



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

**Update prepared by
Climate Prediction Center / NCEP
August 13, 2007**



Outline

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



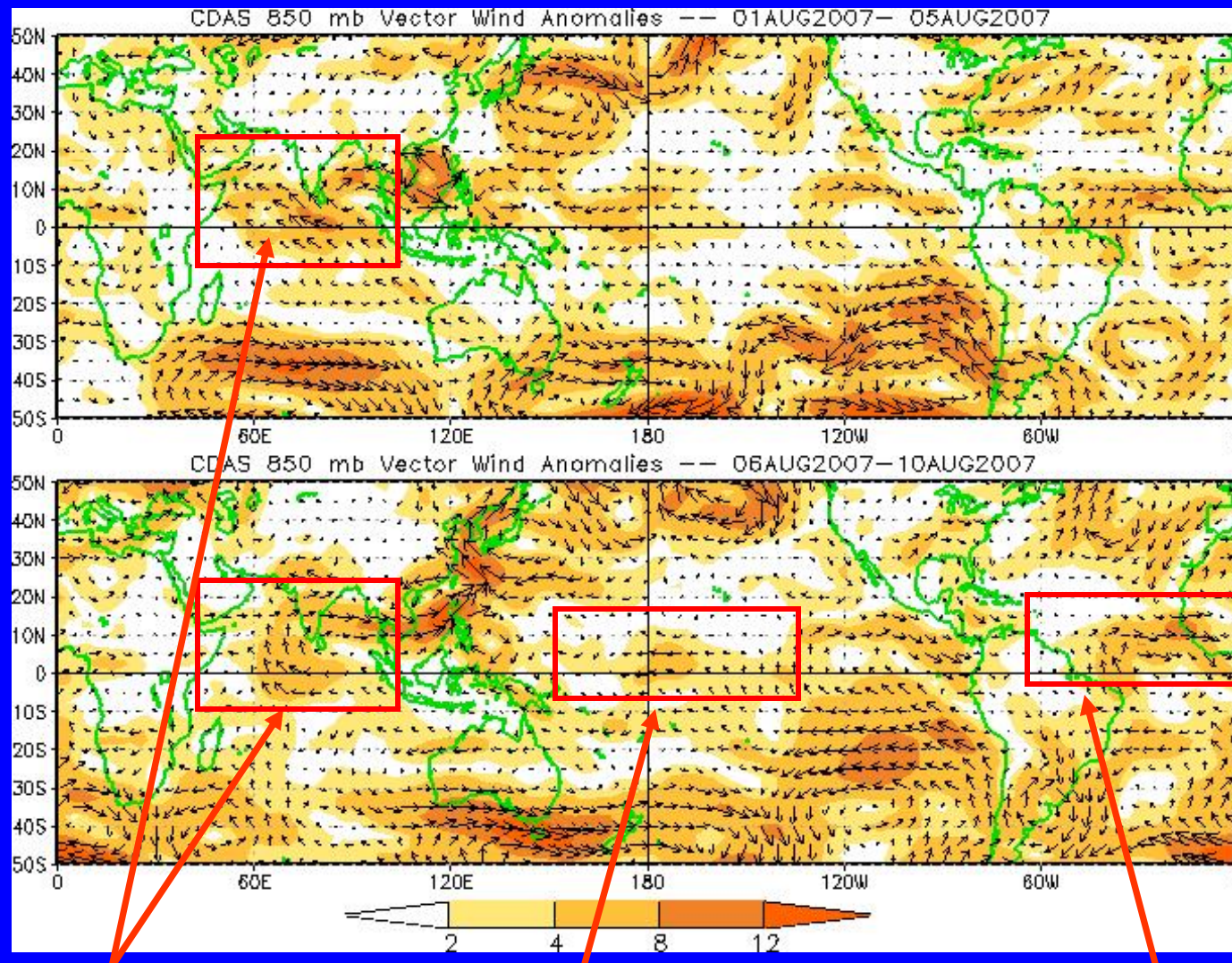
Overview

- **The latest observations indicate that the MJO is incoherent.**
- **During the past week, enhanced convection has been focused across the Arabian Sea, the Bay of Bengal, Southeast Asia, and over the Philippines. Dry conditions have been evident over the eastern Indian Ocean and western Maritime continent.**
- **Wet conditions continued across sections of western Africa.**
- **Based on the latest monitoring and forecast tools, weak MJO activity is expected during the next 1-2 weeks.**



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

Note that shading denotes the magnitude of the anomalous wind vectors



Increased cross-equatorial flow associated with an enhanced monsoon.

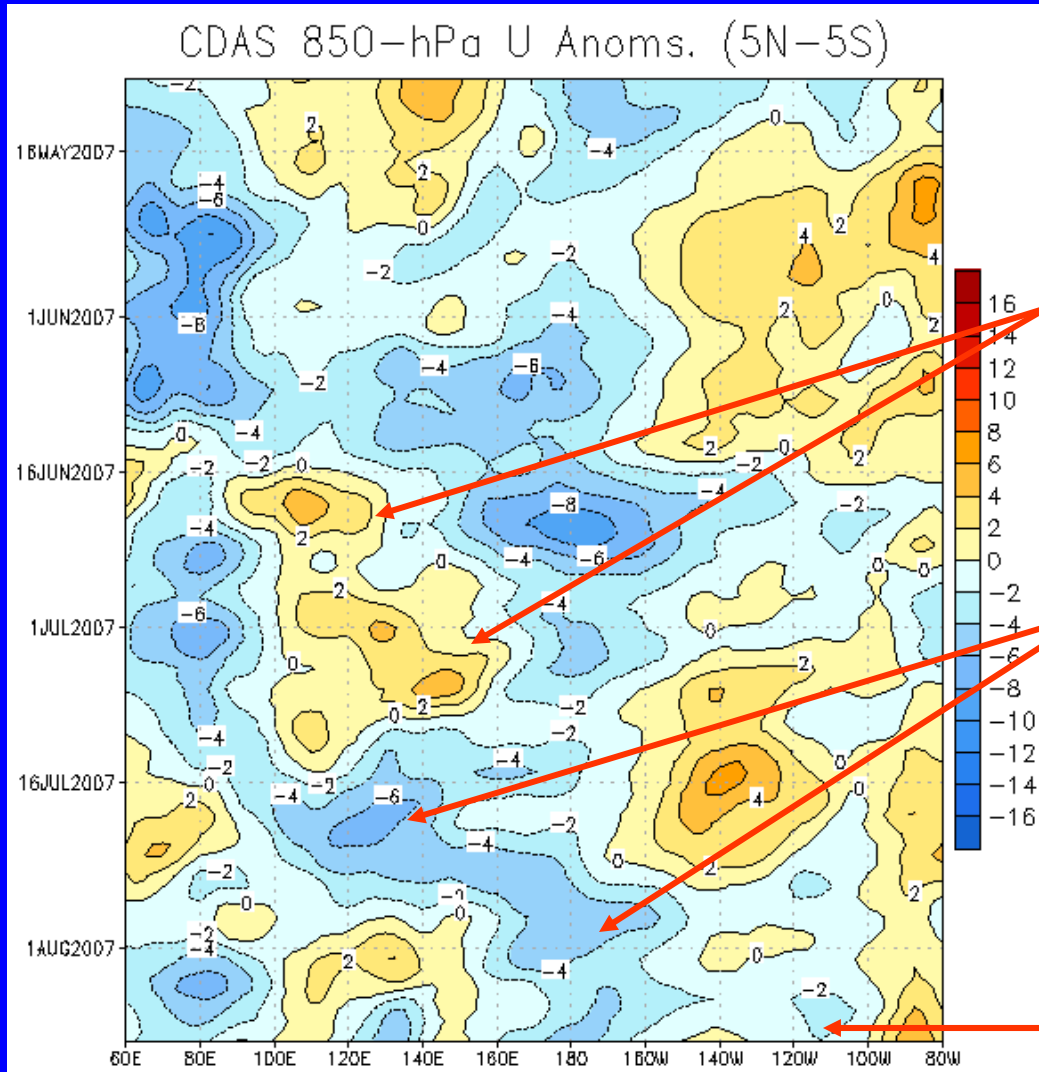
Easterly anomalies have retracted slightly eastward.

Westerly anomalies across the Atlantic deep tropics continue.



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 were evident across sections of the Maritime continent and the western Pacific Ocean from the latter half of June into mid-July.

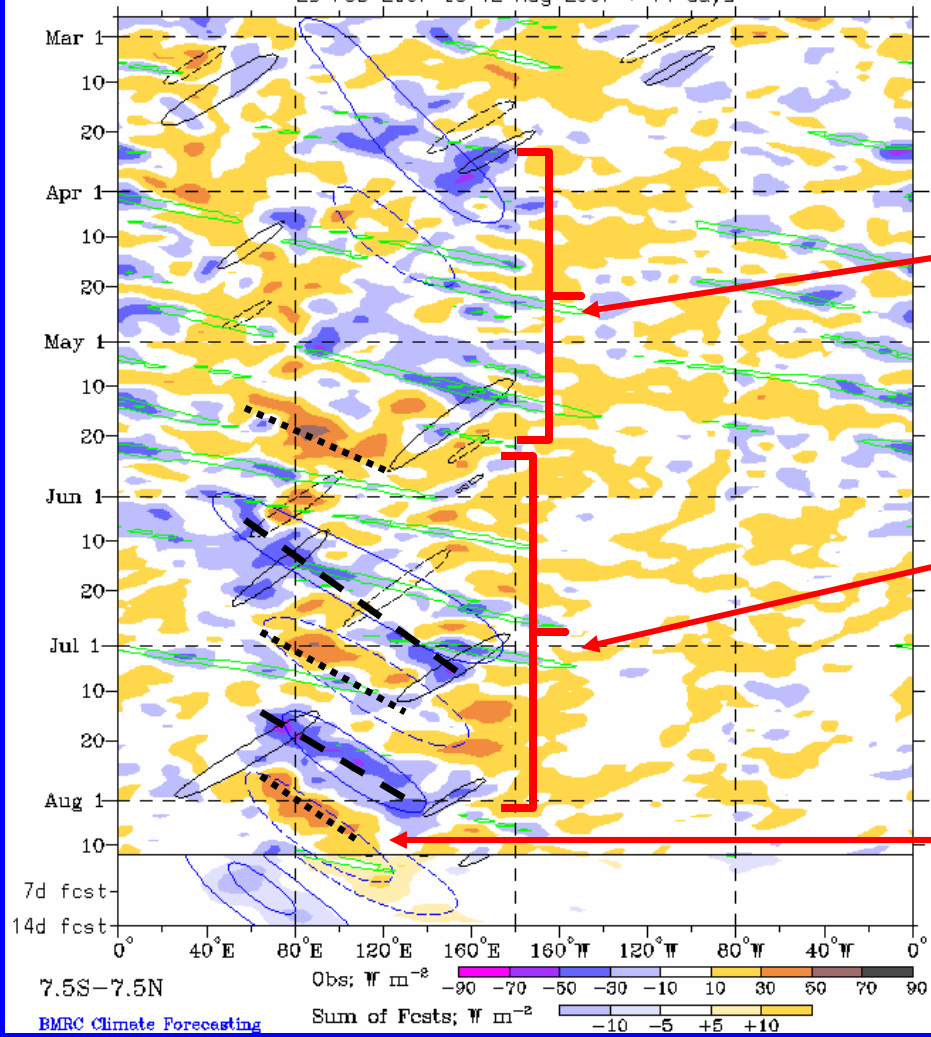
Easterly anomalies increased during mid-July over the Maritime continent and western Pacific and shifted eastward during mid-late July.

Anomalous easterlies winds have recently been observed to the east of the Date Line, while conditions in the western Pacific are near-average.



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

Real-time filtering superimposed upon 1-2-1 filt, R21, OLR Anoms
 MJO blue CINT=10; n1ER black CINT=10; Kelvin green CINT=15
 Negative contours solid, positive dashed (excluding Kelvin)
 25-Feb-2007 to 12-Aug-2007 + 14 days



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.

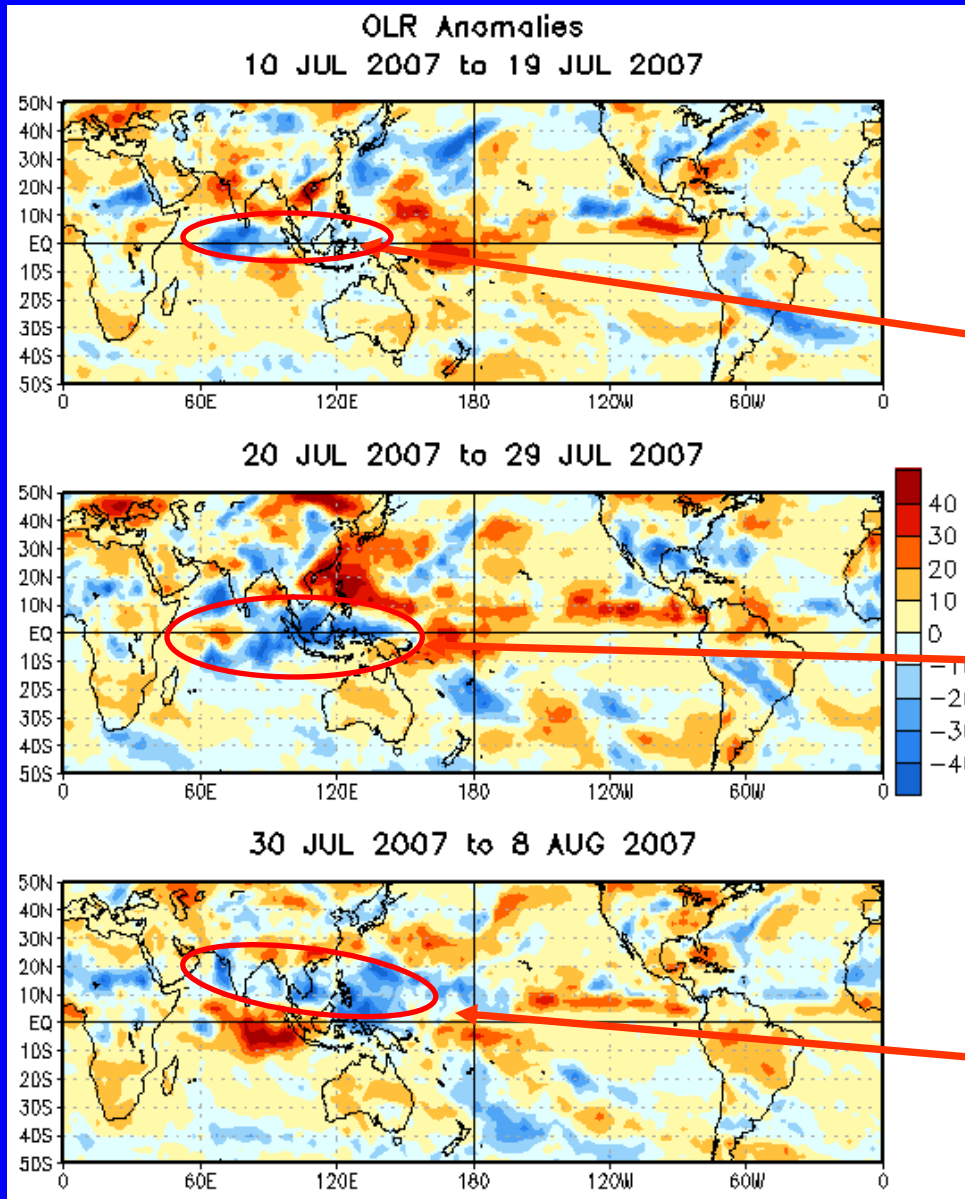
Beginning in mid May, weak-moderate MJO activity has been observed as regions of suppressed and enhanced convection have shifted eastward from the Indian Ocean into the far western Pacific.

Most recently, suppressed convection has shifted east from the Indian Ocean to the Maritime continent.

Longitude



OLR Anomalies: Last 30 days



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

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

During mid July, wet conditions were evident in the Indian Ocean with a weak signal over the Maritime Continent. Dry conditions prevailed in the western Pacific Ocean.

Moderate MJO activity altered rainfall patterns during late-July as wet conditions shifted eastward into the Maritime Continent and dry conditions began to emerge in the western Indian Ocean.

Enhanced convection shifted northeastwards of the Maritime Continent, while suppressed convection strengthened over the central and eastern Indian Ocean.

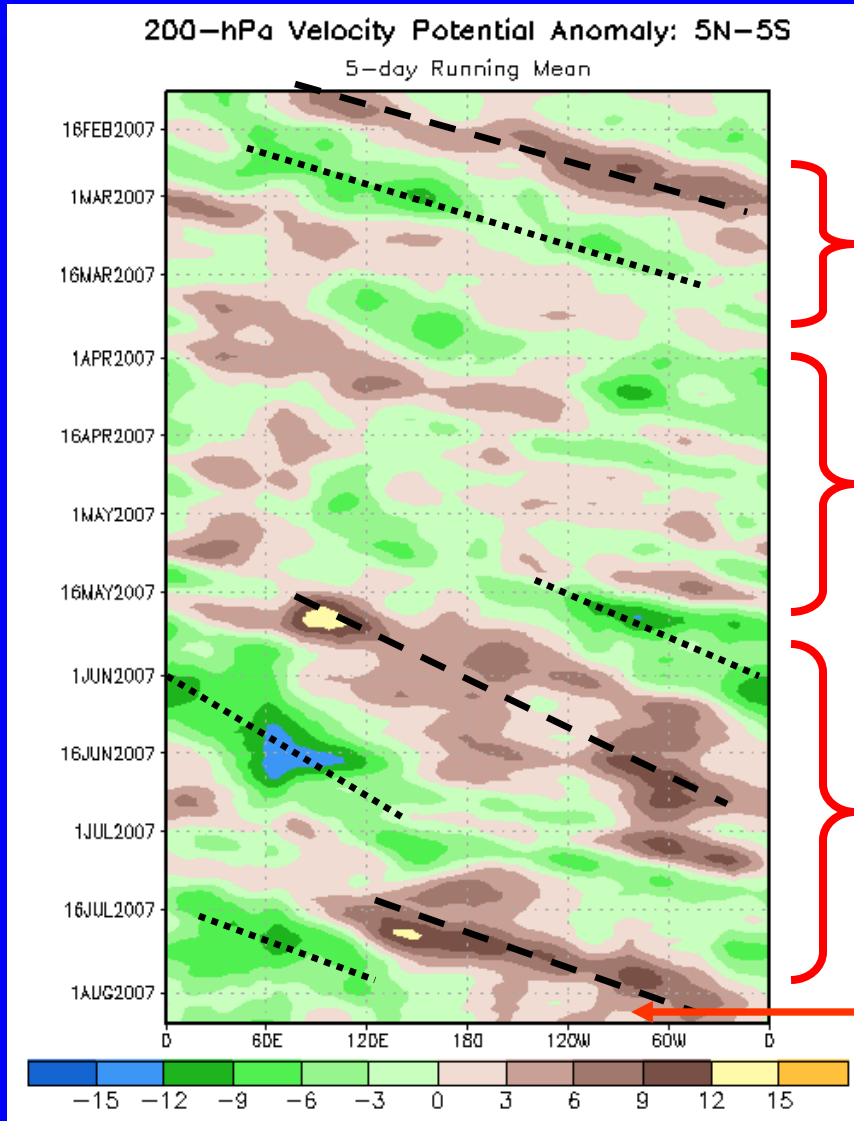


200-hPa Velocity Potential Anomalies (5°S-5°N)

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.

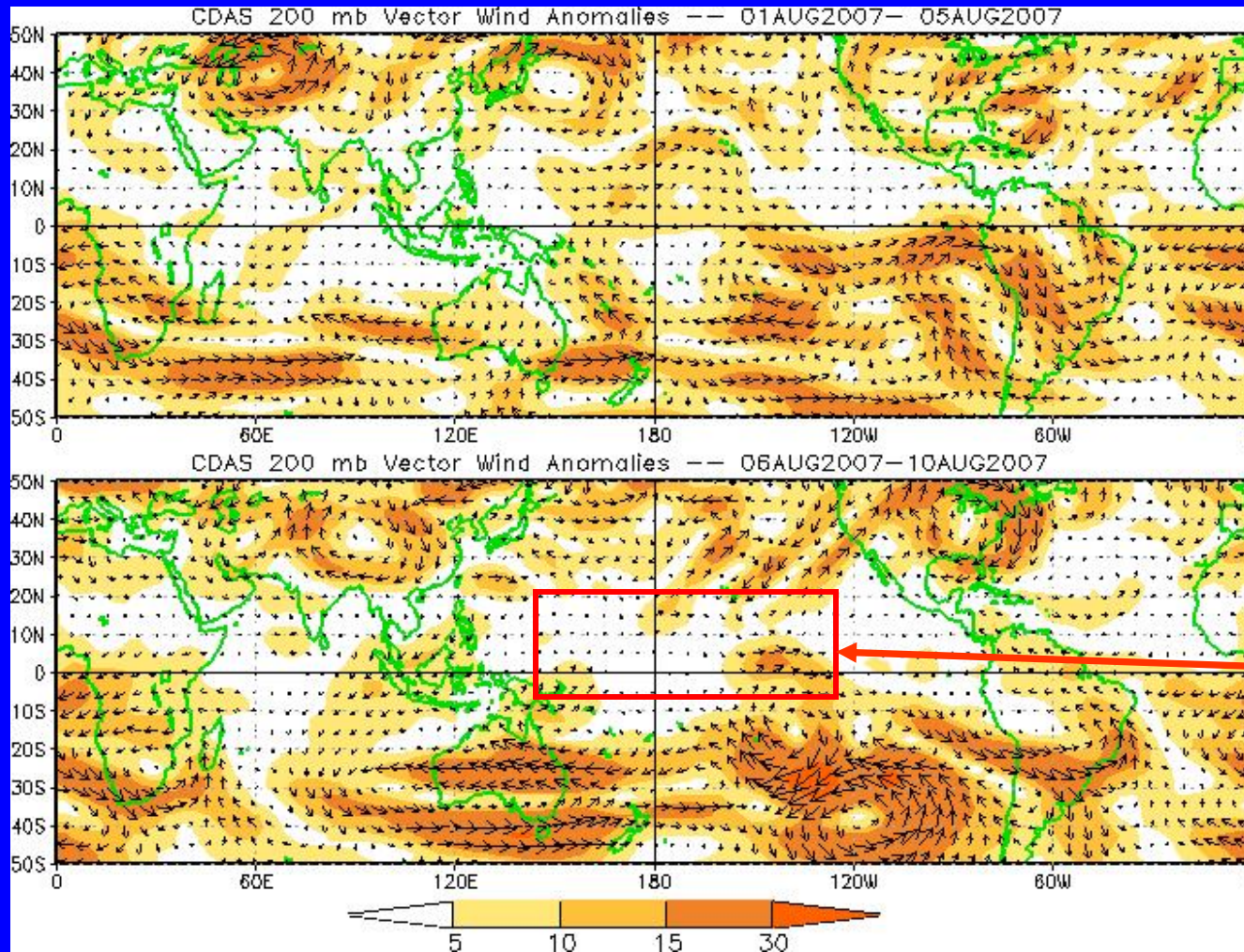
The MJO was weak or incoherent from mid-March to mid-May.

From mid-May through July, weak to moderate MJO activity was observed.

Recently, the velocity potential anomalies have weakened and become more stationary.



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



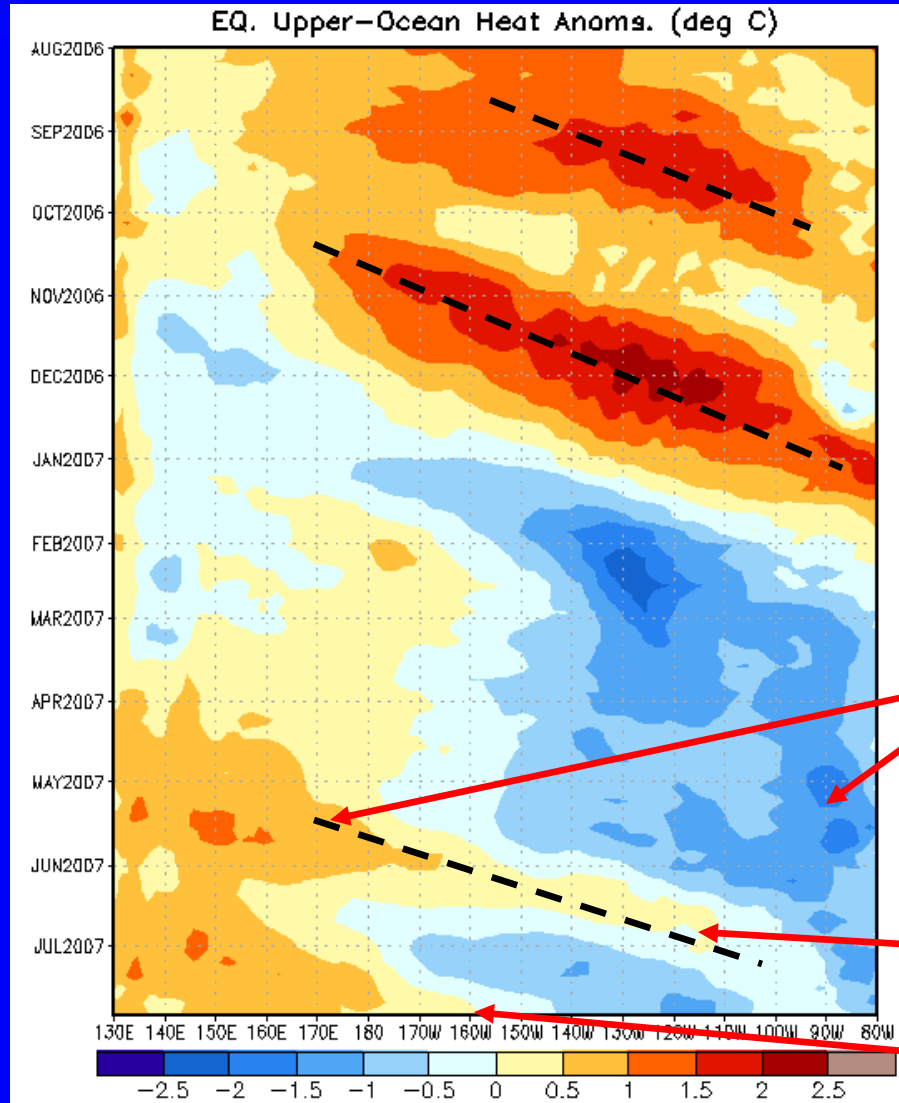
Note that shading denotes the magnitude of the anomalous wind vectors

Westerly anomalies have weakened and remained located over the central Pacific for the last five days.



Weekly Heat Content Evolution in the Equatorial Pacific

Time



Longitude

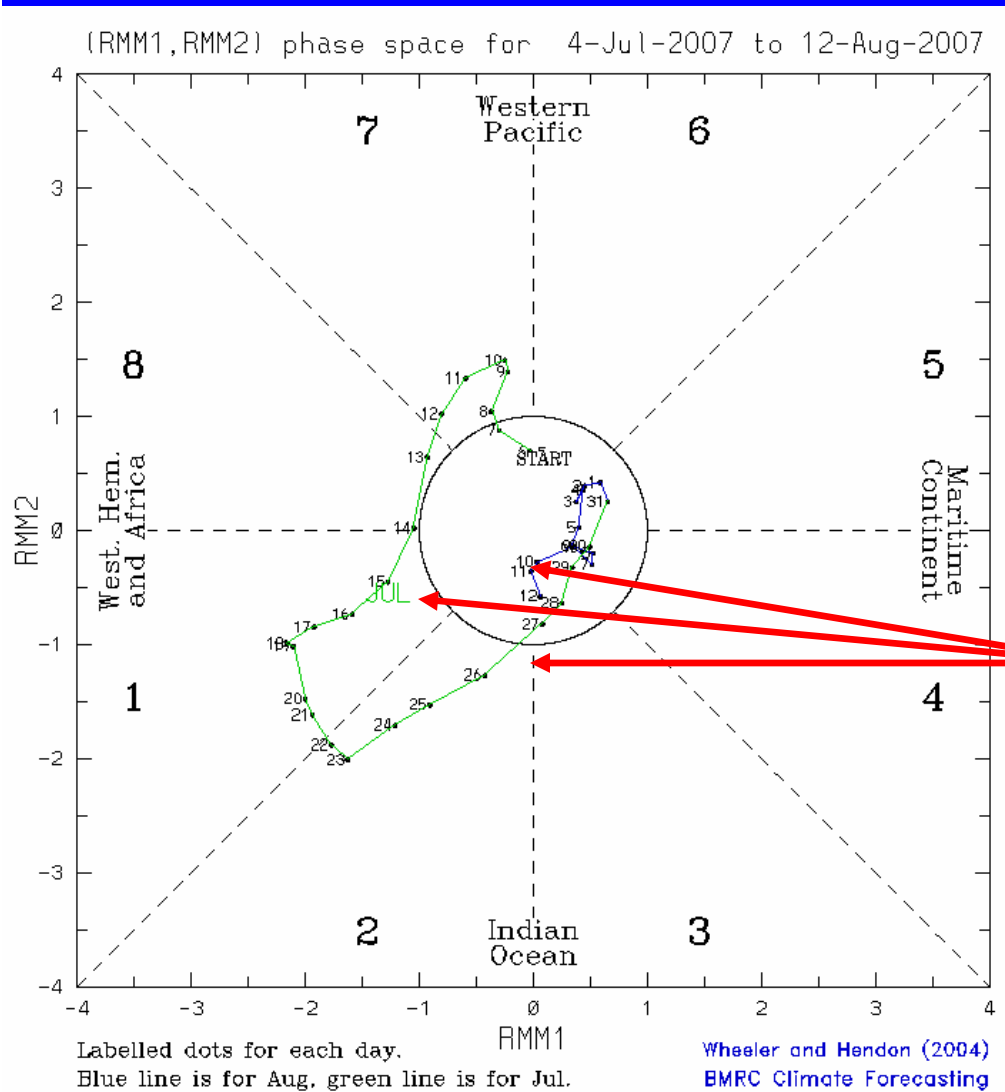
During this period two eastward-propagating Kelvin waves (warm phases indicated by dashed lines) have caused considerable month-to-month variability in the upper-ocean heat content.

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

A weak Kelvin wave developed in mid-May, propagated eastwards and reached the eastern Pacific in early July. Another weak Kelvin wave developed in early July.



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 strengthened in mid July but rapidly weakened in late July.

Currently, the MJO is incoherent.



*****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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