Madden-Julian Oscillation: Recent Evolution, Current Status and Predictions
RMM indices indicate the enhanced phase of the MJO remains over the West Pacific, where it has encountered destructive interference with Rossby wave activity and enhanced trades associated with a decaying La Niña over the equatorial Pacific since late May.

There is fair consensus in the dynamical models favoring eastward propagation of the MJO at a low amplitude through the Western Hemisphere during week-1, with increasing uncertainty with respect to its strength and evolution during the week-2 period.

- The active phase of the MJO is likely to contribute to TC activity across the eastern Pacific and western Atlantic through mid-June.
- The interaction of Kelvin and Rossby wave activity forecast in the Eastern Hemisphere also favors TC formation over the western Pacific and northern Indian Ocean.

A discussion of potential impacts for the global tropics and those related to the U.S. are updated on Tuesday at: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/ghazards/index.php
As the enhanced phase of the MJO propagated into the West Pacific during late May, there has since been little eastward propagation of the convective envelope.

A wave-2 pattern remains evident, with upper-level divergence anomalies likely tied to a quasi-stationary MJO and a Kelvin wave currently over Africa.
The most recent upper level zonal wind field appears better organized compared to late May, which reveals stronger divergence (convergence) aloft near the Date Line (Maritime Continent).

Stronger westerlies are observed to the west of 120E along the equator, reinforced by a pair of anomalous anticyclonic circulations in both Hemispheres over the eastern Pacific.
850-hPa Wind Anomalies

Shading denotes the zonal wind anomaly. **Blue shades:** Anomalous easterlies. **Red shades:** Anomalous westerlies.

- Consistent with the velocity potential anomalies, the eastward propagation of anomalous low-level westerlies has been limited since late May; however, the recent relaxation of the enhanced trades over the equatorial Pacific suggests destructive interference between the MJO and the weakening La Niña.
Following the enhancement of convection associated with a pair of tropical cyclones near India during May, suppressed conditions have prevailed across the northern Indian Ocean and Maritime Continent.

Rossby wave activity is analyzed in the forecast favoring the return of enhanced convection and possible tropical cyclone development over the Indian Ocean and West Pacific.
• Upper-ocean heat content is above-normal along the equator for areas west of 90°W as a result of multiple downwelling oceanic Kelvin waves since March.

• Niño indices still remain below-normal, although the vertically-integrated heat content suggests any cold water is extremely shallow.
MJO Index: Recent Evolution

- Following Rossby wave interference which brought the RMM index inside the unit circle, the intraseasonal signal re-amplified over the West Pacific but has remained quasi-stationary in Phase 7 since early June.

For more information on the RMM index and how to interpret its forecast please see: https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CPC_MJOinformation.pdf
Both the GEFS and ECWMF favor the continued eastward propagation of the MJO through the Western Hemisphere at a lower amplitude, with mean RMM values remaining within the unit circle during the next two weeks. There are several ensemble members which depict a reamplification of the signal over phases 1 and 2 through mid-June.
MJO: GEFS Forecast Evolution

Figures below show MJO associated OLR anomalies only (reconstructed from RMM1 and RMM2) and do not include contributions from other modes (i.e., ENSO, monsoons, etc.)

- The GEFS RMM-based OLR anomaly forecast favors a reversal of the convective pattern over the Indian Ocean and Maritime Continent, with suppressed conditions developing across the tropical Americas during week-2.
MJO: Constructed Analog Forecast Evolution

Figures below show MJO associated OLR anomalies only (reconstructed from RMM1 and RMM2) and do not include contributions from other modes (i.e., ENSO, monsoons, etc.)

- The constructed analog forecast depicts a more canonical MJO, favoring eastward propagation of the convective pattern, but at a weak amplitude during the next two weeks.
MJO: Tropical Composite Maps by RMM Phase

850-hPa Velocity Potential and Wind Anomalies

Precipitation Anomalies
Left hand side plots show temperature anomalies by MJO phase for MJO events that have occurred over the three month period in the historical record. Blue (red) shades show negative (positive) anomalies respectively.

Right hand side plots show a measure of significance for the left hand side anomalies. Purple shades indicate areas in which the anomalies are significant at the 95% or better confidence level.

Left hand side plots show precipitation anomalies by MJO phase for MJO events that have occurred over the three month period in the historical record. Brown (green) shades show negative (positive) anomalies respectively.

Right hand side plots show a measure of significance for the left hand side anomalies. Purple shades indicate areas in which the anomalies are significant at the 95% or better confidence level.