



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

**Update prepared by
Climate Prediction Center / NCEP
June 18, 2007**



Outline

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



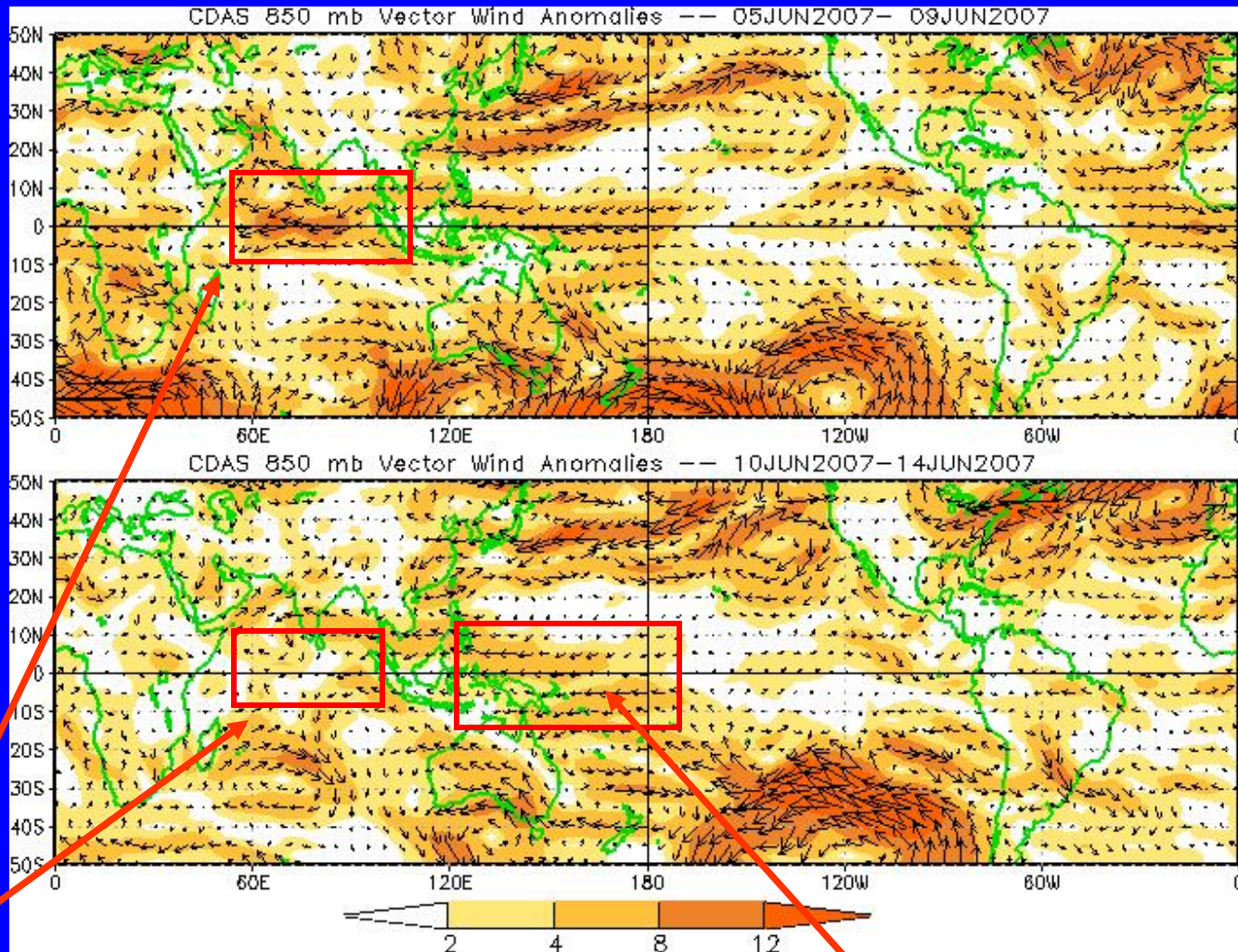
Overview

- **Indications are that a moderate MJO is established with the enhanced phase centered across the eastern Indian Ocean and Indonesia.**
- **Enhanced convection continued across sections of the Arabian Sea and the tropical Indian Ocean but there also has been a tendency during the past week for this convection to shift eastward.**
- **Dry conditions have been evident across many areas in the western Hemisphere especially western Africa.**
- **Based on the latest monitoring and forecast tools, moderate MJO activity is expected during the upcoming 1-2 week period.**



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

Note that shading denotes the magnitude of the anomalous wind vectors



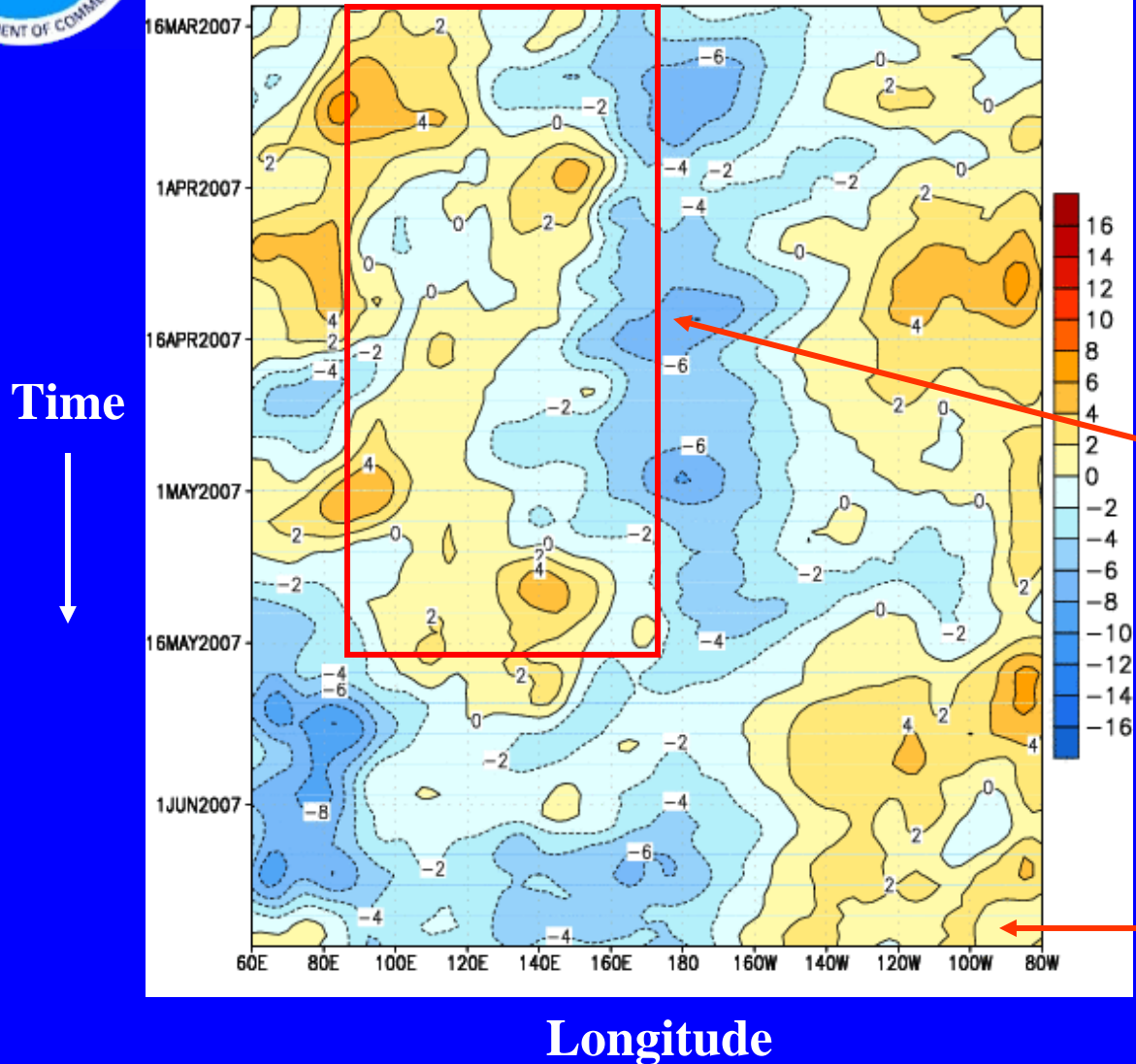
Easterly anomalies in the equatorial Indian Ocean decreased during the past five days.

Easterly anomalies remain evident in the west-central Pacific Ocean near the equator.



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

CDAS 850-hPa U Anoms. (5N-5S)



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

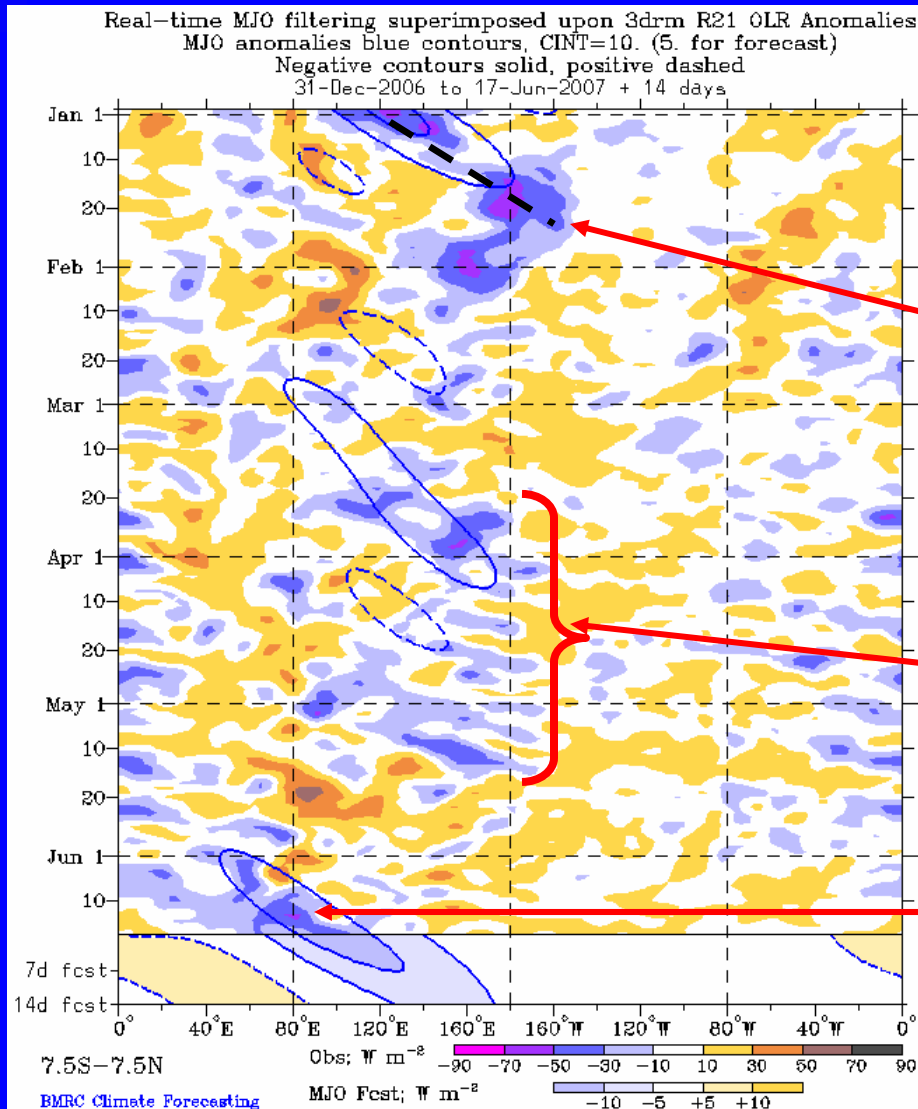
Easterly anomalies (blue shading) represent anomalous east-to-west flow.

During late March and April, an extension of easterly anomalies to the west followed by the development of westerly anomalies across Indonesia into the far western Pacific Ocean occurred.

Westerly anomalies continue across the eastern Pacific Ocean while easterly anomalies stretch from 90° E – 170° W. Small westerly anomalies are now evident in the western Indian Ocean.



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)

Enhanced convection, associated with the MJO in late December and January, shifted eastward from the Indian Ocean across the Maritime continent and western Pacific.

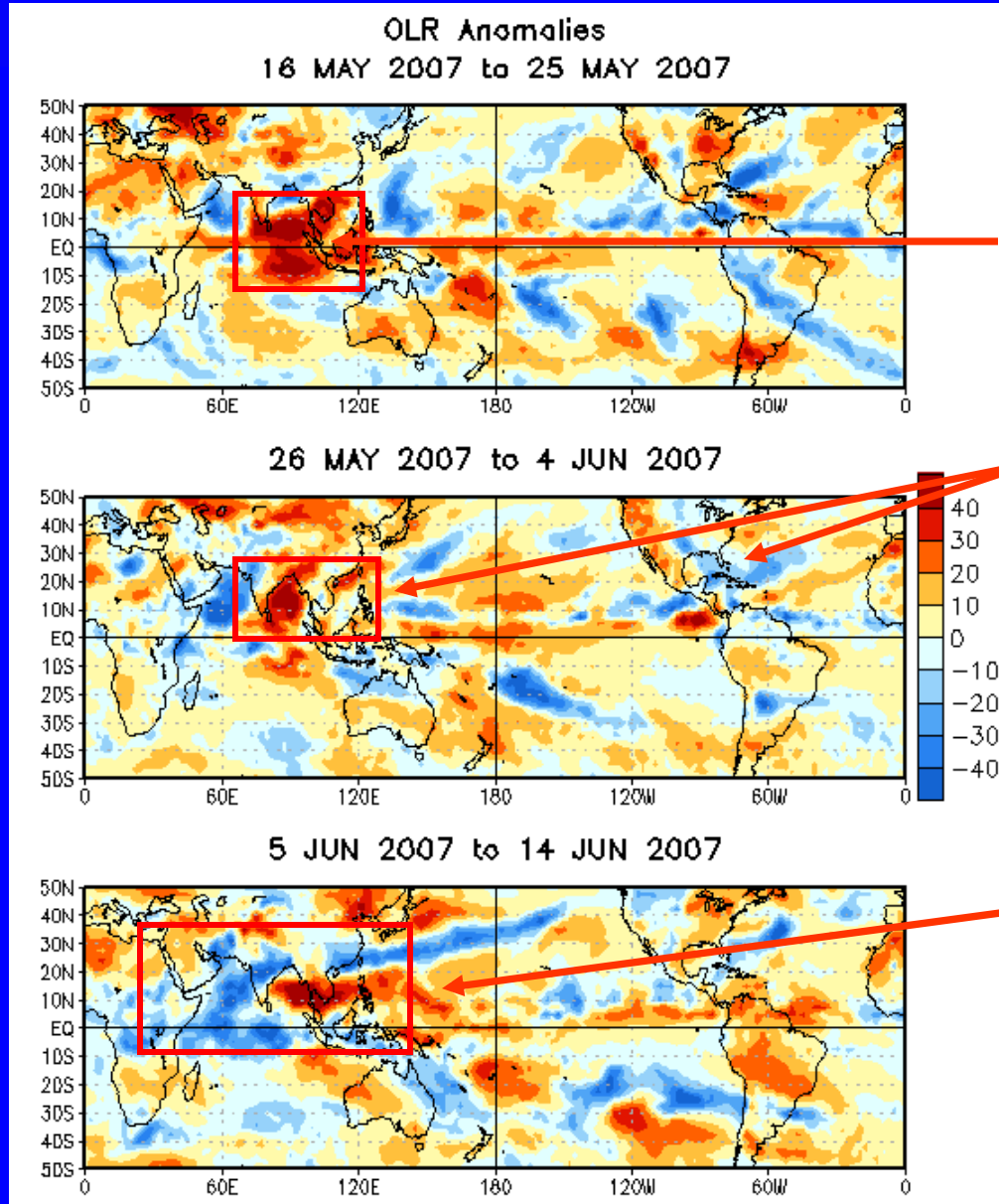
Intermittent periods of enhanced convection were evident in the western Pacific Ocean from late March into May.

Convection has markedly increased in the Indian Ocean and shifted eastward into the Maritime Continent during the past week.

Longitude



OLR Anomalies: Last 30 days



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

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

In mid-late May, dry conditions were observed across the Indian Ocean.

During late May and early June, enhanced rainfall continued over sections of the eastern Pacific Ocean, Caribbean Sea, the West Indies, and off the southeast US coast. The dry conditions in the eastern Indian Ocean propagated northward into the Bay of Bengal.

During early June, dry conditions were evident across the Bay of Bengal, Southeast Asia, and the Philippines while the Arabian Sea, the Indian Ocean, and sections of Africa have been quite wet.

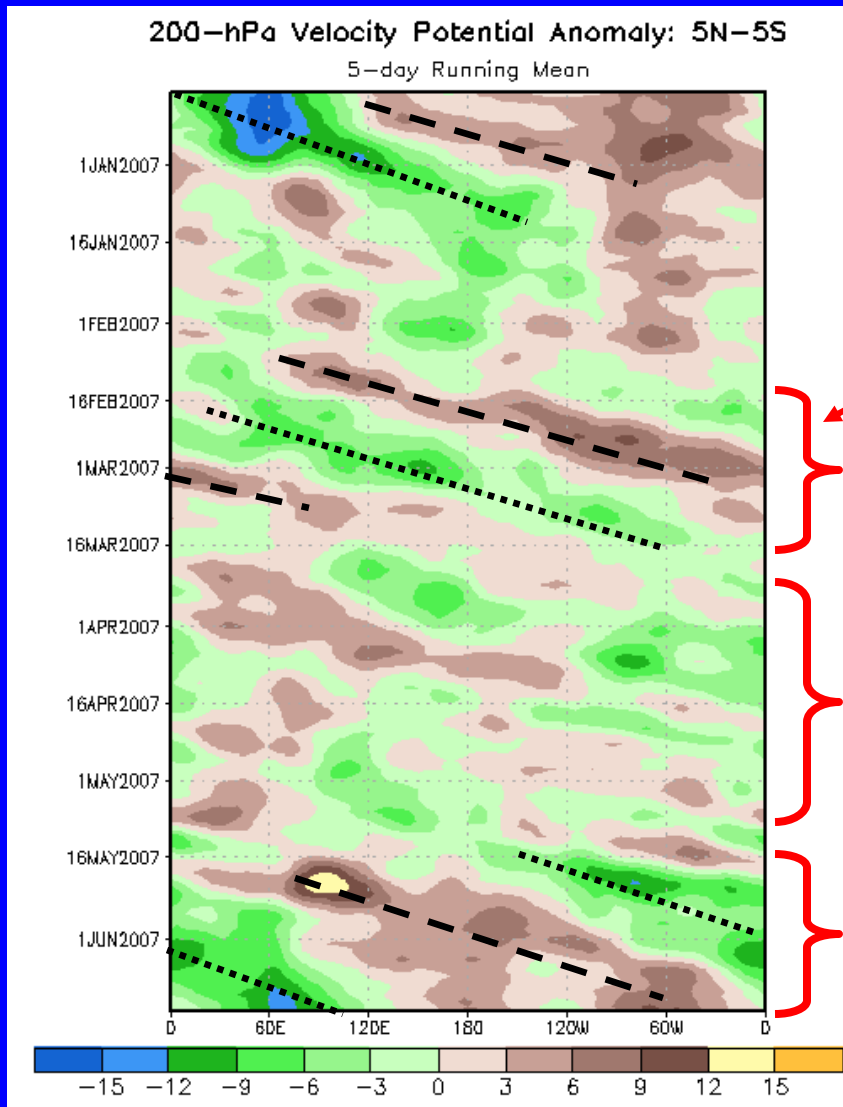


200-hPa Velocity Potential Anomalies (5°S-5°N)

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

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

Time
↓



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.

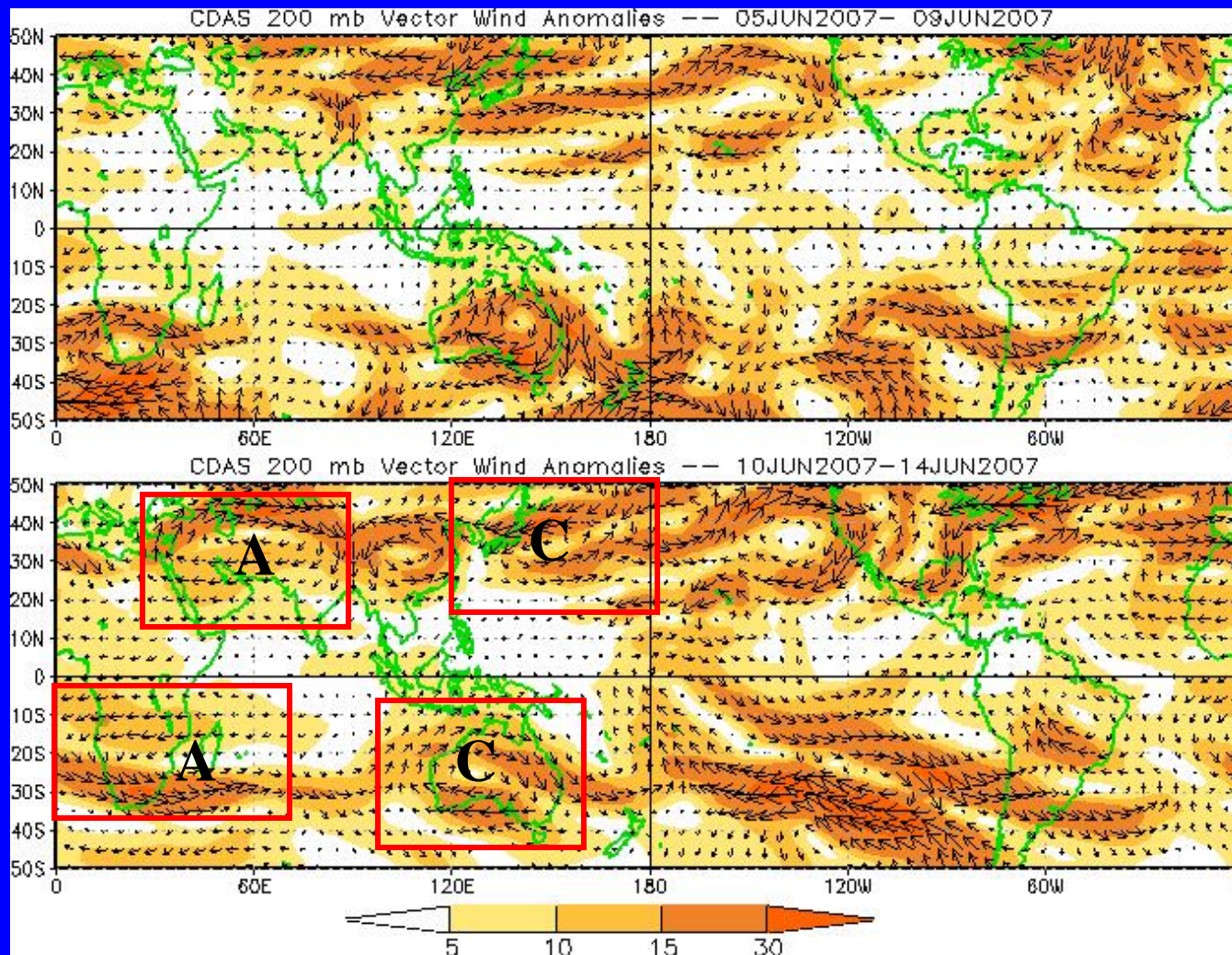
The MJO strengthened in late May as velocity potential anomalies increased and shifted eastward.

Longitude



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

Note that shading denotes the magnitude of the anomalous wind vectors

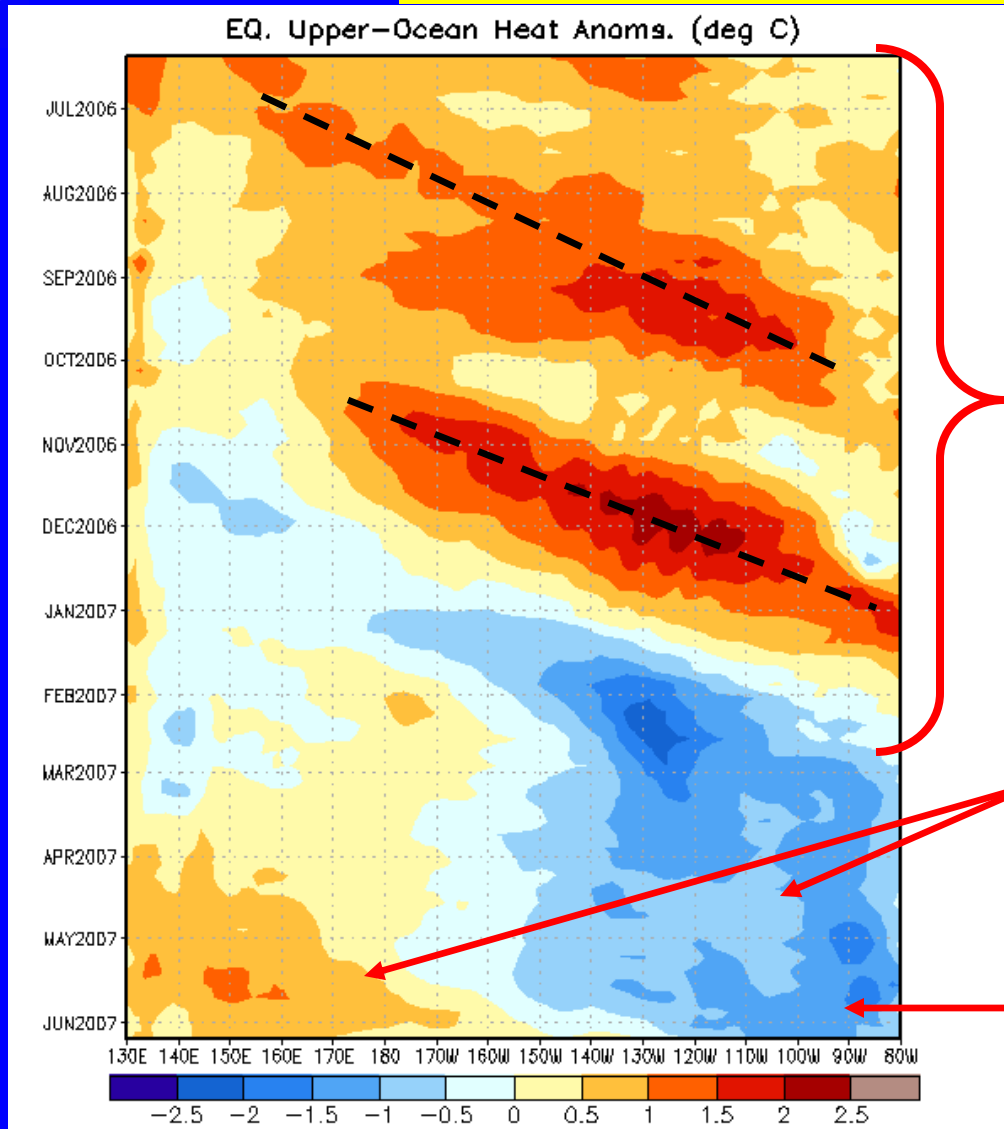


Anomalous anti-cyclonic and cyclonic circulations, often observed with an established MJO, are evident north and south of the equator.



Weekly Heat Content Evolution in the Equatorial Pacific

Time
↓



During this period 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, negative heat content anomalies have decreased in the east Pacific Ocean while anomalies have become positive as far east as 140° W.

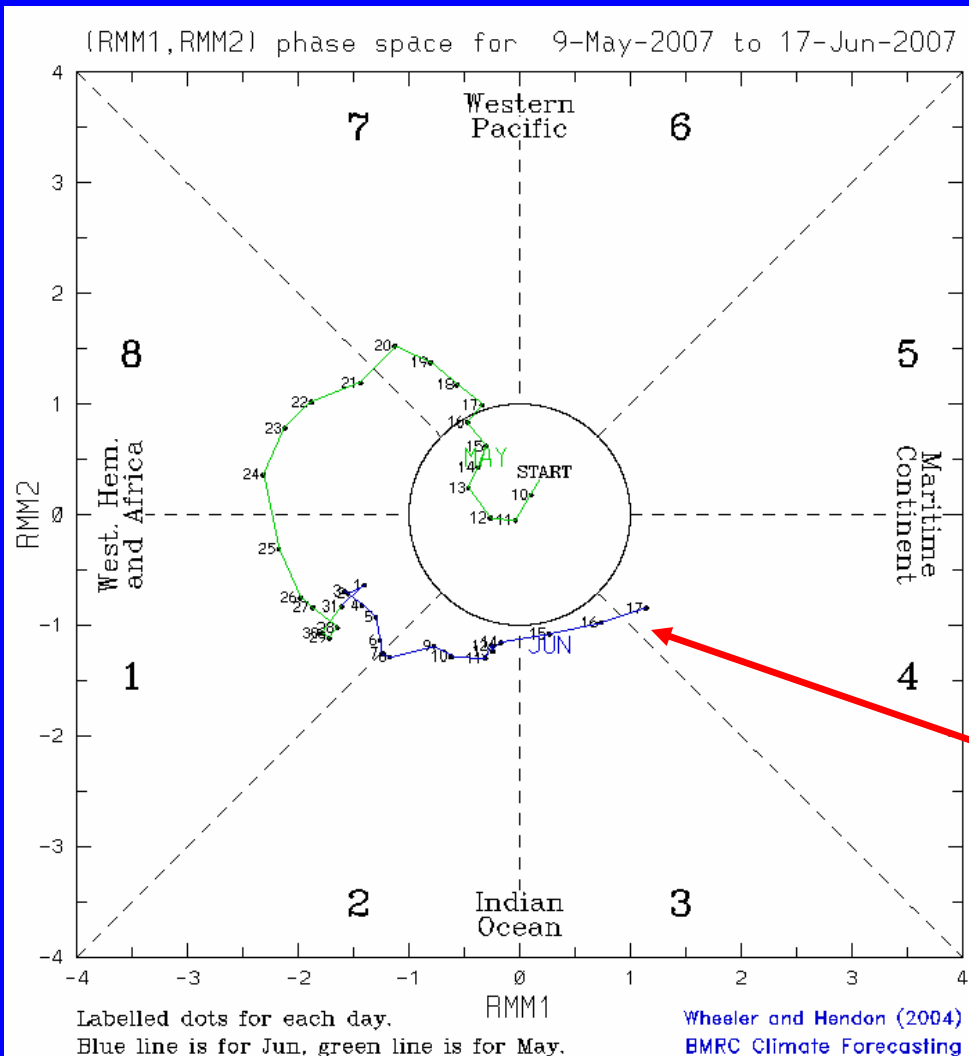
Longitude



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).

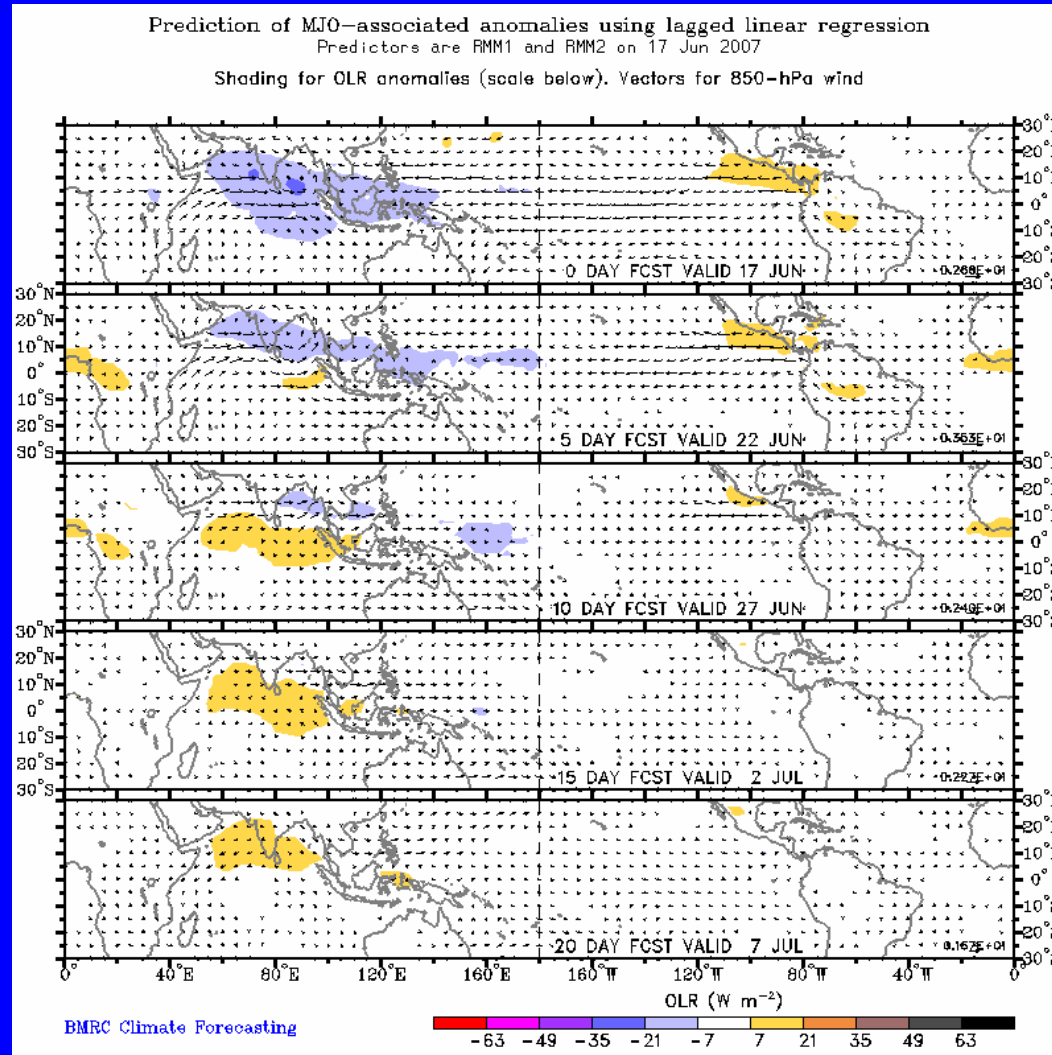
The axes represent the time series of the two leading modes of variability and are used to measure the amplitude while the triangular areas indicate the phase or location of the enhanced phase of the MJO. The farther away from the center of the circle the stronger the MJO. Different color lines indicate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



The MJO index amplitude has increased during the past few days with evident eastward propagation.



MJO OLR Forecast



The forecast indicates enhanced convection across sections of the Arabian Sea, southern India, the Bay of Bengal, and Southeast Asia during the first 10 days with dry conditions entering the Indian ocean by the end of week 2.



200–850 hPa Vertical Wind Shear

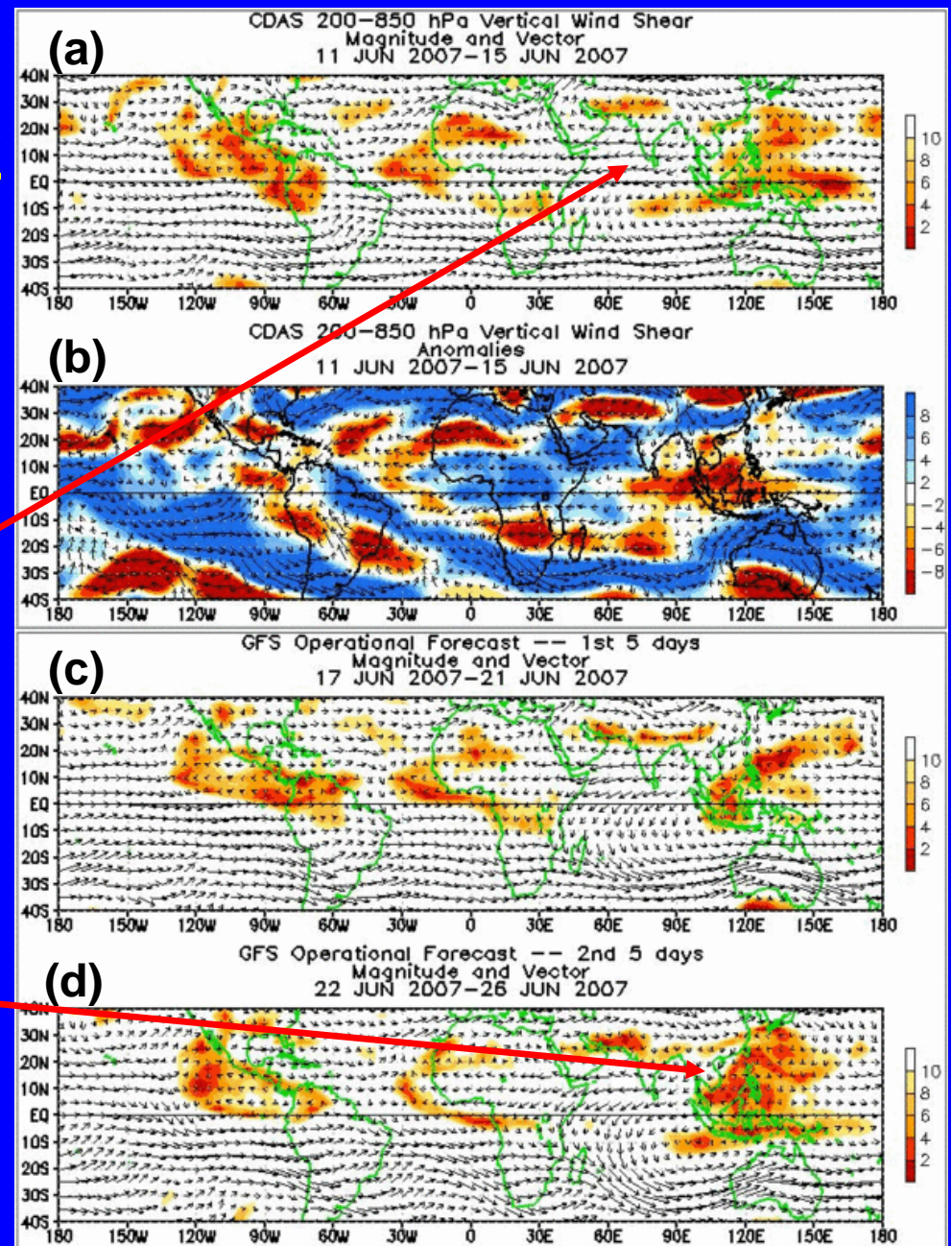
All plots: Shading denotes magnitude of vectors

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 shear has been high during the past week across the Arabian Sea and the Bay of Bengal.

The GFS forecast indicates some decrease in shear across parts of the Bay of Bengal and the South China Sea by day 10.





*****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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