



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

**Update prepared by
Climate Prediction Center / NCEP
July 9, 2007**



Outline

- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden-Julian Oscillation Forecast**
- **Summary**



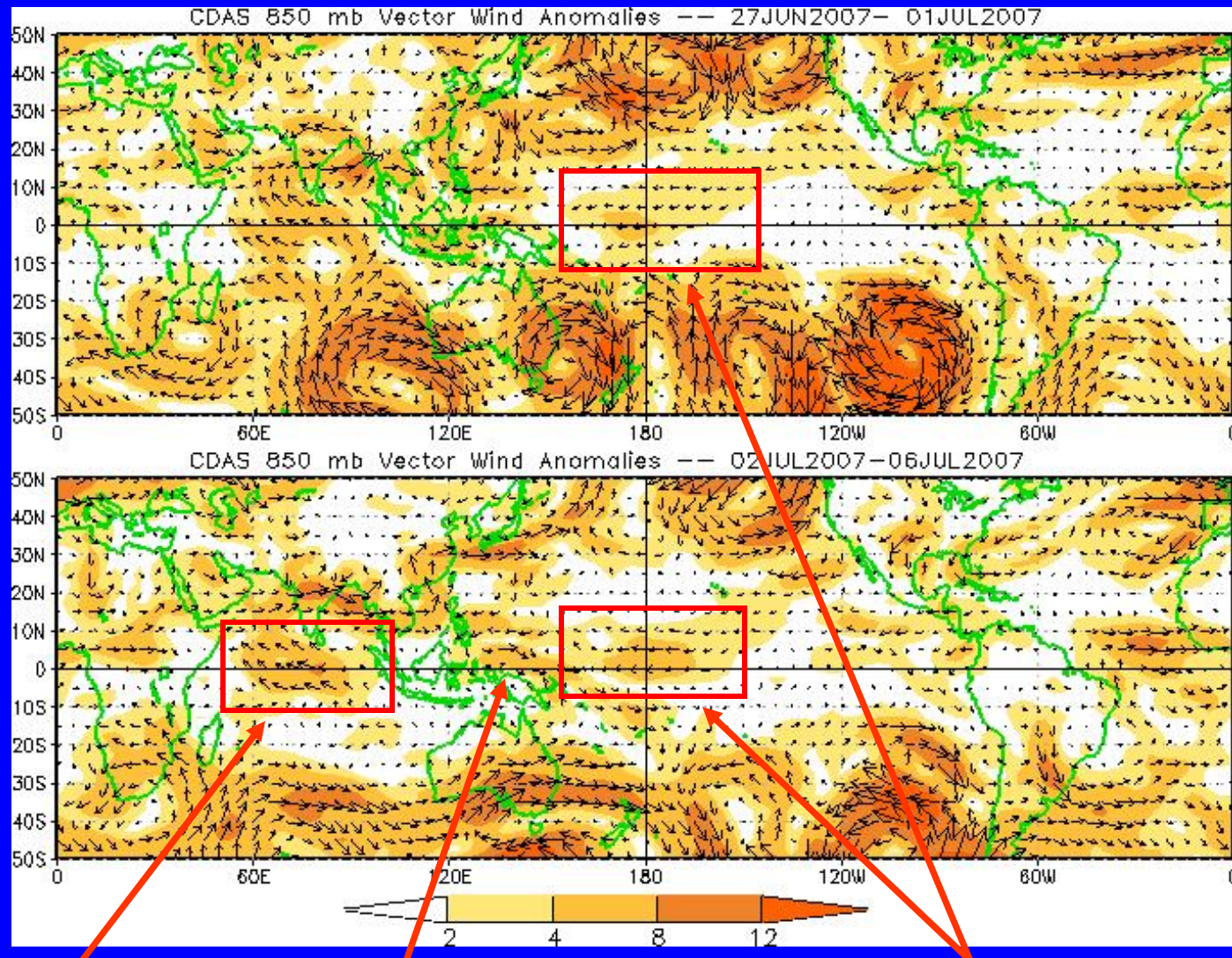
Overview

- **The weak-moderate MJO activity that has been evident since mid-May continues. The enhanced phase is centered across the west-central Pacific.**
- **Convection intensified across the western Pacific Ocean and a tropical cyclone associated with the MJO developed east of the Philippines.**
- **Dry conditions were observed across much of tropical western hemisphere.**
- **Based on the latest monitoring and forecast tools, weak to moderate MJO activity is expected to continue during the next two weeks.**



850-hPa Vector Wind Anomalies (m s^{-1})

Note that shading denotes the magnitude of the anomalous wind vectors



Easterly anomalies in the equatorial Indian Ocean continue.

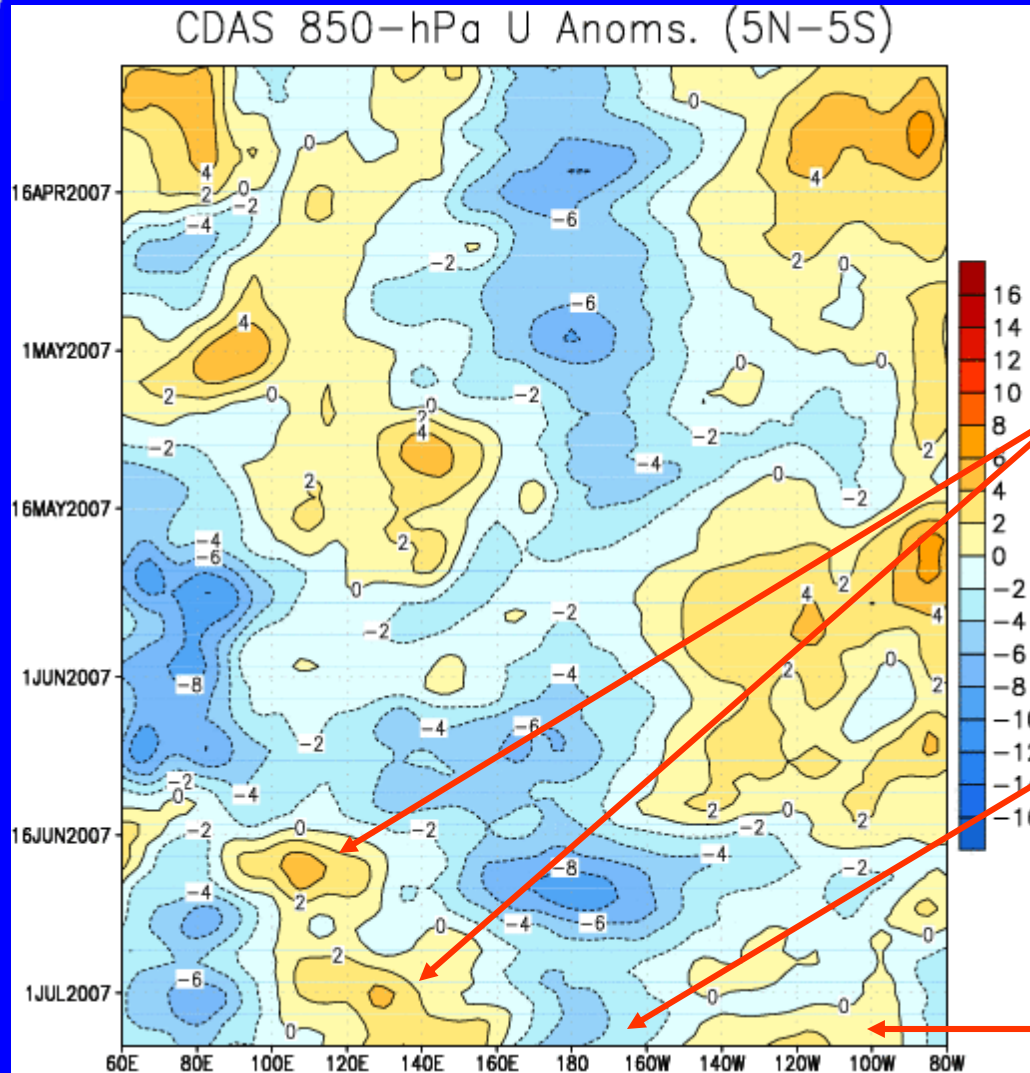
Westerly anomalies are evident across the equatorial far western Pacific Ocean.

Easterly anomalies continue near the Date Line in the central Pacific Ocean.



850-hPa Zonal Wind Anomalies (m s^{-1})

Time



Longitude

Westerly anomalies (orange/red shading) represent anomalous west-to-east flow.

Easterly anomalies (blue shading) represent anomalous east-to-west flow.

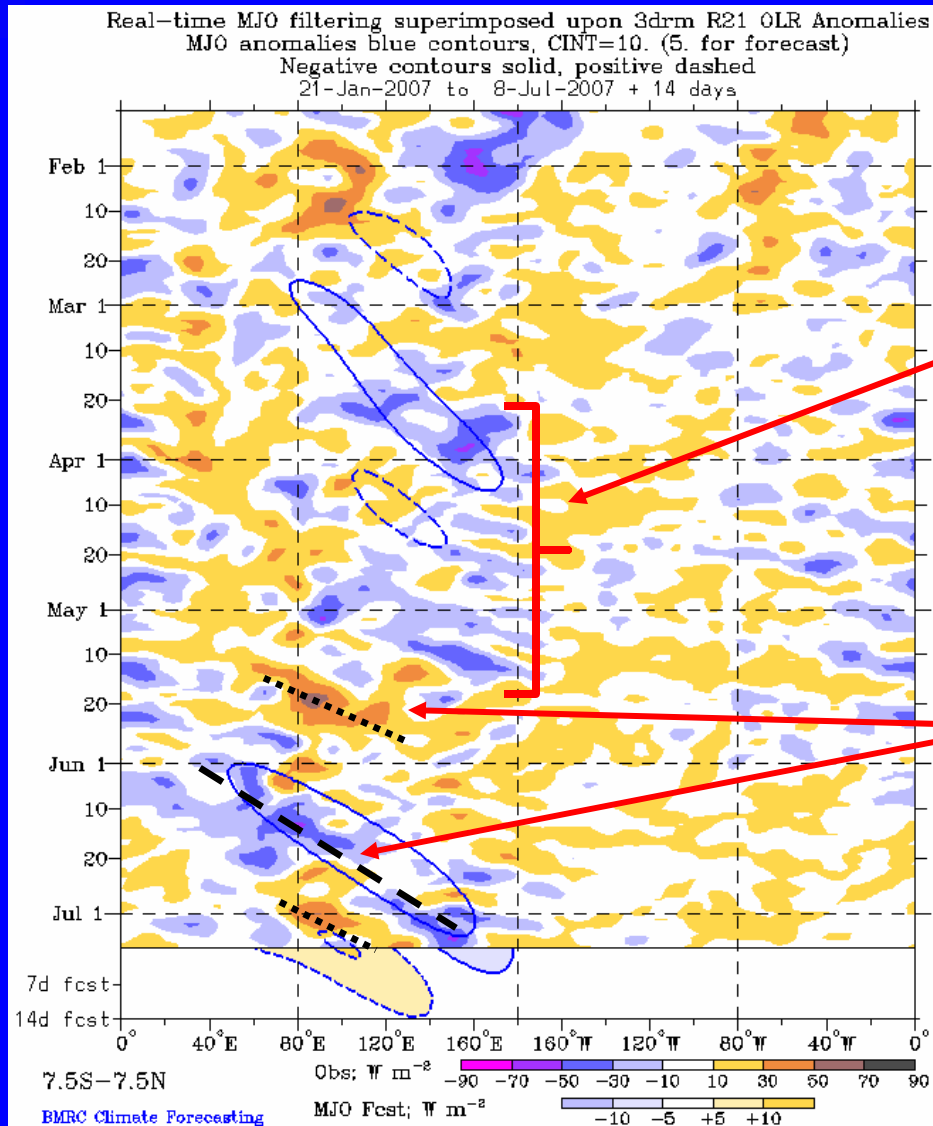
Westerly anomalies have been evident across sections of the Maritime continent and the western Pacific Ocean during from the latter half of June into early July.

Easterly anomalies continue near the Date Line.

Positive anomalies are again evident across the eastern Pacific Ocean during the last week.



Outgoing Longwave Radiation (OLR) Anomalies (7.5°S-7.5°N)



Drier-than-normal conditions, positive OLR anomalies (yellow/orange shading)

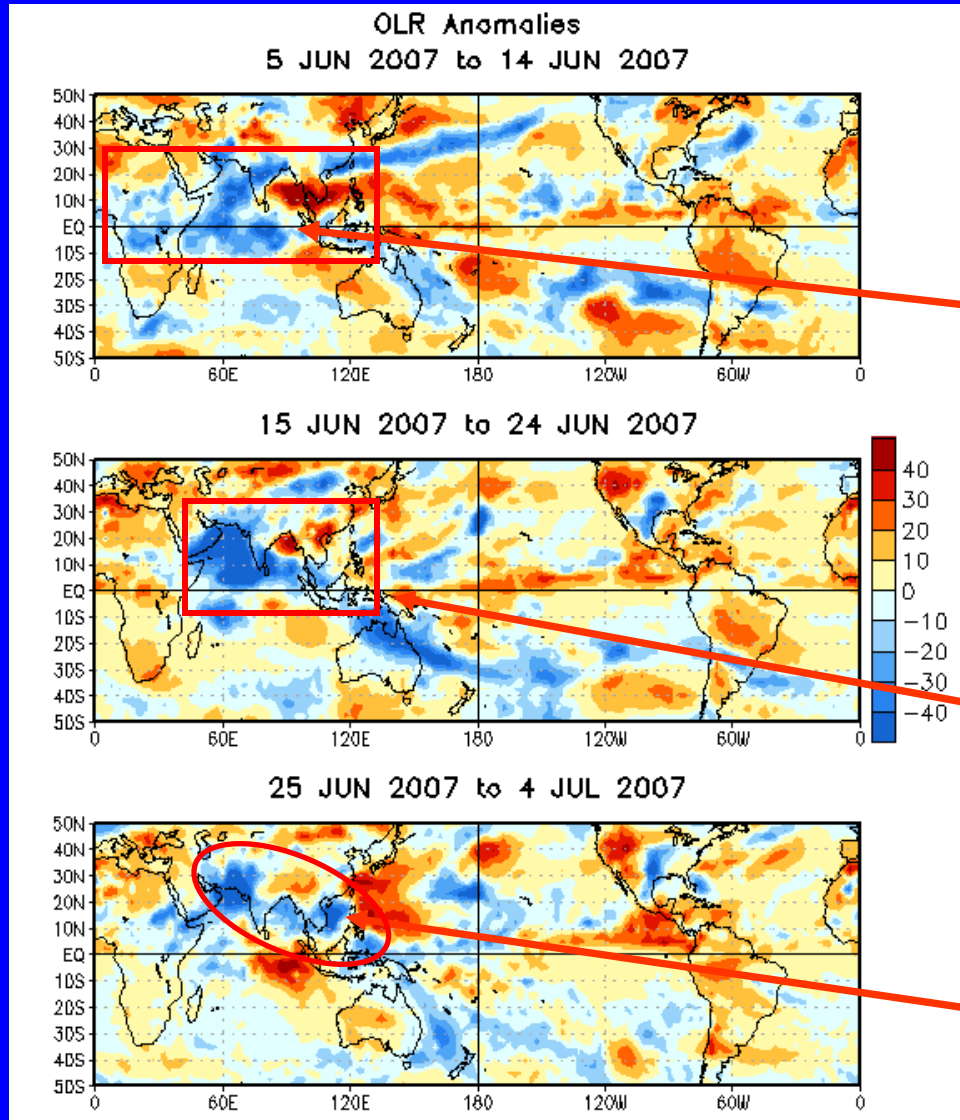
Wetter-than-normal conditions, negative OLR anomalies (blue shading)

Intermittent periods of enhanced convection were evident in the western Pacific Ocean from late March into May.

Beginning in mid May, weak-moderate MJO activity has been observed as first suppressed convection and later enhanced convection shifted eastward from the Indian Ocean into the far western Pacific.



OLR Anomalies: Last 30 days



Drier-than-normal conditions, positive OLR anomalies (red shading)

Wetter-than-normal conditions, negative OLR anomalies (blue shading)

During early-mid June, enhanced rainfall continued over sections of the Arabian Sea and Africa while dry conditions prevailed across Southeast Asia.

During mid-late June, wet conditions expanded eastward across the Indian Ocean and Maritime Continent associated with the MJO.

The enhanced convection across the Eastern Hemisphere shifted northward during late June into early July.

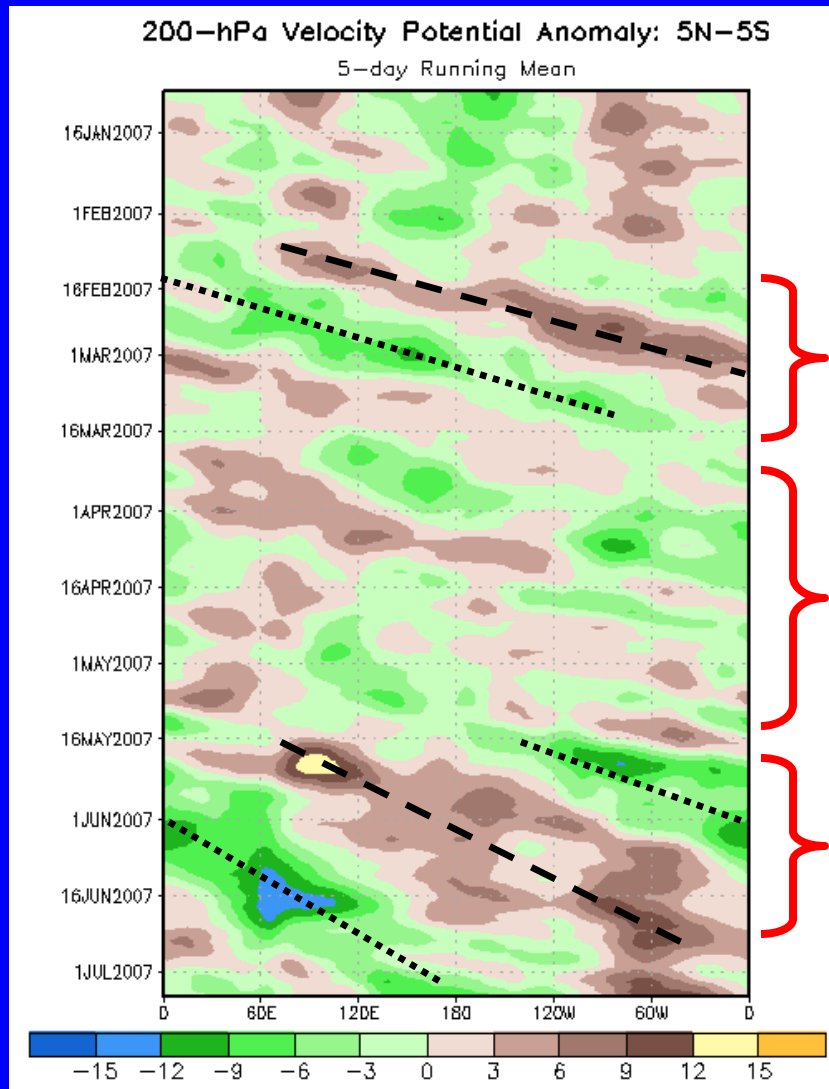


200-hPa Velocity Potential Anomalies (5°S-5°N)

Positive anomalies (brown shading) indicate unfavorable conditions for precipitation.

Negative anomalies (green shading) indicate favorable conditions for precipitation.

Time



Longitude

Weak to moderate MJO activity was observed during late February and early March as velocity potential anomalies shifted eastward.

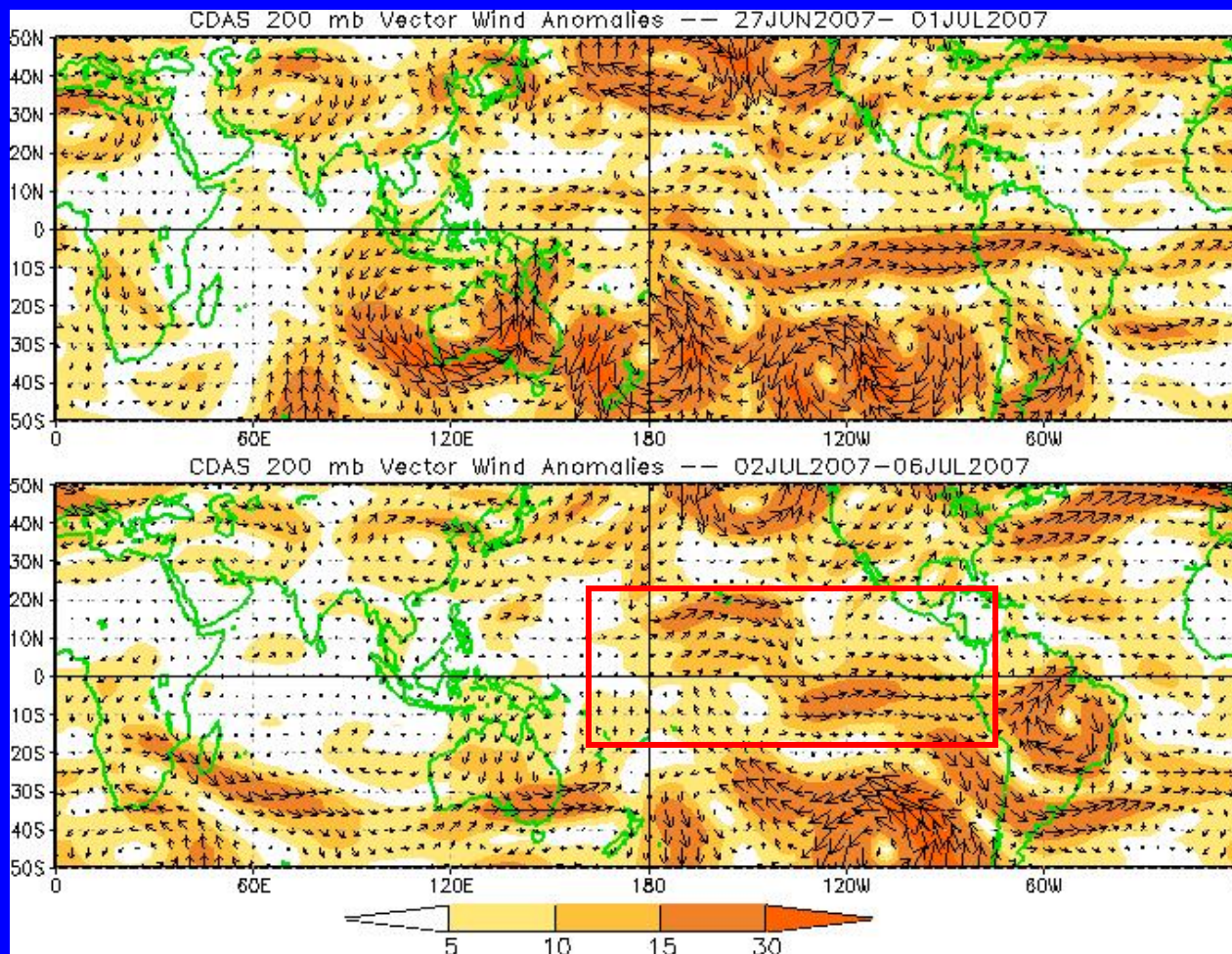
The MJO was weak or incoherent from mid-March to mid-May.

Weak to moderate MJO activity has been evident since mid-May as velocity potential anomalies increased and have shifted eastward.



200-hPa Vector Wind Anomalies (m s^{-1})

Note that shading denotes the magnitude of the anomalous wind vectors

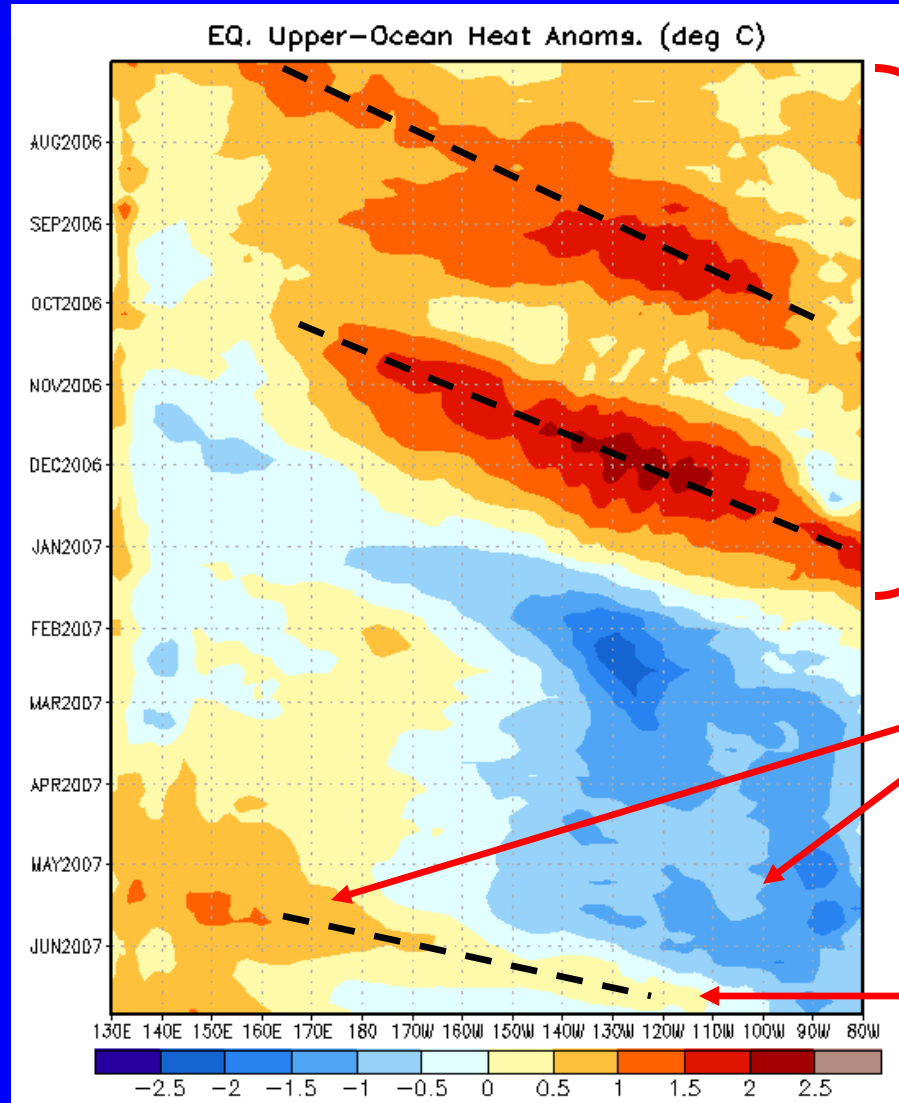


A lack of anomalous winds aloft is noted in the Eastern Hemisphere while westerly anomalies continue over the east Pacific.



Weekly Heat Content Evolution in the Equatorial Pacific

Time



Longitude

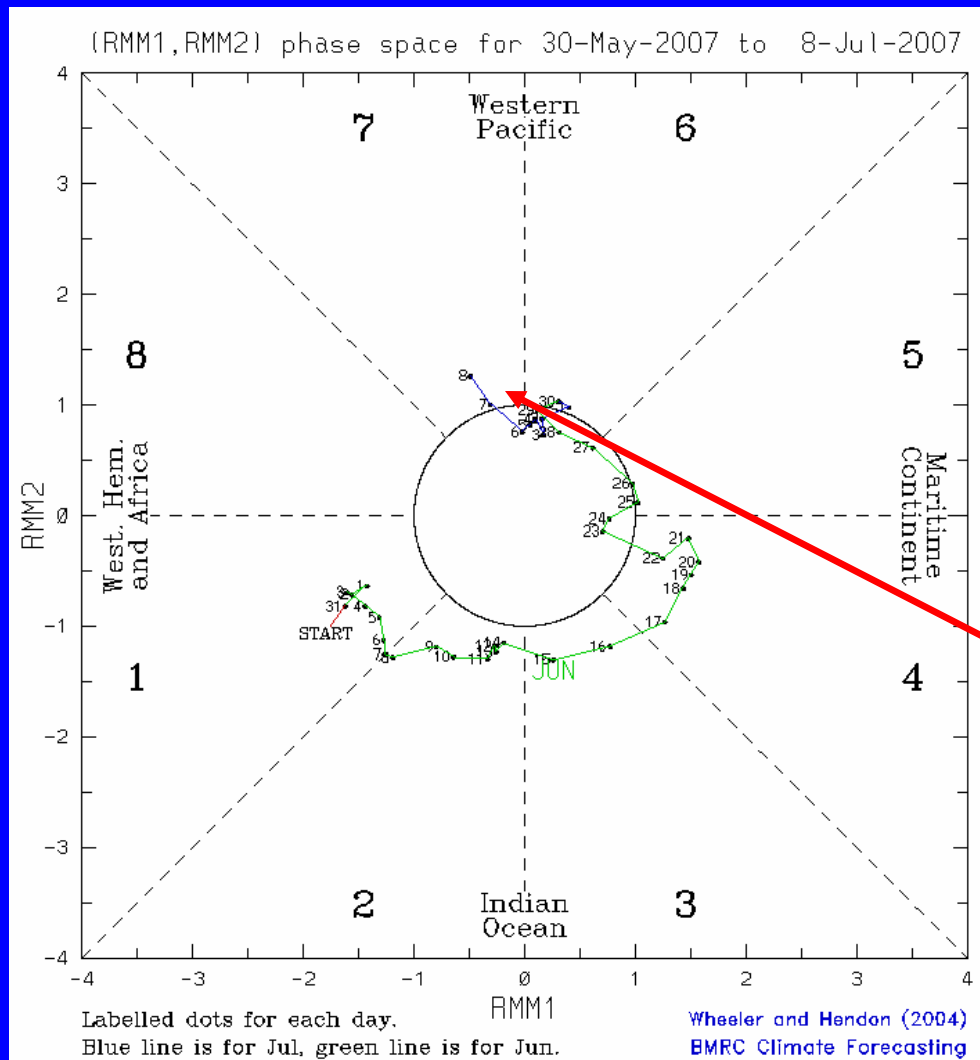
During this period two eastward-propagating Kelvin waves (warm phases indicated by dashed lines) have caused considerable month-to-month variability in the upper-ocean heat content.

Since January, negative heat content anomalies are evident across the eastern equatorial Pacific and since late March larger positive anomalies are evident in the far western Pacific Ocean.

Most recently a weak Kelvin wave has resulted in small positive anomalies as far east as 110° W.



MJO Index



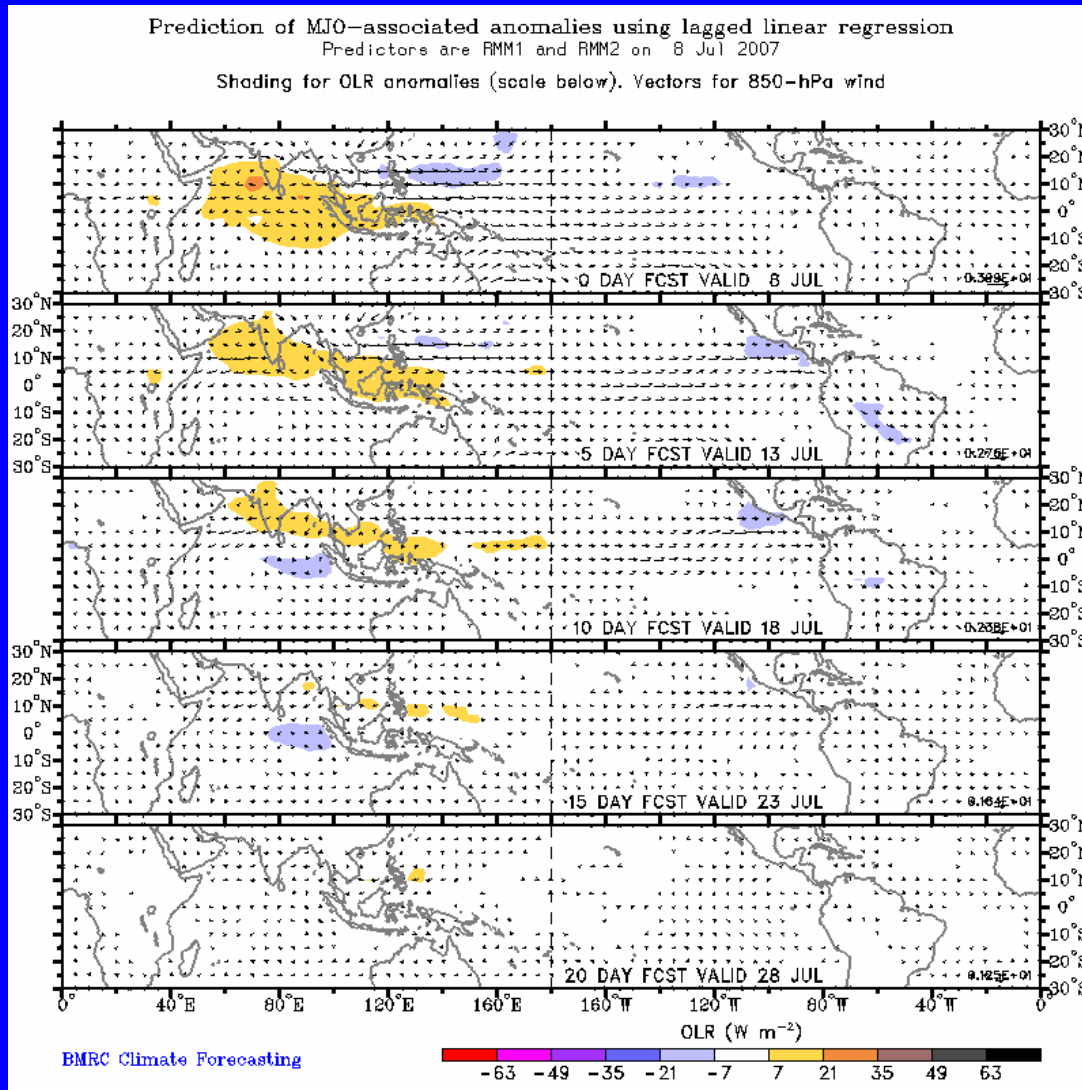
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850-hPa and 200-hPa zonal wind and outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

The axes represent the time series of the two leading modes of variability and are used to measure the amplitude while the triangular areas indicate the phase or location of the enhanced phase of the MJO. The farther away from the center of the circle the stronger the MJO. Different color lines indicate different months.

In recent days, the MJO index has increased in amplitude and has shifted eastward.



MJO OLR Forecast



The statistical method forecasts dry conditions across the Indian Ocean and western Maritime continent during the next 5-10 days.



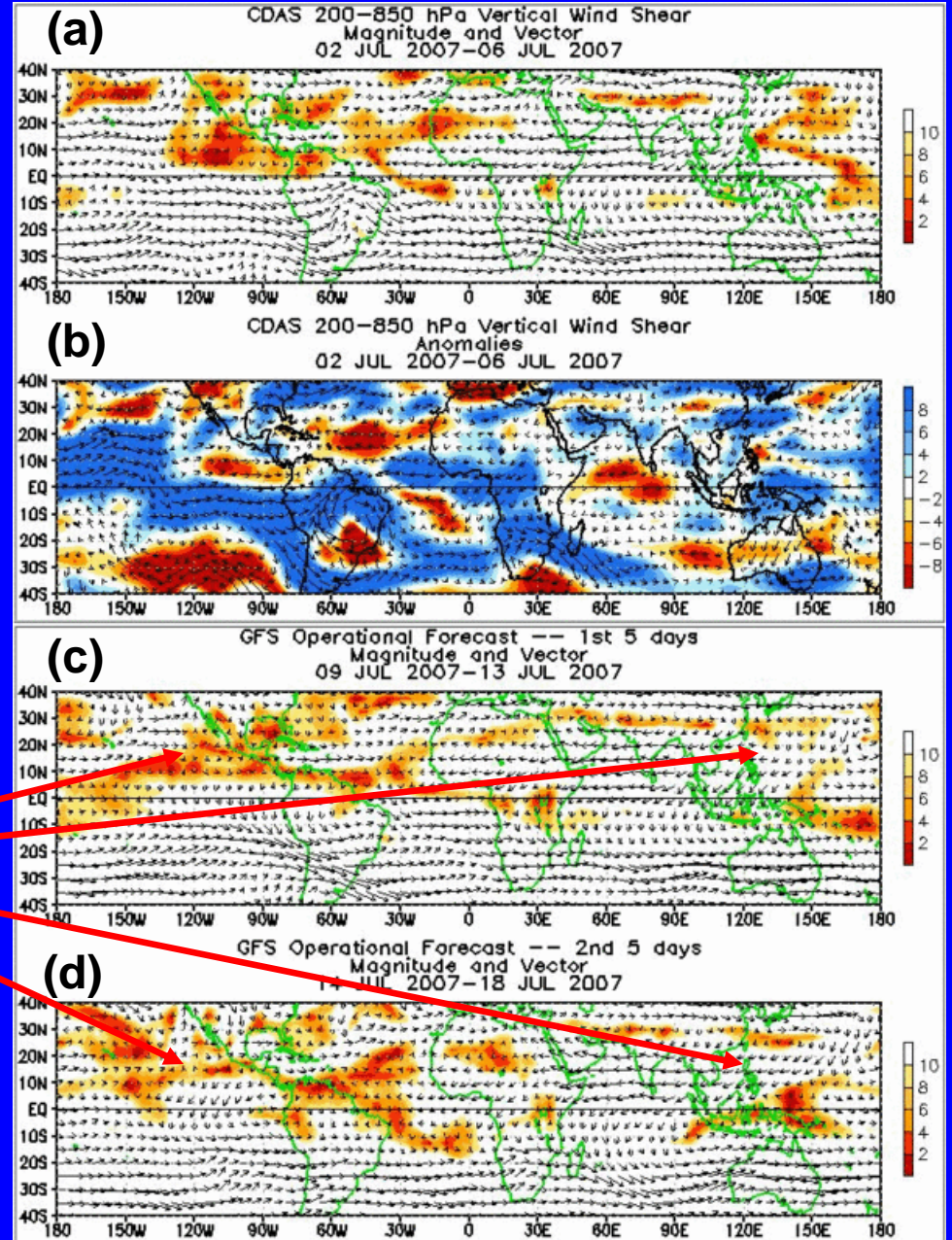
200–850 hPa Vertical Wind Shear

All plots: Shading denotes magnitude of vectors

Plots (a),(c),(d): low shear (red), high shear (yellow/white)

Plot (b): Shear greater than average (blue) Shear less than average (yellow/red)

The GFS forecast indicates weak shear across sections of the eastern Pacific Ocean but increasing shear across the western Pacific Ocean by mid July.





*****NOTICE OF CHANGE*****

The slides depicting potential benefits and hazards normally located here will no longer be placed within the MJO weekly update. Expected impacts during the upcoming 1-2 week time period can now be found as part of a new product:

Experimental Global Tropics Benefits/Hazards Assessment

The product can be found at:

<http://www.cpc.ncep.noaa.gov/products/precip/CWlink/ghazards/ghaz.shtml>

Please send questions/comments/suggestions to

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