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

Update prepared by
Climate Prediction Center / NCEP
June 25, 2007

Outline

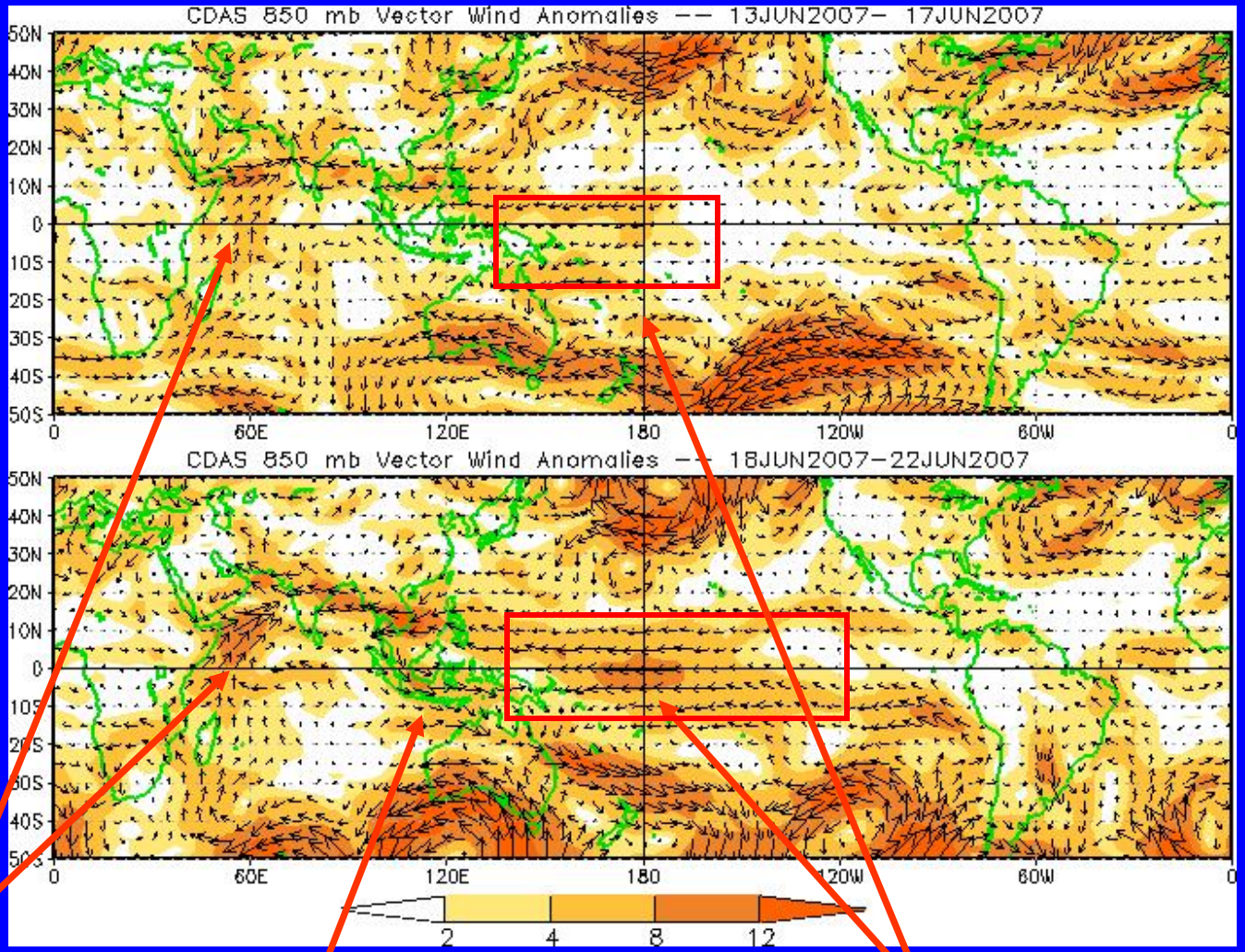
- Overview
- Recent Evolution and Current Conditions
- Madden-Julian Oscillation Forecast
- Summary

Overview

- The MJO has weakened during the past week with the enhanced phase centered across the Maritime continent.
- Enhanced convection continued across sections of the Arabian Sea, India and sections of Indochina and the western Pacific Ocean.
- Dry conditions were observed across parts of the eastern Pacific Ocean, Central America, and Africa.
- Based on the latest monitoring and forecast tools, weak MJO activity is expected to continue 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

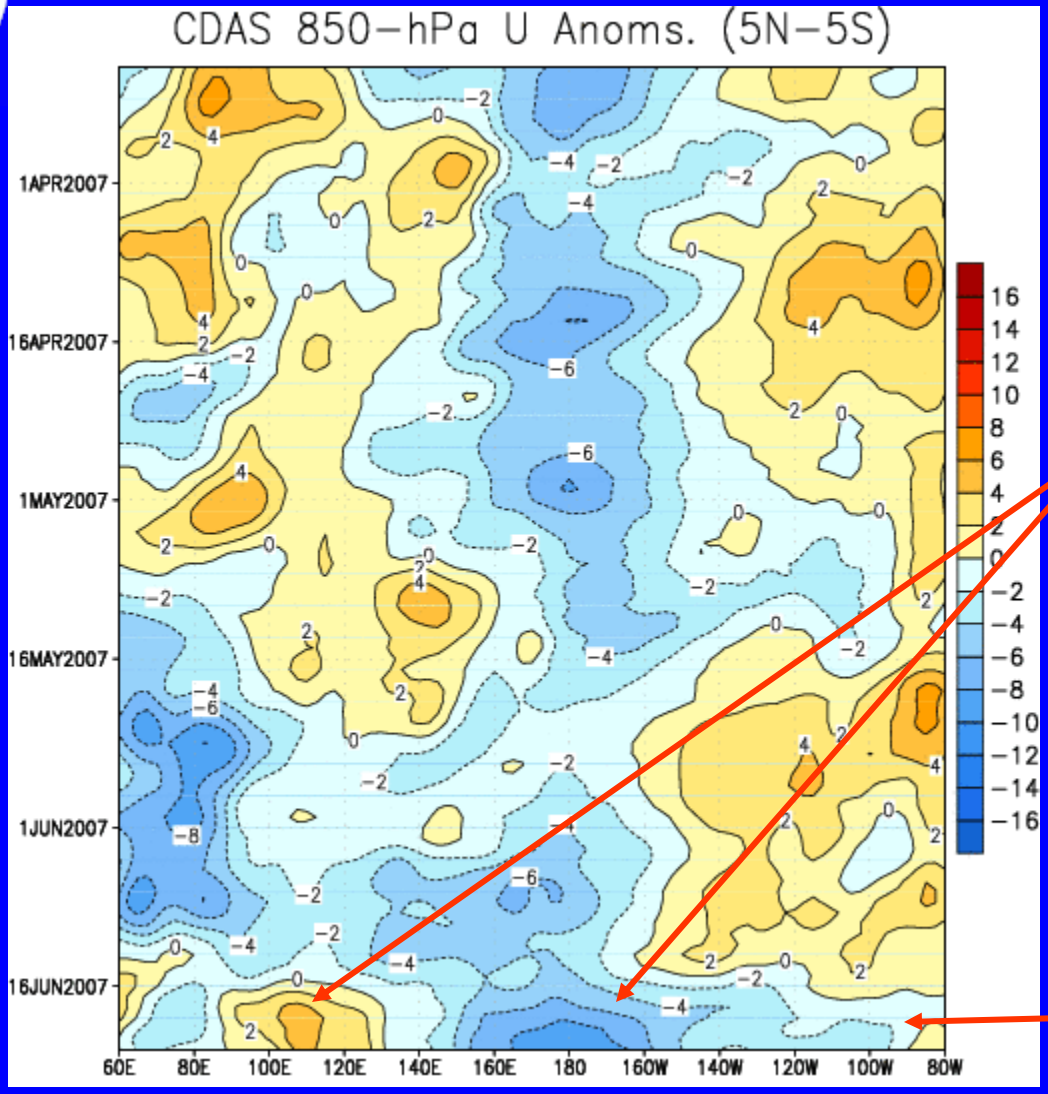


The Somali Jet remains enhanced.

Westerly anomalies are now evident across the Maritime Continent.

Easterly anomalies in the west-central Pacific Ocean have shifted eastward and strengthened.

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



Time

Longitude

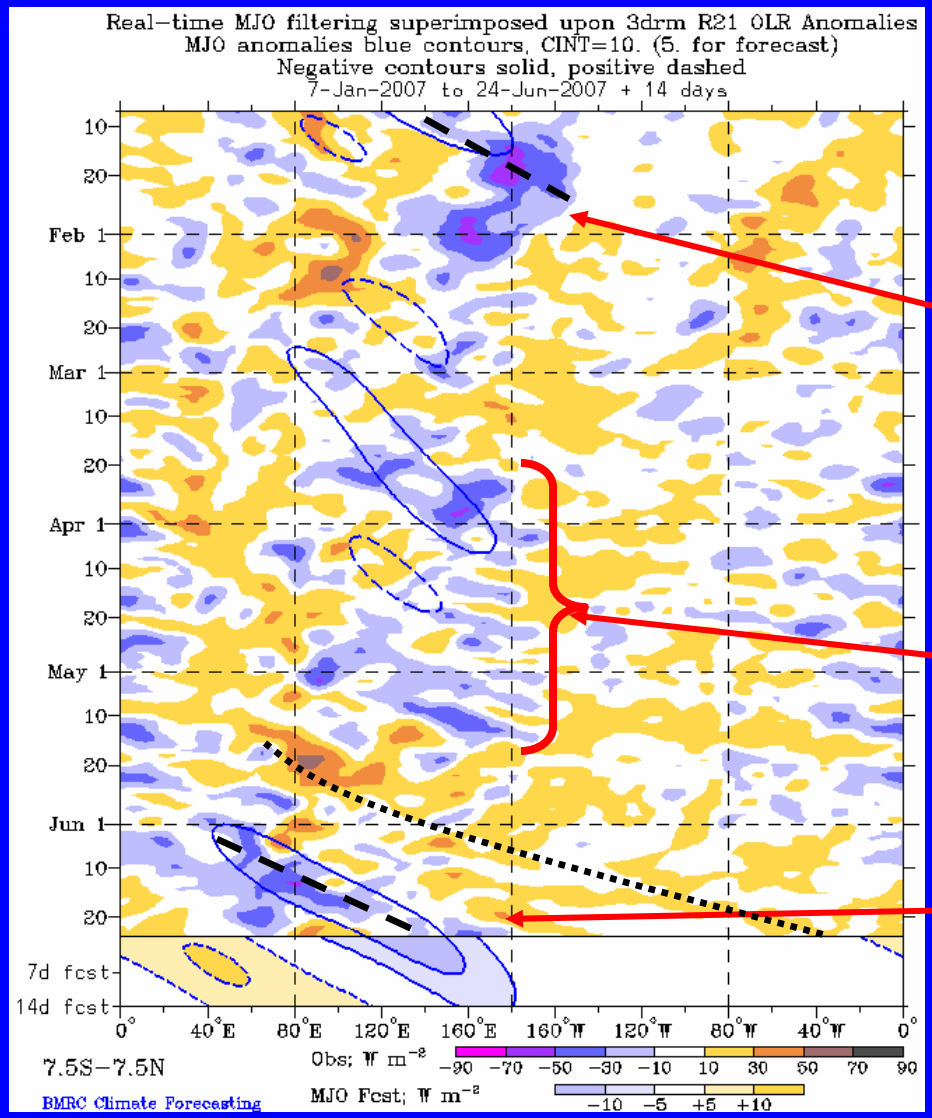
Westerly anomalies (orange/red shading) represent anomalous west-to-east flow.

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

Westerly anomalies developed over the Maritime Continent during the past week while easterly anomalies in the Pacific Ocean have shifted eastward. These changes are associated with the current MJO.

The persistent westerly anomalies across the eastern Pacific from mid-May to mid June have diminished and winds are near average in the far eastern Pacific Ocean.

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



Time

Longitude

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

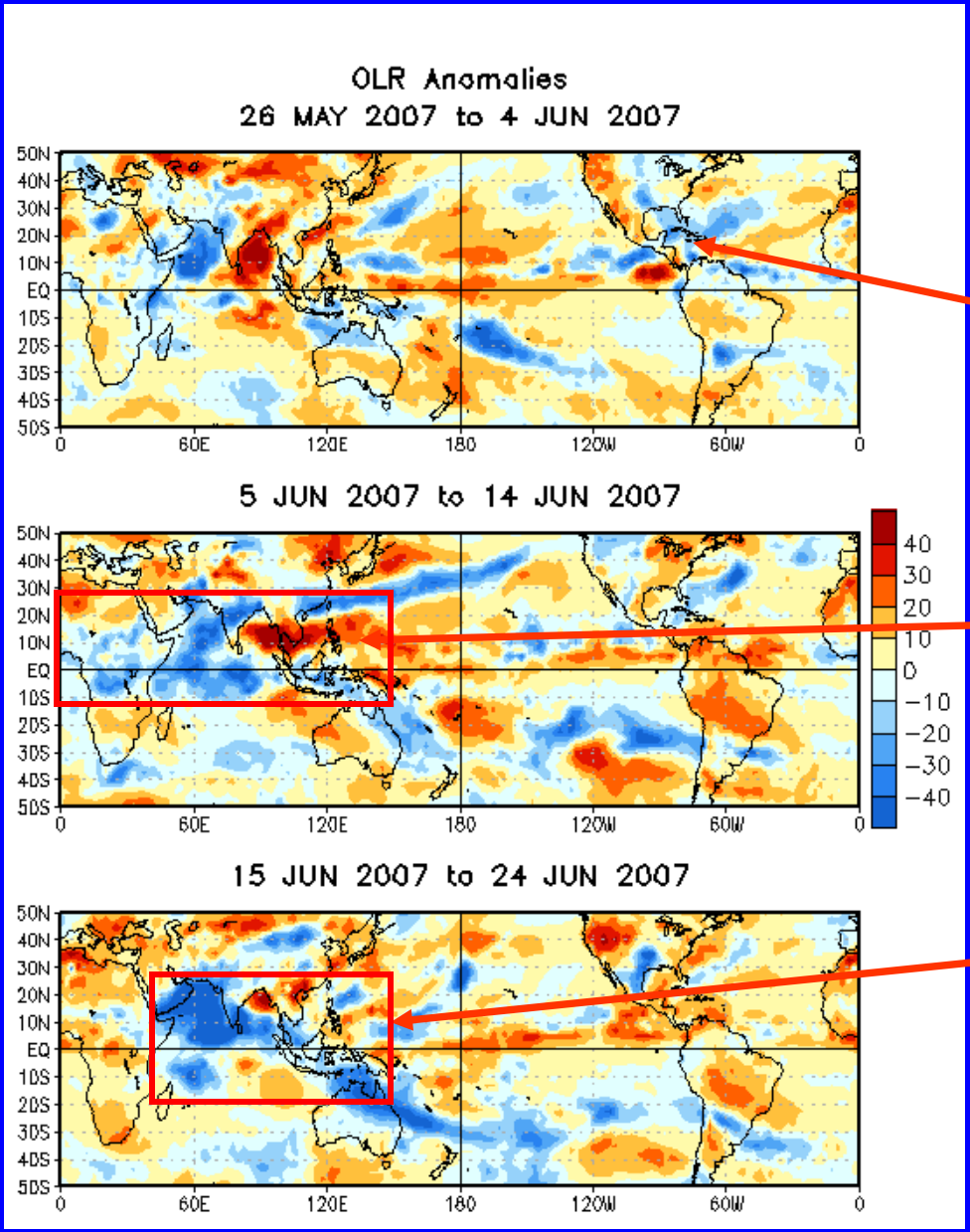
Wetter-than-normal conditions, negative OLR anomalies (blue shading)

Enhanced convection, associated with the MJO in 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 shifted eastward into the Maritime Continent and western Pacific during the past week.

OLR Anomalies: Last 30 days



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

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

During late May and early June, enhanced rainfall continued over sections of the eastern Pacific Ocean to the western Atlantic.

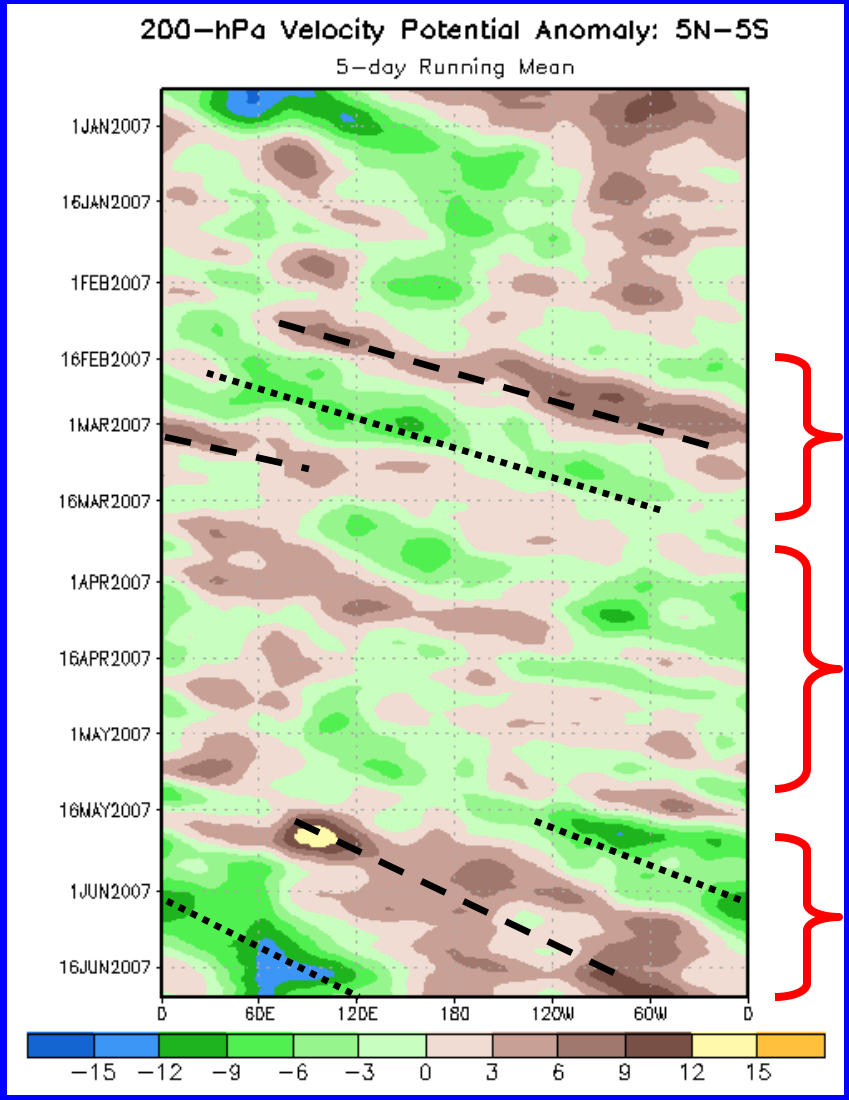
During early-mid June, dry conditions were evident across the Bay of Bengal, Southeast Asia, and the Philippines while the Arabian Sea, the Indian Ocean, and sections of Africa were wet.

The development of the MJO continued enhanced convection in these areas with an extension to the east to include the rest of the Indian Ocean and the western Maritime continent.

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

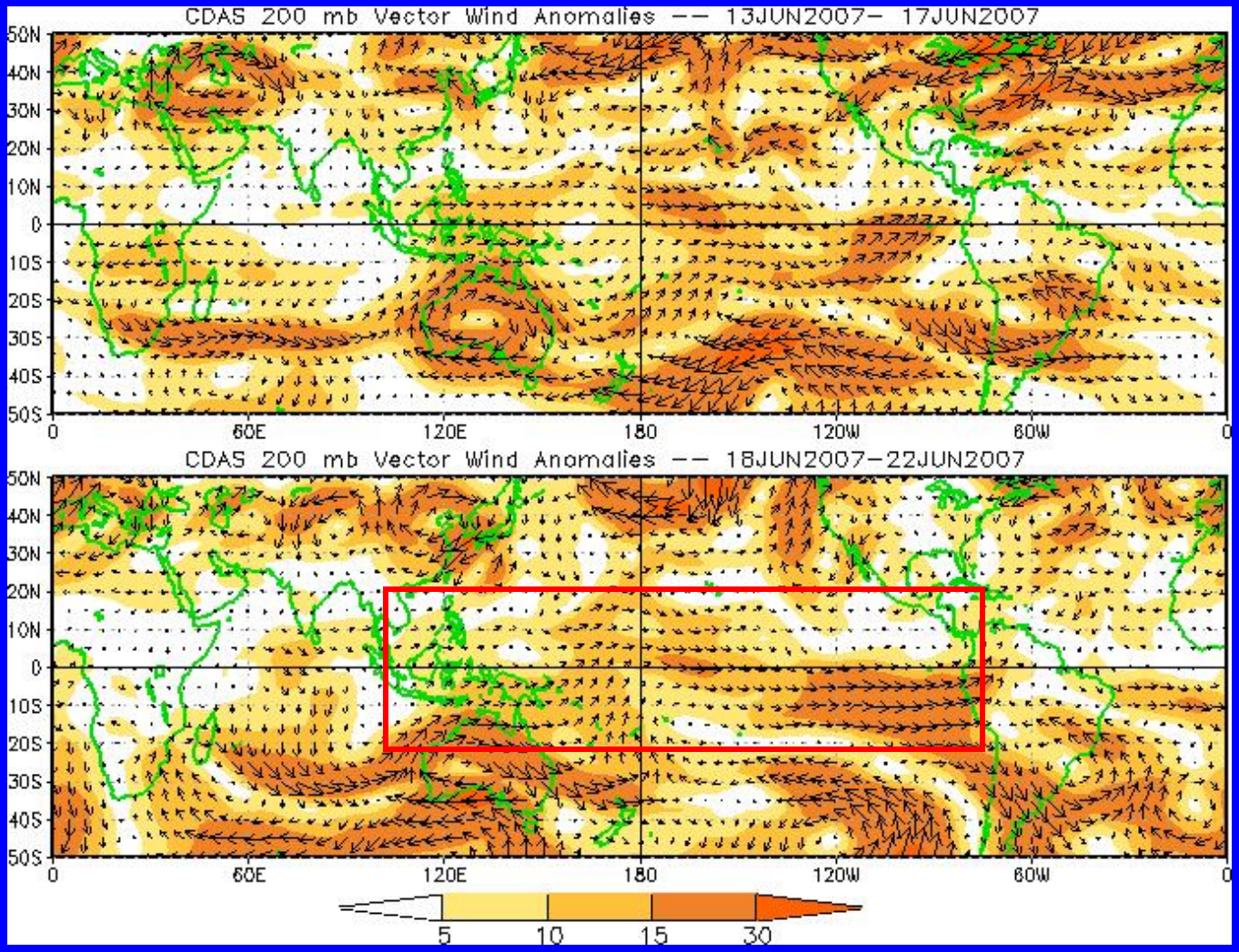
Longitude

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.

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

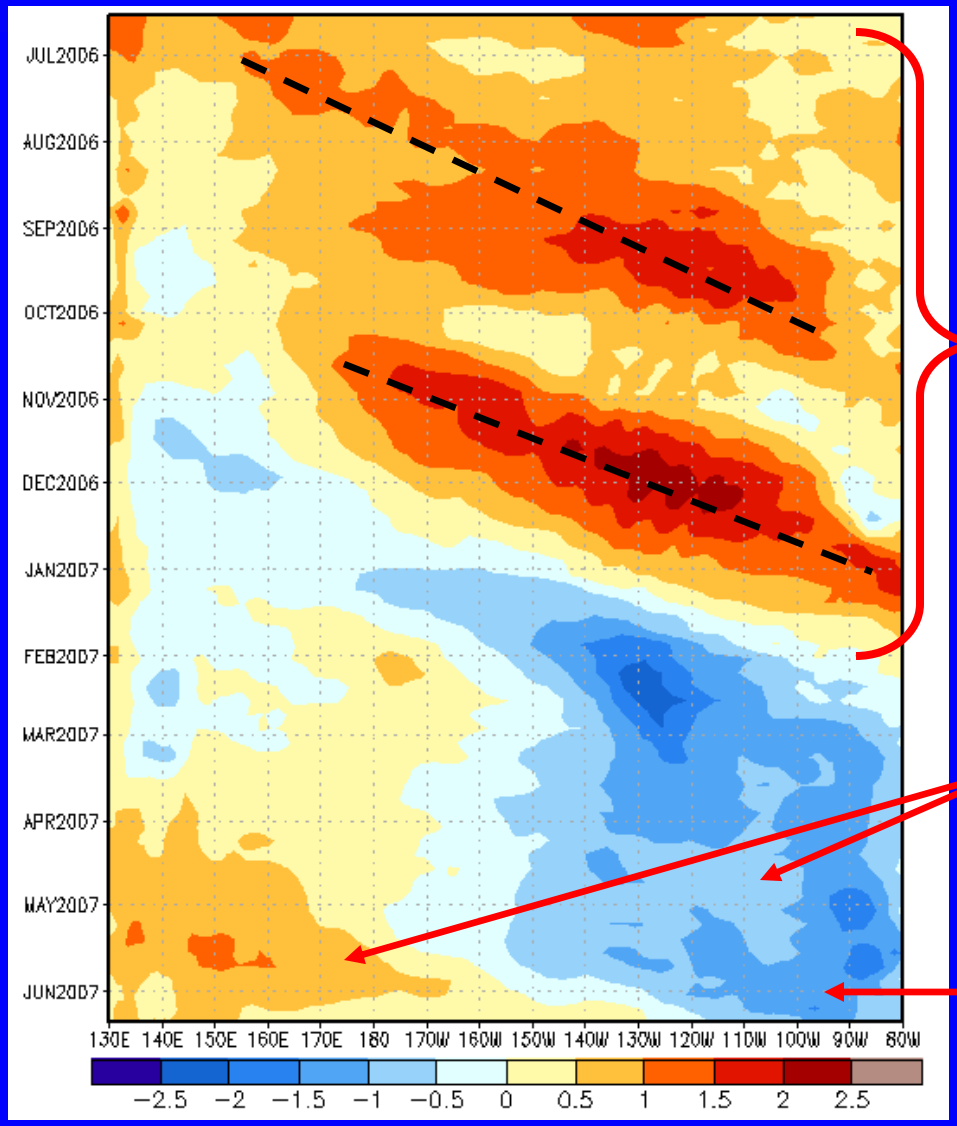
200-hPa Vector Wind Anomalies (m s^{-1})



Note that shading denotes the magnitude of the anomalous wind vectors

Widespread westerly anomalies are evident along the equator from the Maritime continent across much of the Pacific Ocean.

Weekly Heat Content Evolution in the Equatorial Pacific



Time

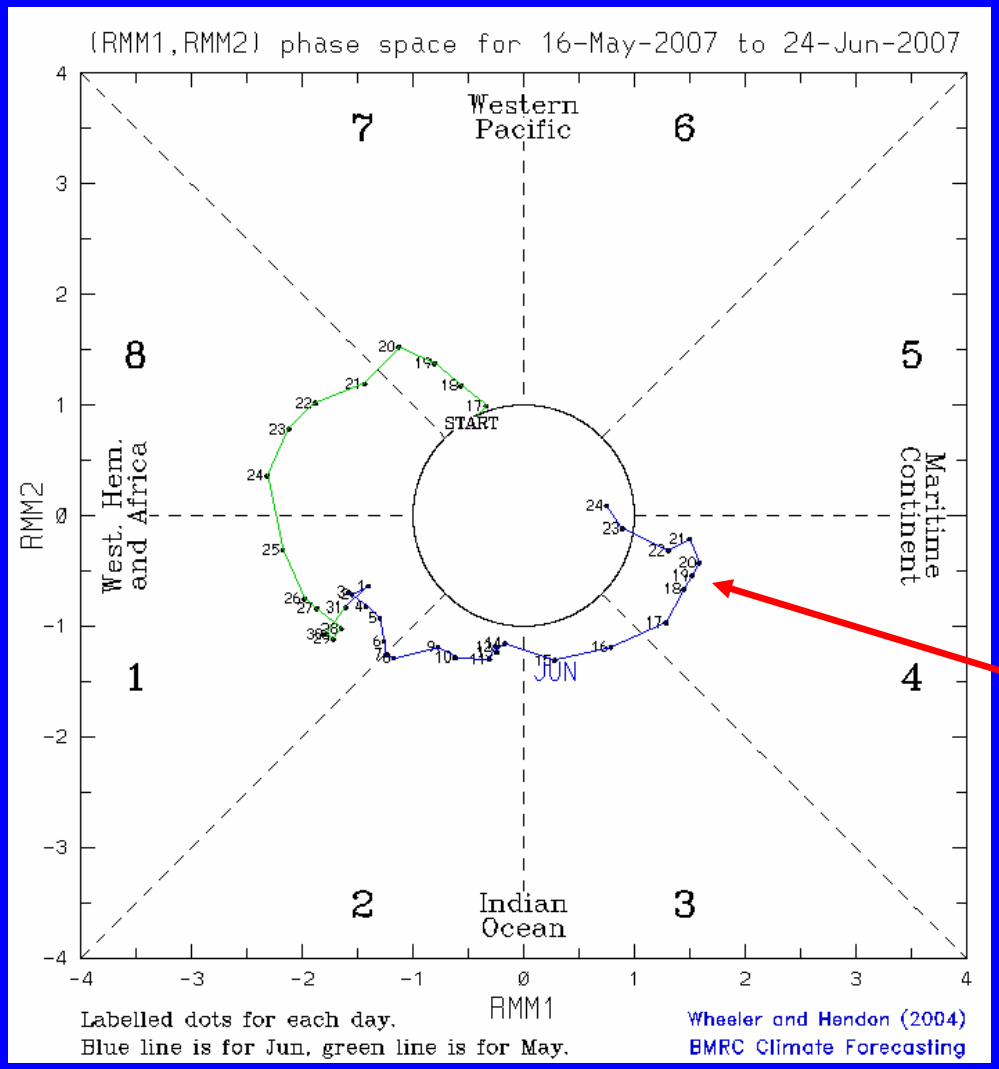
Longitude

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 130° W.

MJO Index

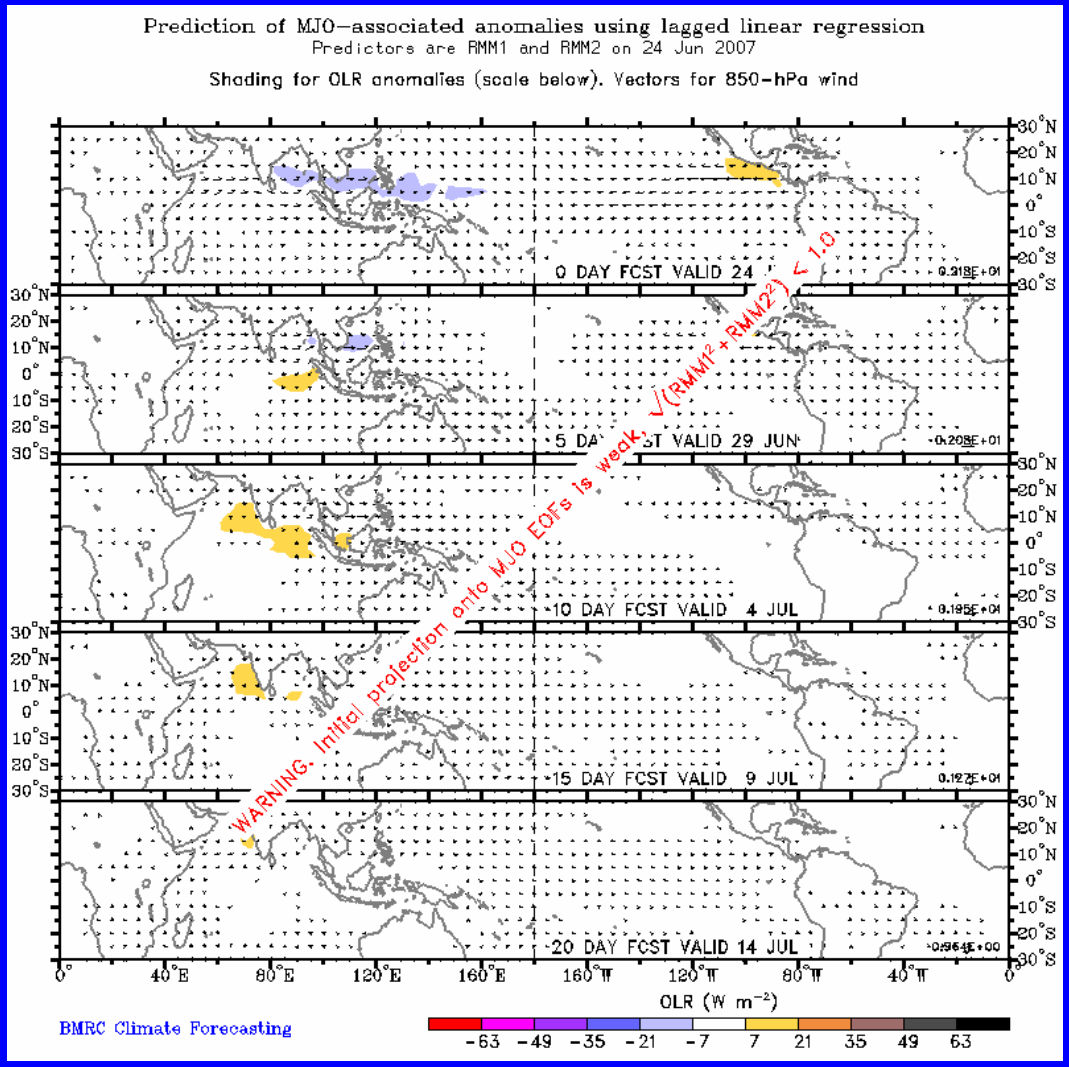


The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850-hPa and 200-hPa zonal wind and outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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.

The MJO index amplitude has decreased during the past few days with little eastward propagation.

MJO OLR Forecast



The statistical method forecasts weak wet conditions stretching from the Bay of Bengal into the western Pacific Ocean over the next five days. Weak dry conditions are expected to develop across the tropical Indian Ocean by the end of week 2.

200–850 hPa Vertical Wind Shear

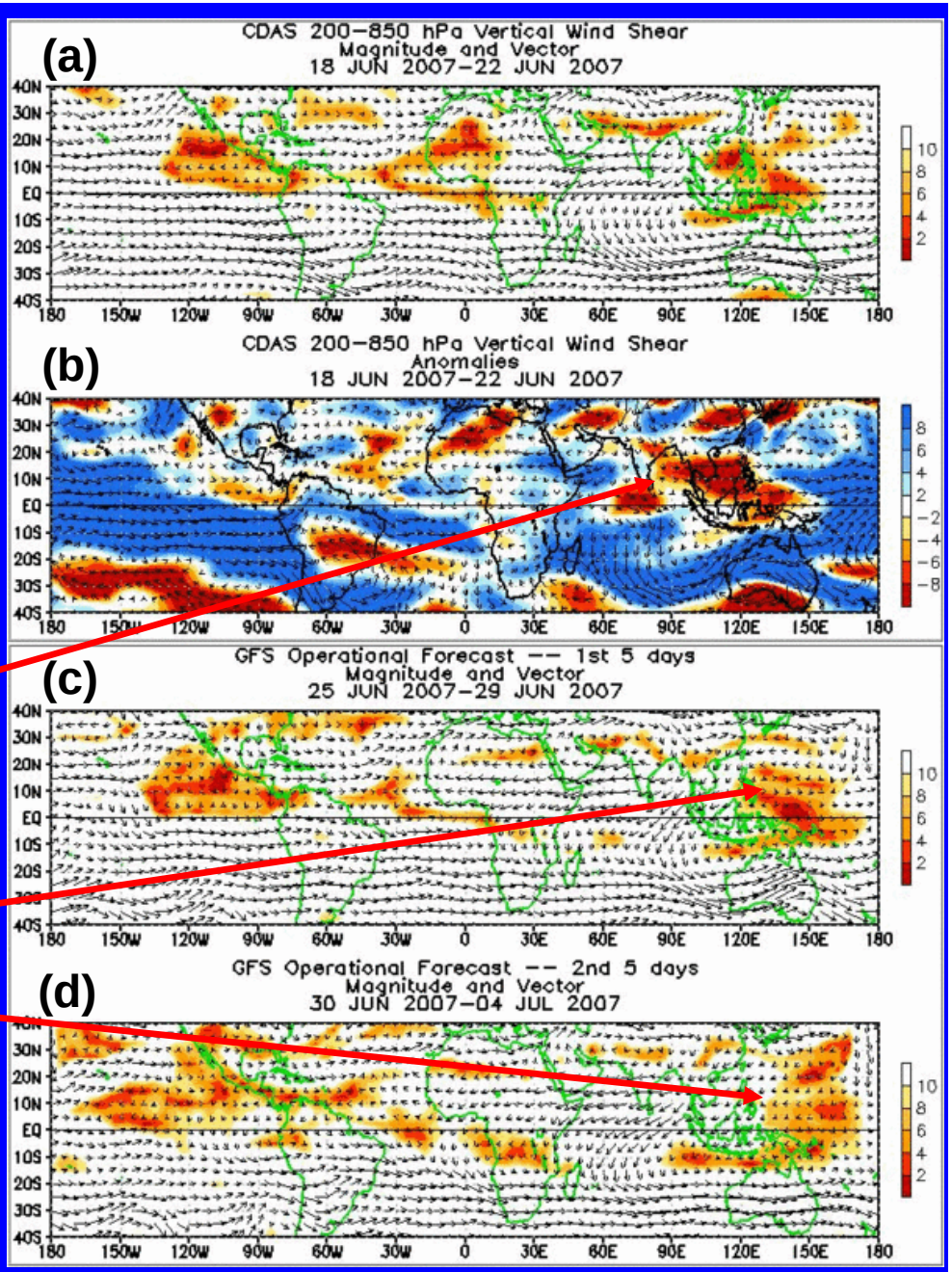
All plots: Shading denotes magnitude of vectors

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

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

Weaker than normal shear has been observed during the past week across the Bay of Bengal and South China Sea.

The GFS forecast indicates some areas of weak-moderate shear across parts of the western Pacific Ocean.



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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