triggering El Niño under certain conditions, and also propagate into the deep oceans. Recent work has shown a role for an ocean dynamical feedback mechanism on the MJO itself. The extratropical atmospheric response to the MJO can also force a response in the ocean through surface wind stress anomalies. The dynamical ocean response is such that the extent of the MJO even reaches to the ocean floor around Antarctica.