

Madden-Julian Oscillation: Recent Evolution, Current Status and Predictions



Update prepared by the Climate Prediction Center
Climate Prediction Center / NCEP
27 January 2020

Overview

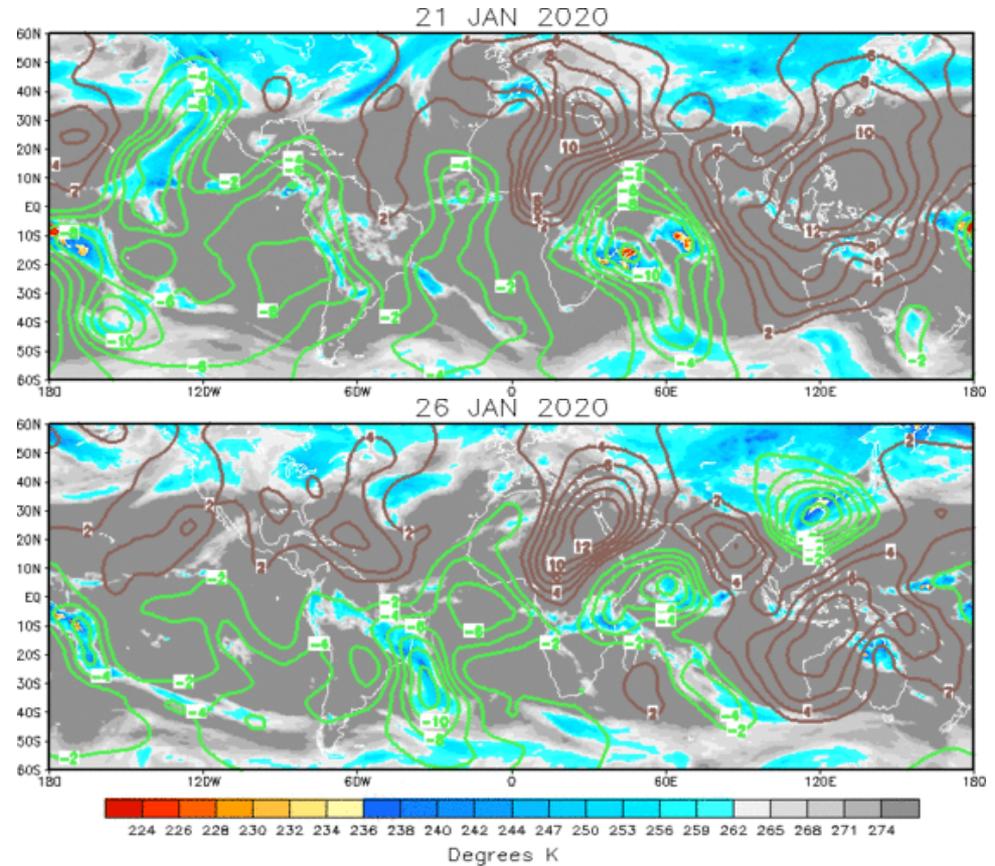
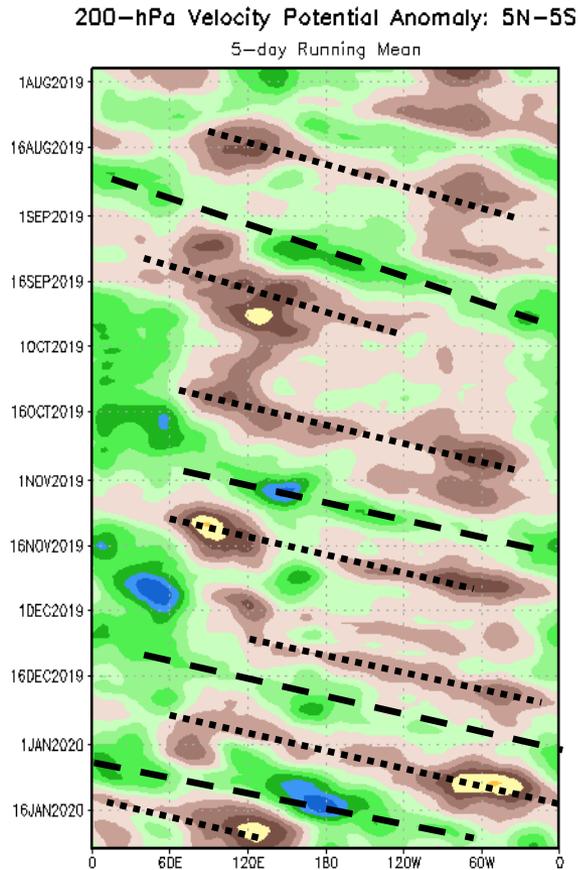
- Following a robust MJO event during most of January, the MJO has since weakened and become disorganized in late January.
- Dynamical and statistical model guidance suggests possible reemergence of the MJO late into Week-2. Models favor the persistence of suppressed convection across the Maritime Continent into early February
- It is likely that the MJO plays little to no role in the circulation pattern over North America during the next two weeks.

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>

200-hPa Velocity Potential Anomalies

Green shades: Anomalous divergence (favorable for precipitation).

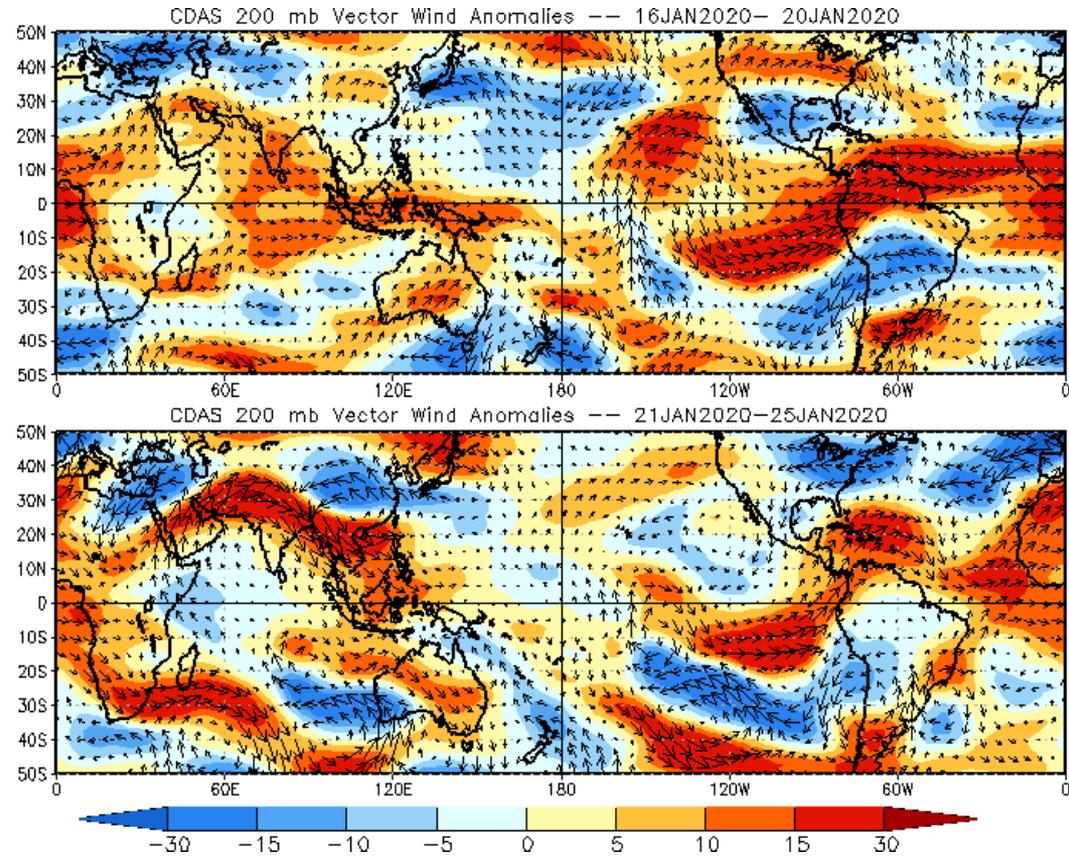
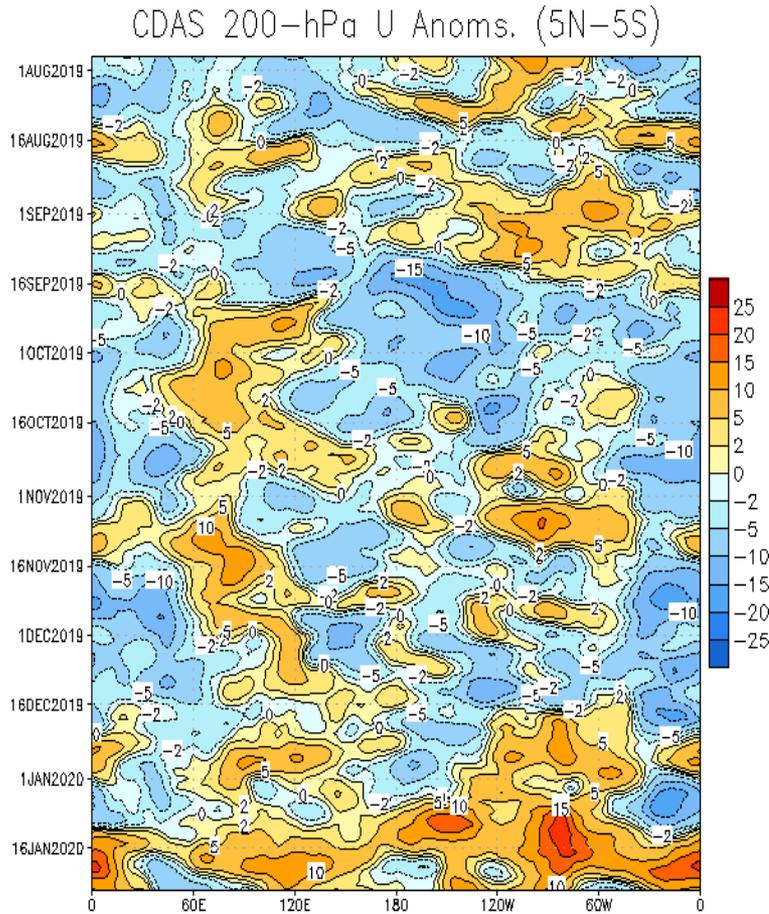
Brown shades: Anomalous convergence (unfavorable for precipitation).



- Since mid-January, anomalous upper-level convergence remains anchored over the Maritime Continent, while anomalous upper-level divergence has weakened over the East Pacific.
- A Kelvin wave has shifted eastward over eastern Asia.

200-hPa Wind Anomalies

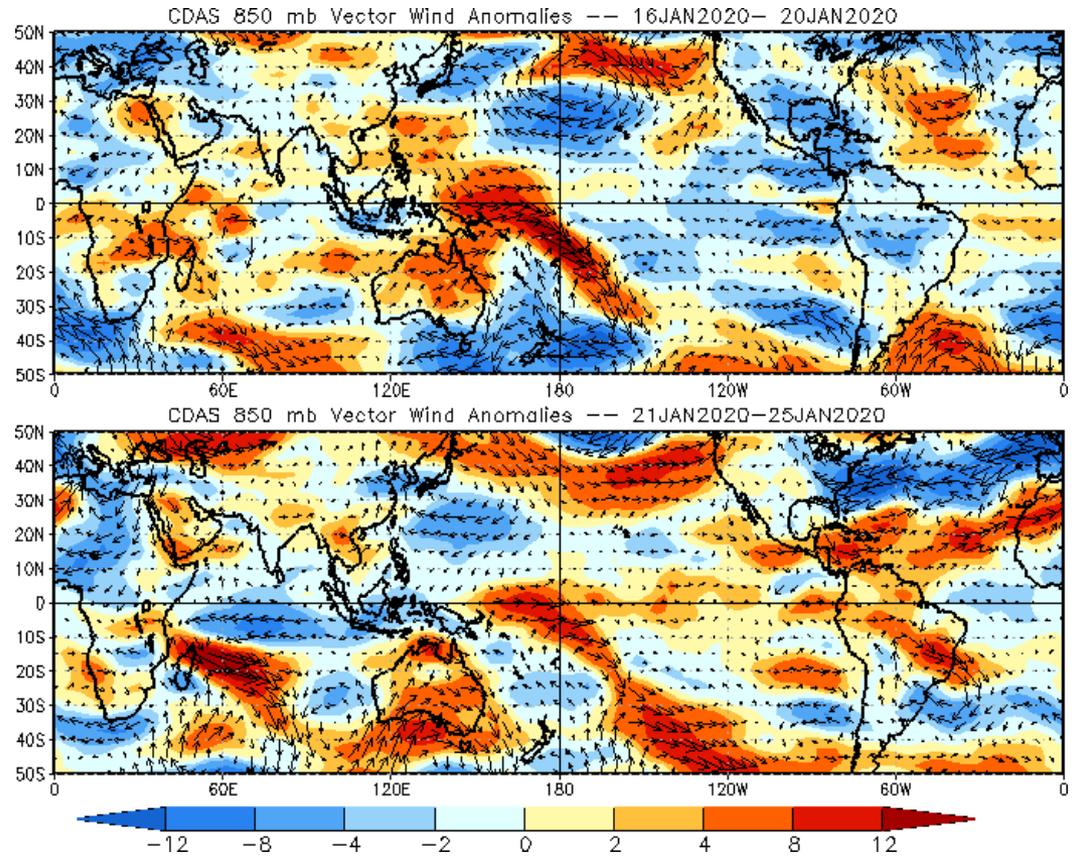
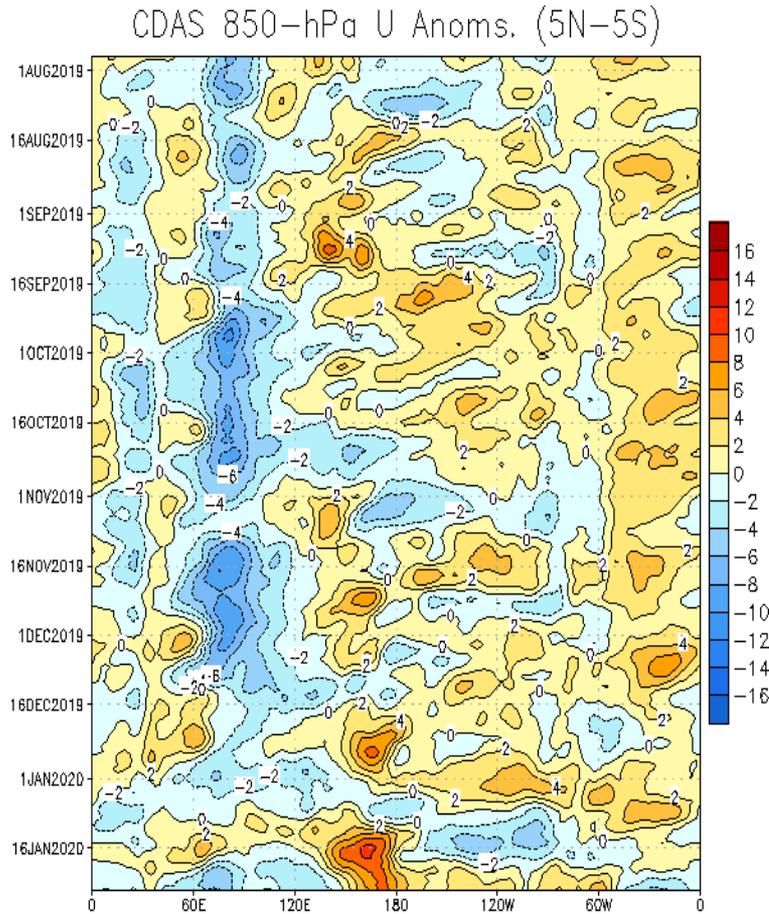
Shading denotes the zonal wind anomaly. **Blue shades:** Anomalous easterlies. **Red shades:** Anomalous westerlies.



- Anomalous westerlies aloft have persisted over the Maritime Continent and the equatorial Atlantic, while anomalous easterlies have strengthened over eastern equatorial Africa.
- A cyclonic circulation aloft is featured over East Asia.

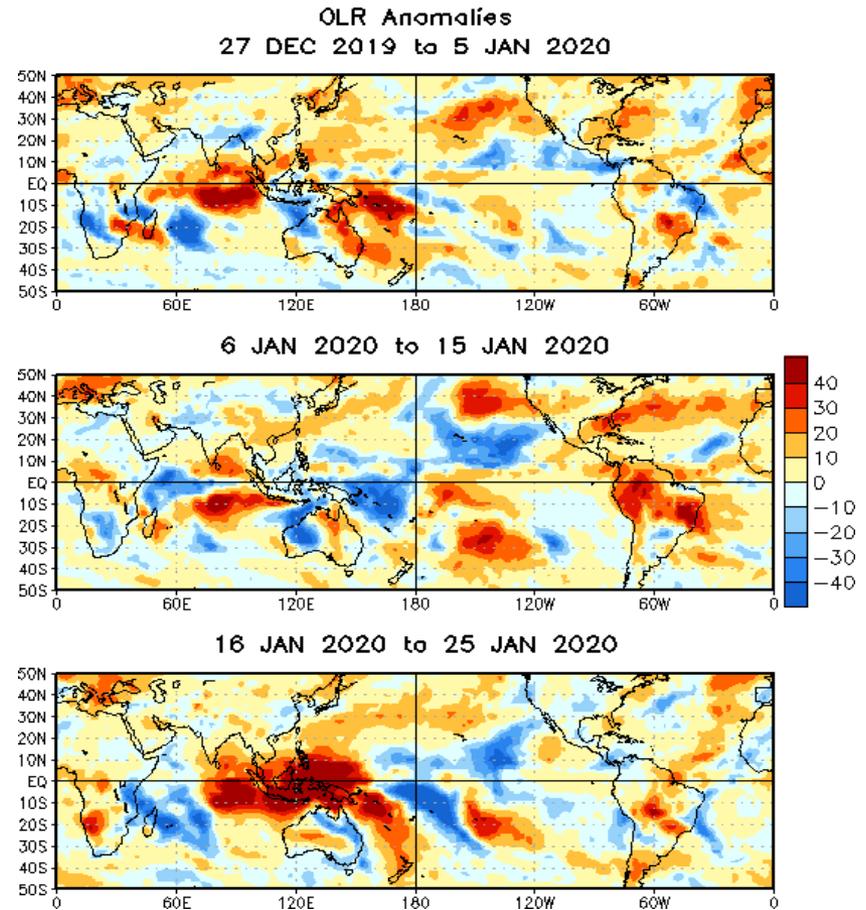
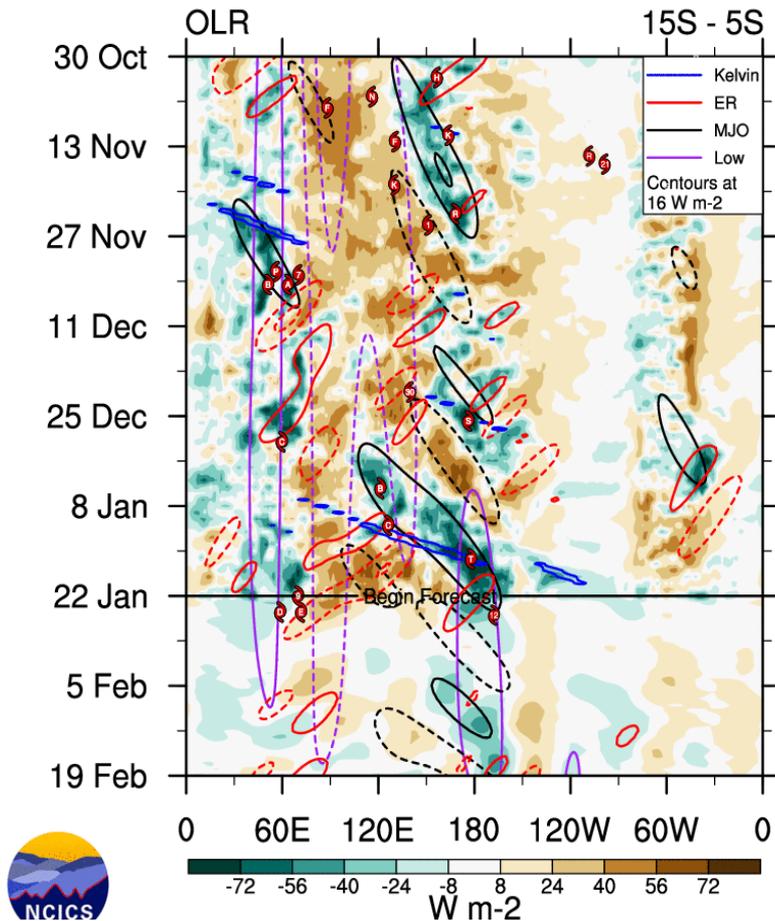
850-hPa Wind Anomalies

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



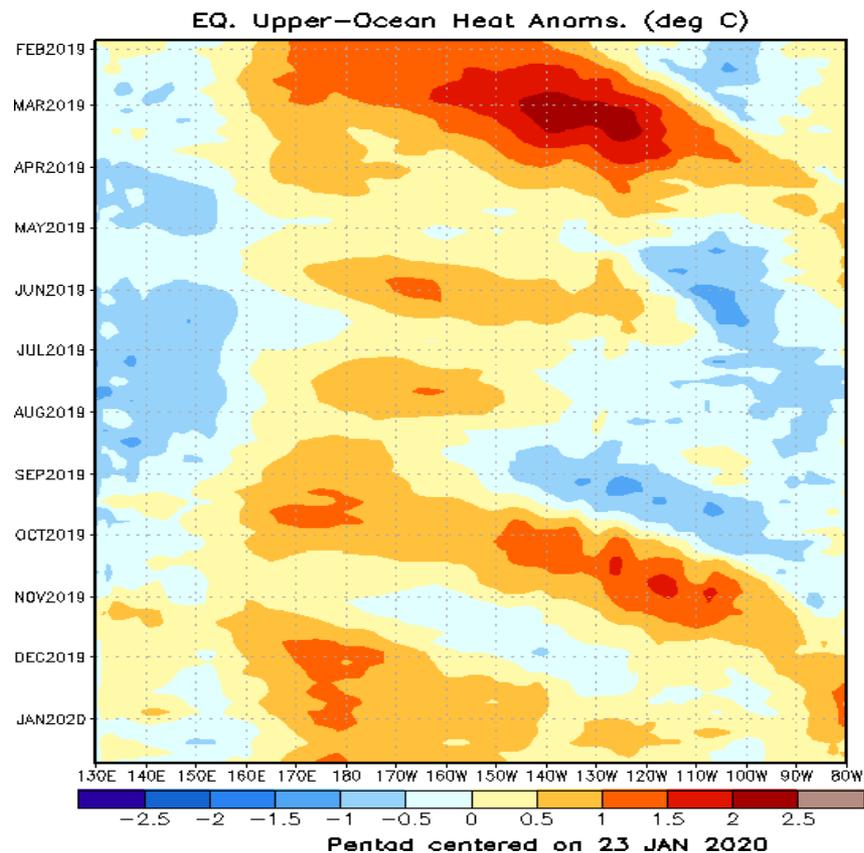
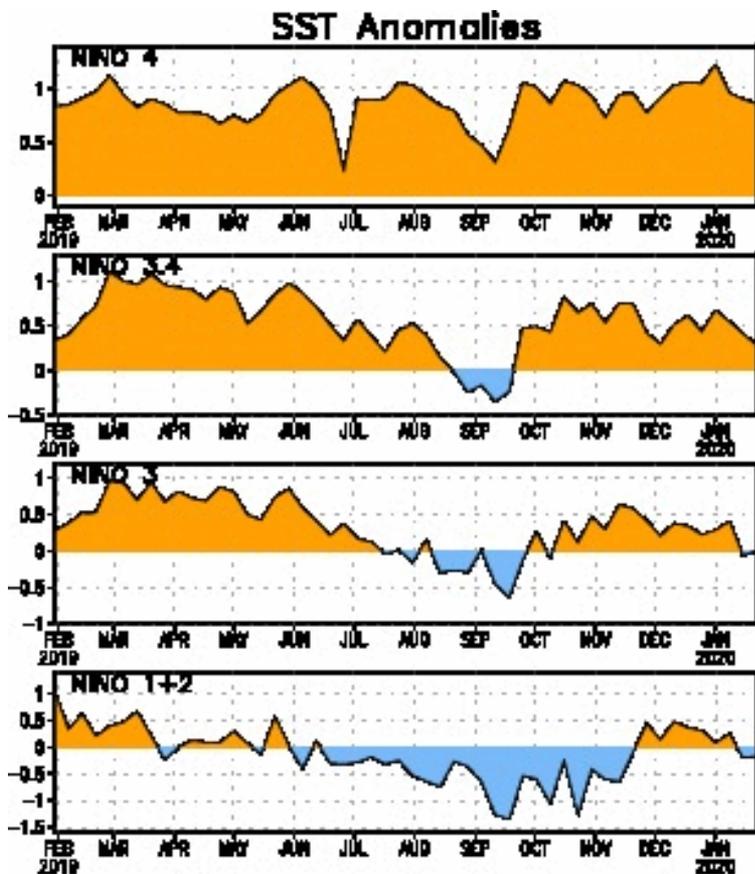
- Anomalous easterlies have strengthened over the equatorial Indian Ocean, with strong anomalous westerlies persisting to west of the Dateline.
- Anomalous westerlies have also strengthened and expanded over the equatorial East Pacific and in the Caribbean.

Outgoing Longwave Radiation (OLR) Anomalies



- Enhanced convection strengthened across the western Indian Ocean, and persisted over the Central Pacific since mid-January.
- Conversely, suppressed convection, tied to stronger lower-level divergence, intensified over the Maritime Continent and into Western Pacific since mid-January.

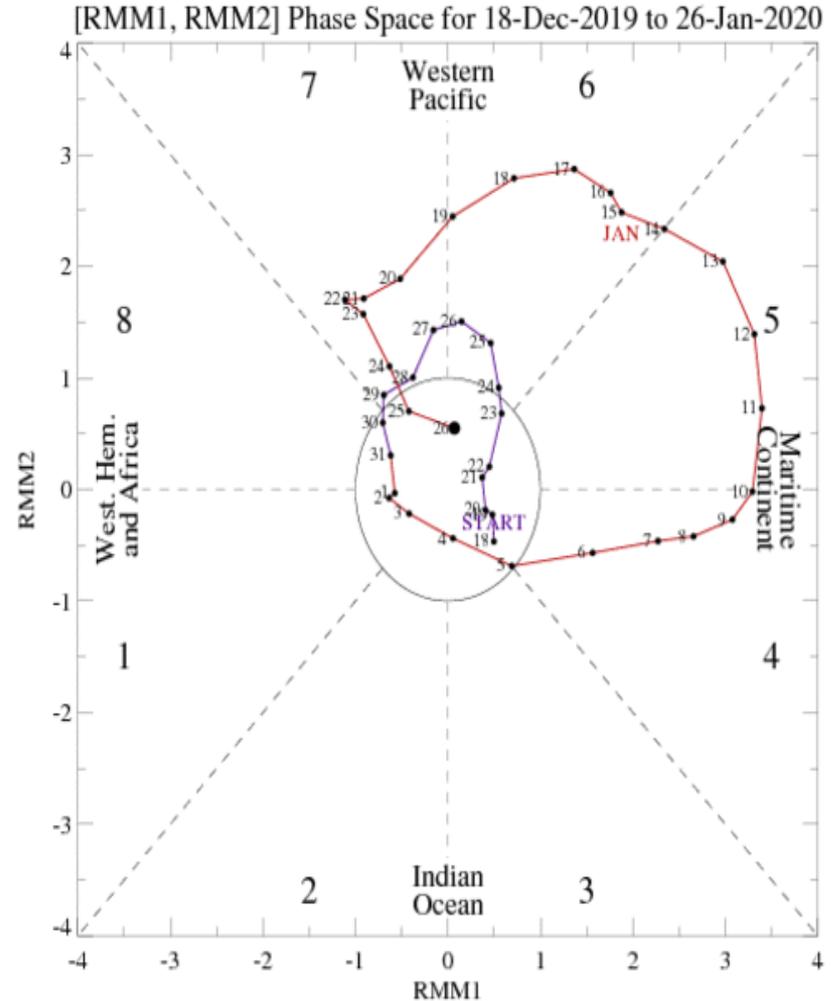
SSTs and Weekly Heat Content Evolution in the Equatorial Pacific



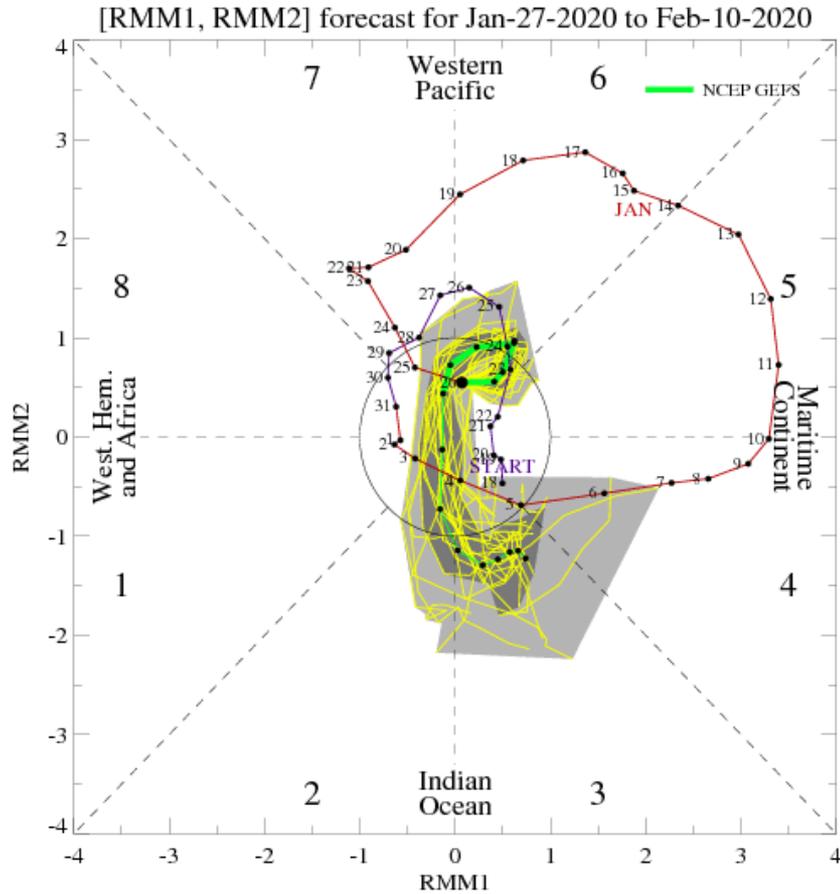
- Positive SST anomalies have been weakened across much of the Central and Eastern Pacific, with negative anomalies recently observed in the Niño 1+2 region.
- Increased warming near the Date Line most likely in response to the strong westerly wind burst in the region.

MJO Index: Recent Evolution

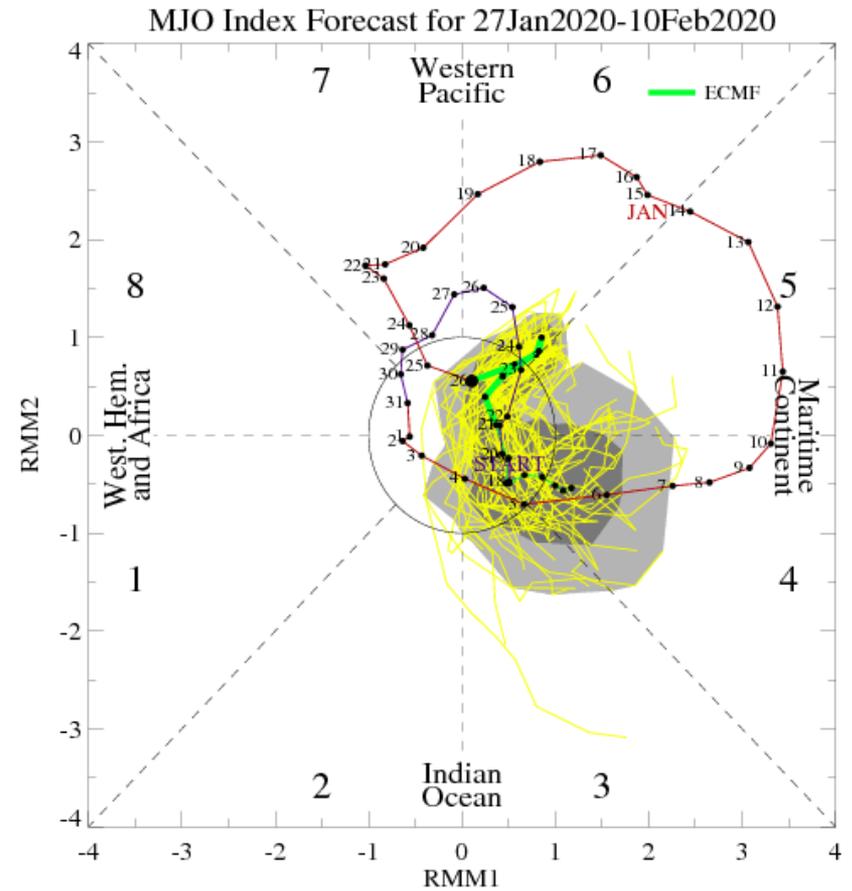
- The decay of the IOD aided in the resurgence of the MJO signal over the Maritime Continent at the beginning of January.
- The enhanced phase of the MJO shifted east into the Western Pacific Ocean and rapidly weakened during the past two weeks.



MJO Index: Forecast Evolution



GEFS Forecast



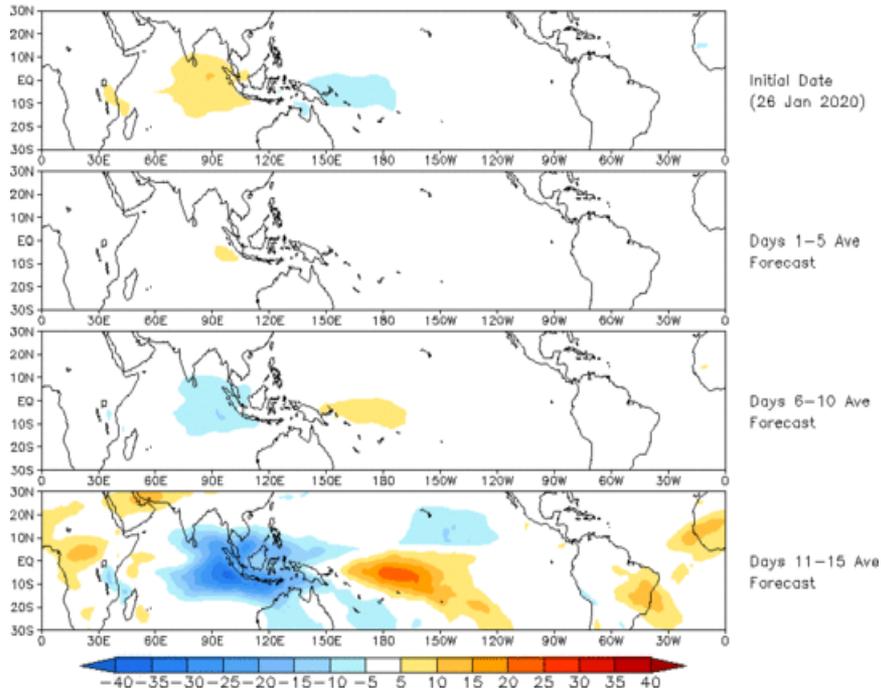
ECMWF Forecast

- Both GEFS and ECMWF suggest the MJO to remain at low amplitude, with possible reemergence and eastward propagation later in Week-2.

MJO: Tropical Composite Maps by RMM Phase

850-hPa Velocity Potential and Wind Anomalies

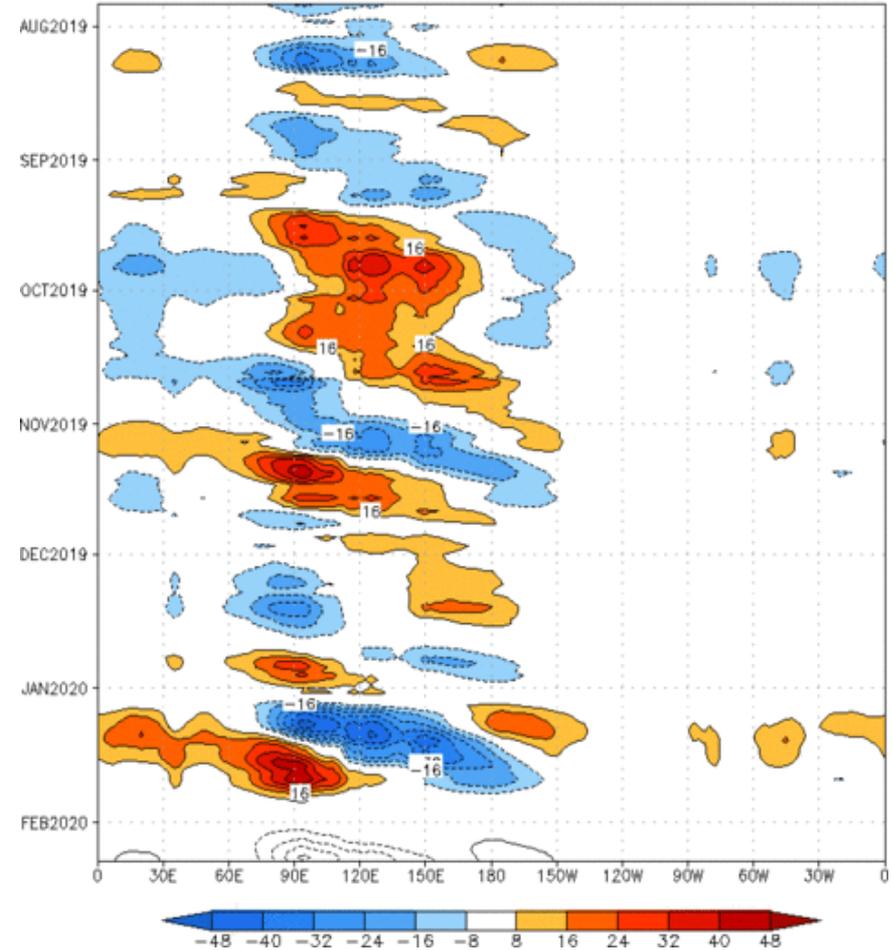
OLR prediction of MJO-related anomalies using CA model reconstruction by RMM1 & RMM2 (26 Jan 2020)



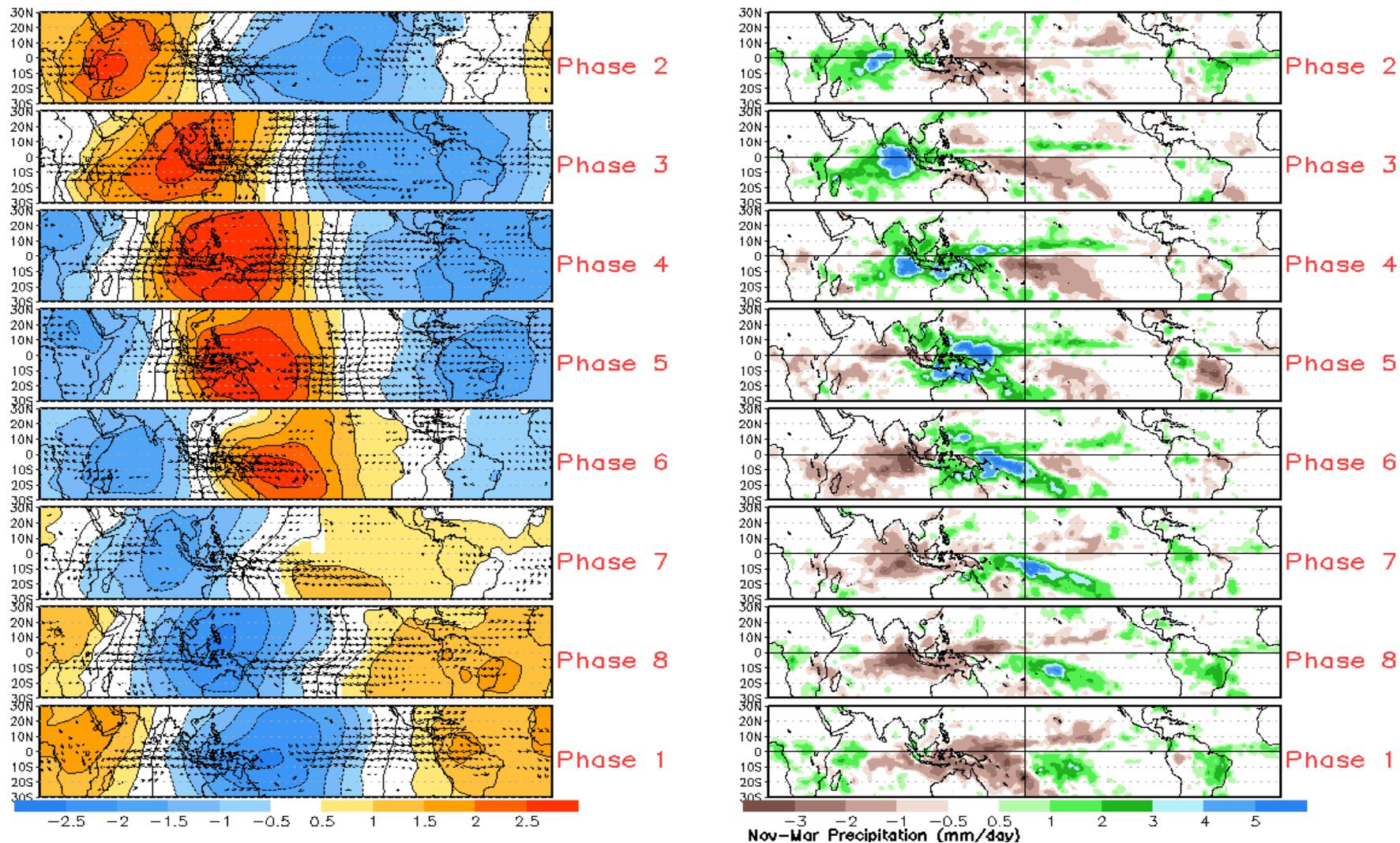
- The constructed analog MJO forecast suggests a weak MJO during week-1, with reemergence into Phase 3/4 later in week-2 with enhanced (suppressed) convection over the Eastern IO/ Maritime Continent (Western Pacific/Western Hemisphere)

Precipitation Anomalies

Reconstructed anomaly field associated with the MJO using RMM1 & RMM2 OLR [7.5°S,7.5°N] (cint:4Wm⁻²) Period:27-Jul-2019 to 26-Jan-2020
The unfilled contours are CA forecast reconstructed anomaly for 15 days



MJO: CONUS Composite Maps by RMM Phase - Temperature



MJO: CONUS Composite Maps by RMM Phase - Temperature

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.

