



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

**Update prepared by  
Climate Prediction Center / NCEP  
August 6, 2007**



# Outline

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



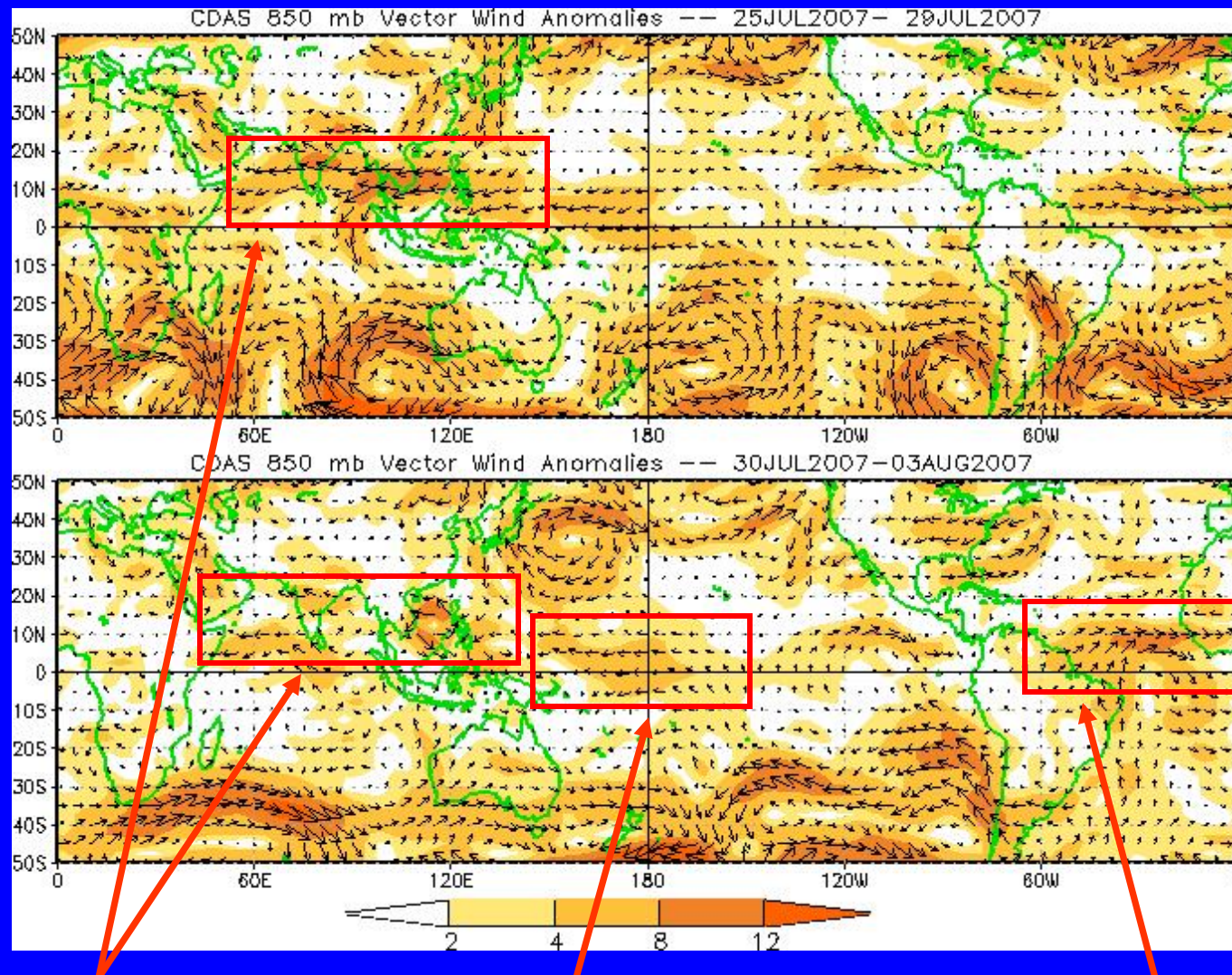
# Overview

- **The latest observations indicate that the MJO is weak.**
- **During the past week, enhanced convection has been focused across the Maritime continent and areas across southern Asia while dry conditions have been evident in the central Indian Ocean.**
- **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 ( $\text{m s}^{-1}$ )

Note that shading denotes the magnitude of the anomalous wind vectors



Widespread easterly anomalies from the western Pacific Ocean across Southern Asia have mainly dissipated.

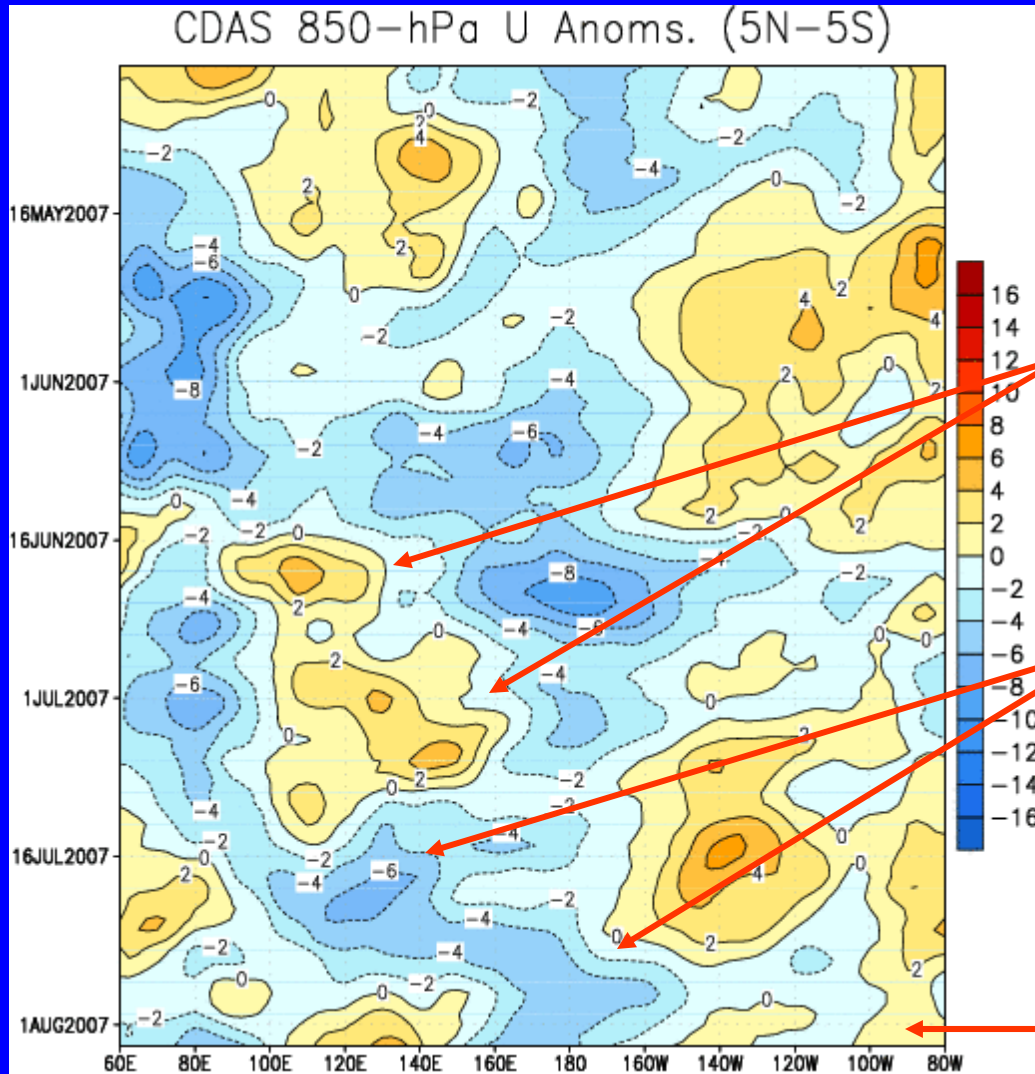
Easterly anomalies have shifted slightly eastward.

Westerly anomalies across the Atlantic deep tropics continue.



# 850-hPa Zonal Wind Anomalies ( $\text{m s}^{-1}$ )

Time



Longitude

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

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

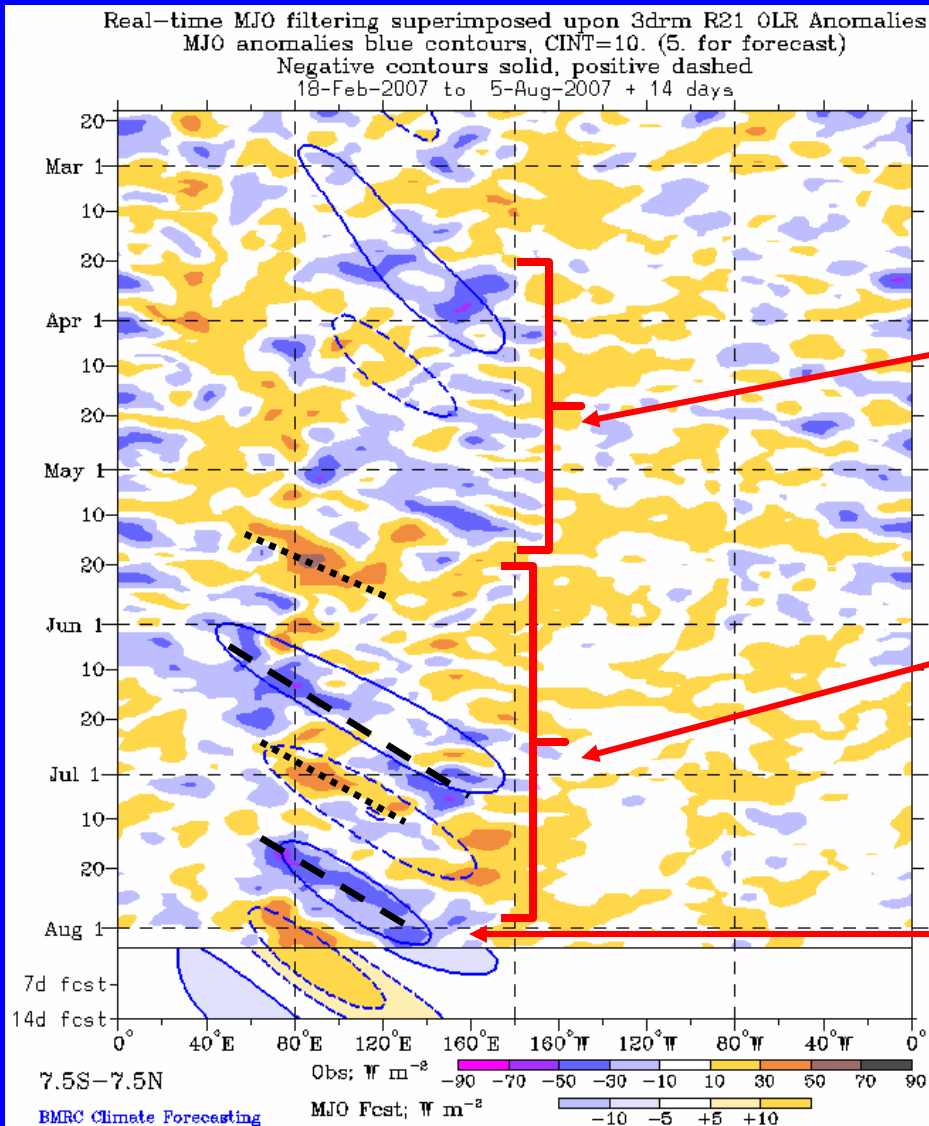
Westerly anomalies were evident across sections of the Maritime continent and the western Pacific Ocean from the latter half of June into mid-July.

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

Winds across much of the eastern Pacific Ocean have returned to near average while increasing westerly anomalies are evident in the far western Pacific 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)

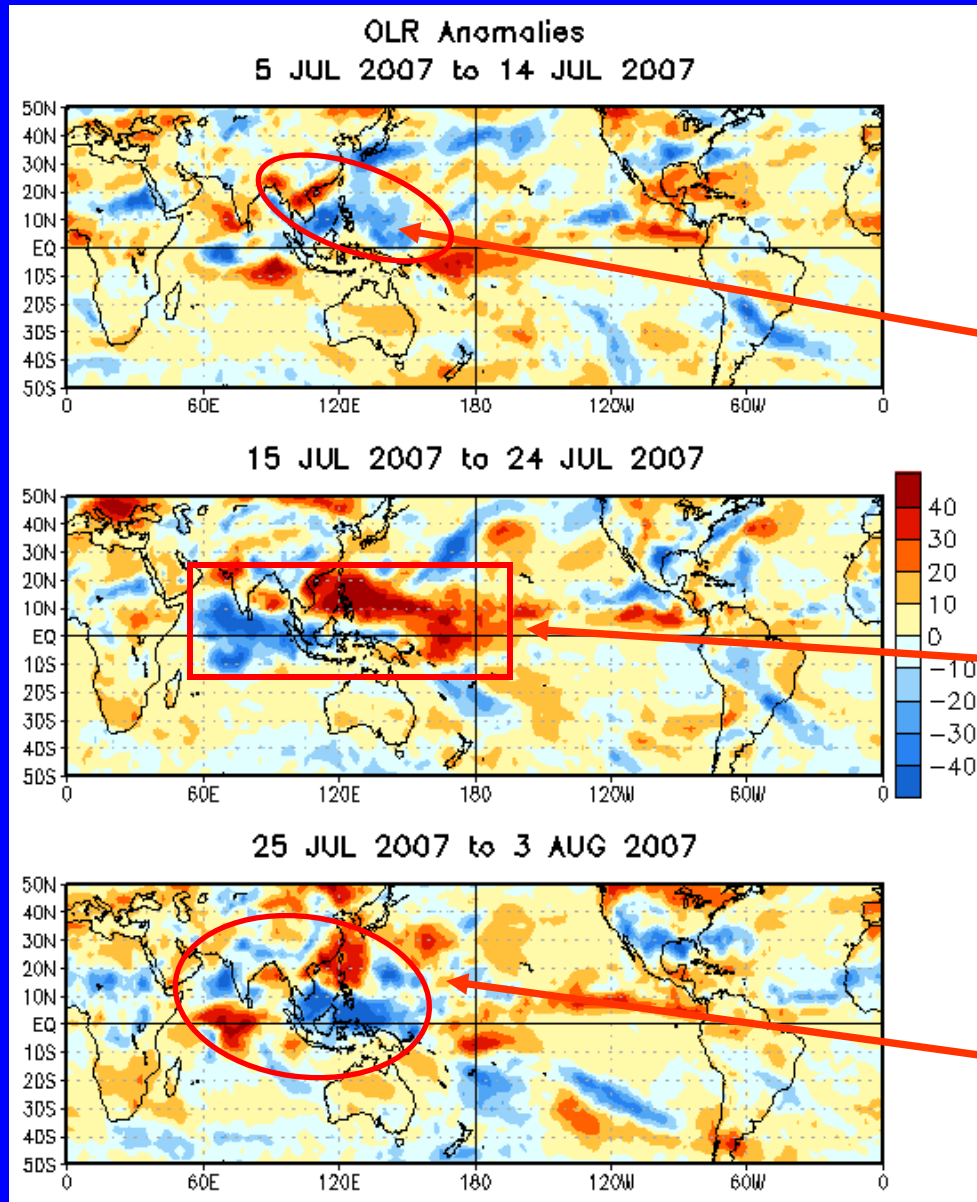
Intermittent periods of enhanced convection were evident in the western Pacific Ocean from late March into May.

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, enhanced convection has shifted east from the Indian Ocean across the Maritime continent and western Pacific Ocean.



# 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 July, wet conditions were evident from the South China Sea into the far western Pacific Ocean.**

**Moderate MJO activity altered rainfall patterns during mid-July as wet conditions developed in the Indian Ocean and dry conditions prevailed in the western Pacific Ocean.**

**Enhanced convection shifted eastwards into the Maritime Continent, while suppressed convection is found north and southwest of this region.**

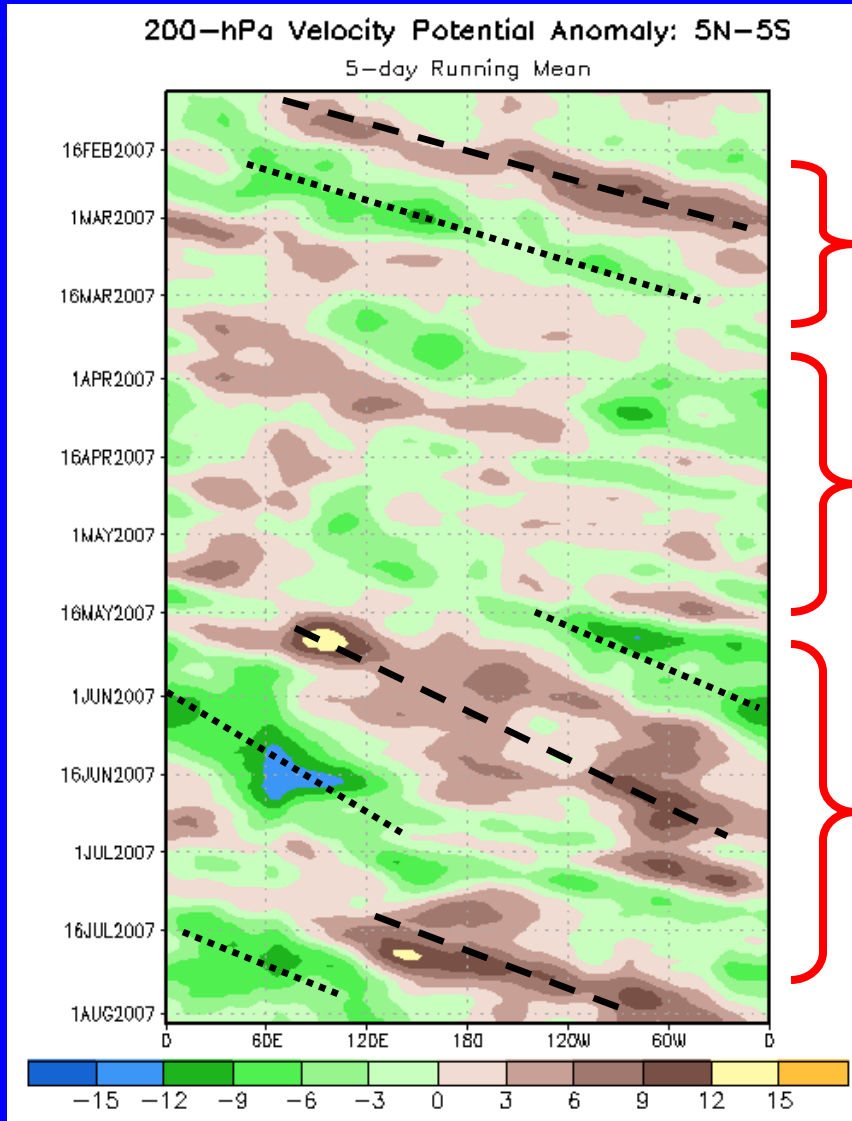


# 200-hPa Velocity Potential Anomalies (5°S-5°N)

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.

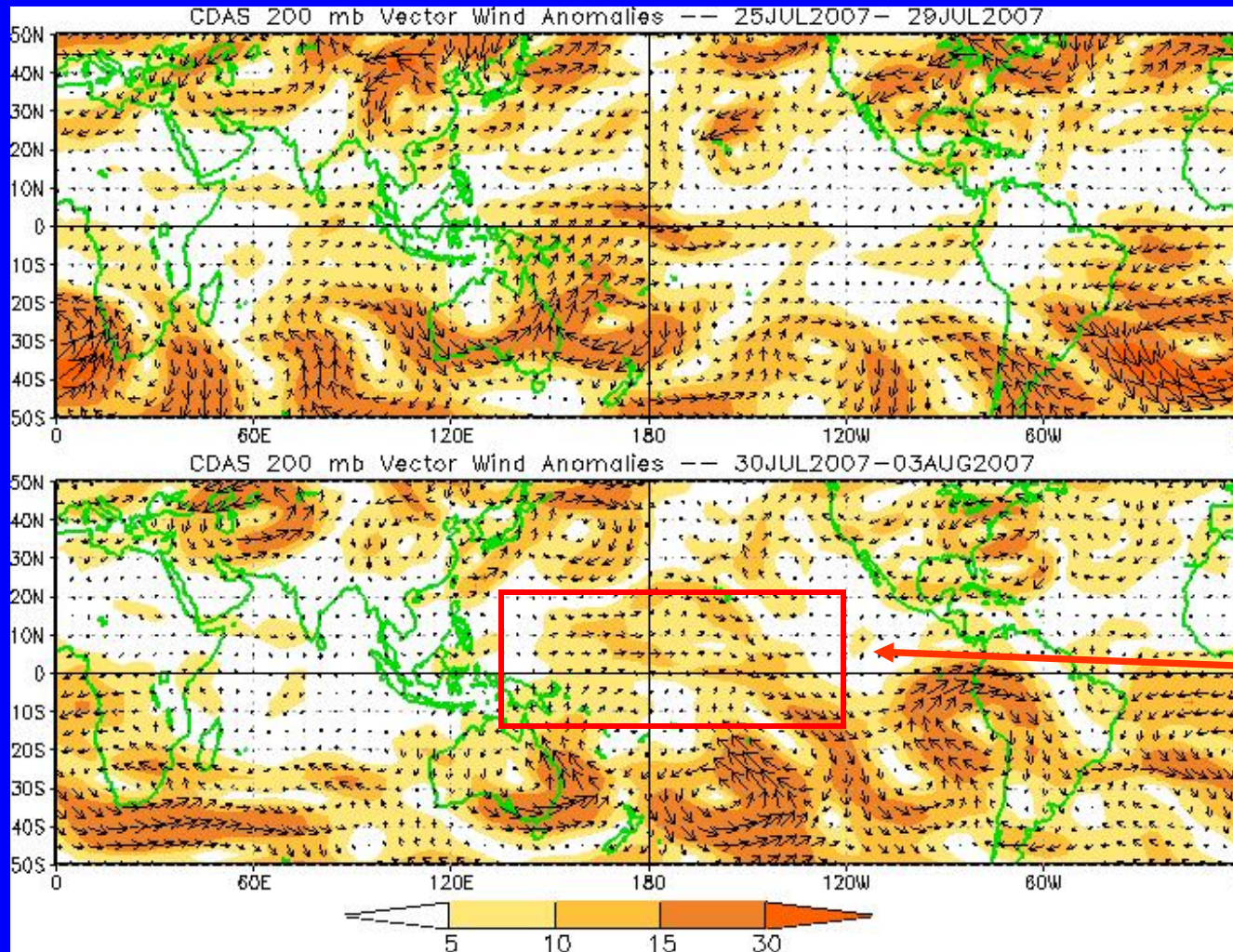
The MJO was weak or incoherent from mid-March to mid-May.

Since mid-May, weak to moderate MJO activity has been observed. The MJO has shown evidence of weakening in early August.





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



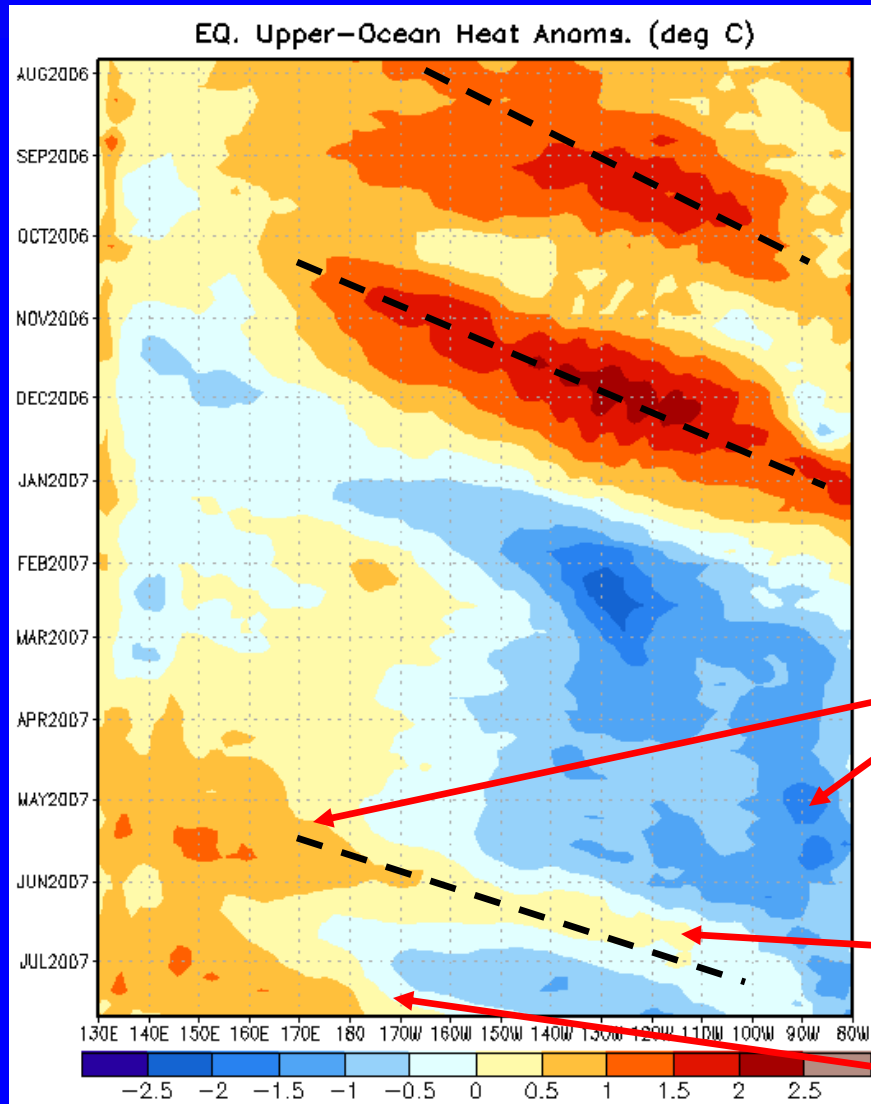
Note that shading denotes the magnitude of the anomalous wind vectors

Westerly anomalies have shifted eastwards during the last five days and weakened.



# Weekly Heat Content Evolution in the Equatorial Pacific

Time



Longitude

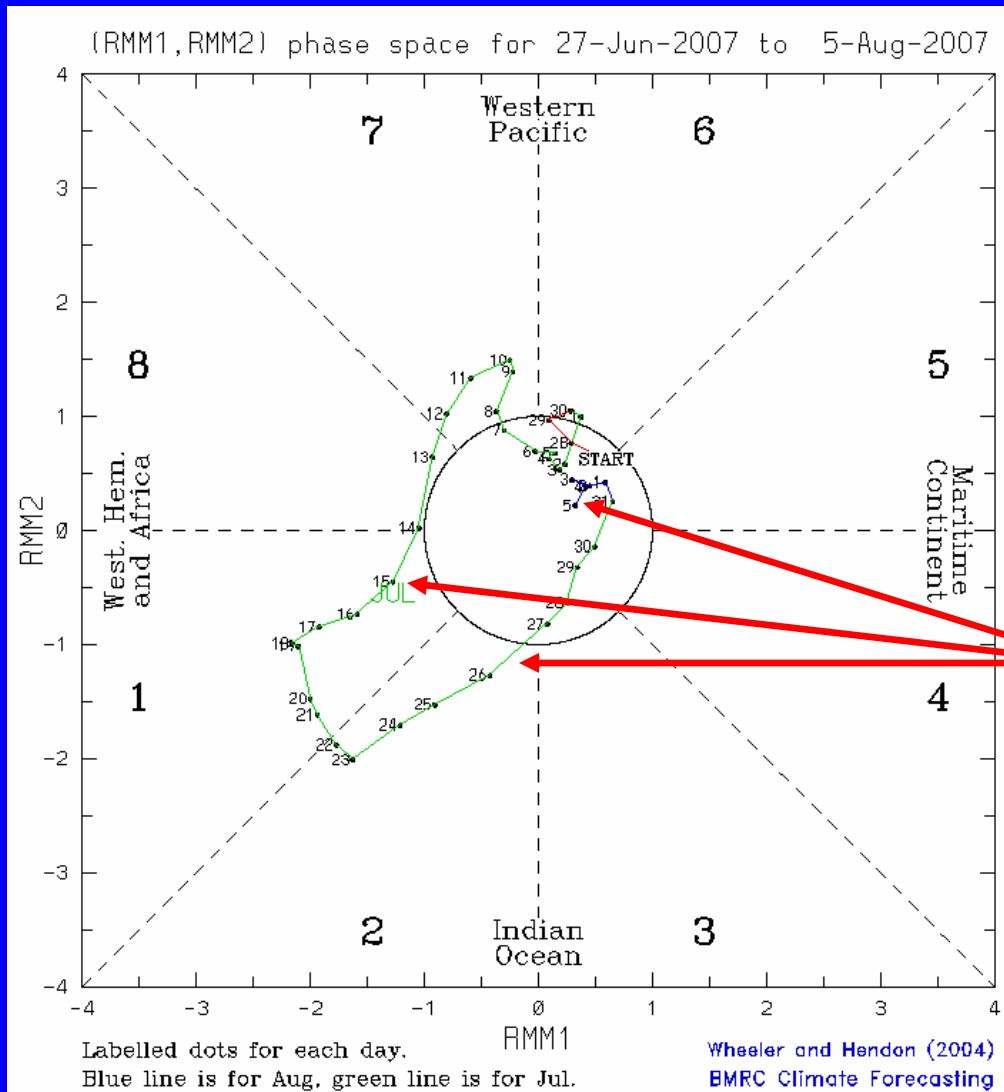
During this period two eastward-propagating Kelvin waves (warm phases indicated by dashed lines) have caused considerable month-to-month variability in the upper-ocean heat content.

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 remains weak.



# 200–850 hPa Vertical Wind Shear

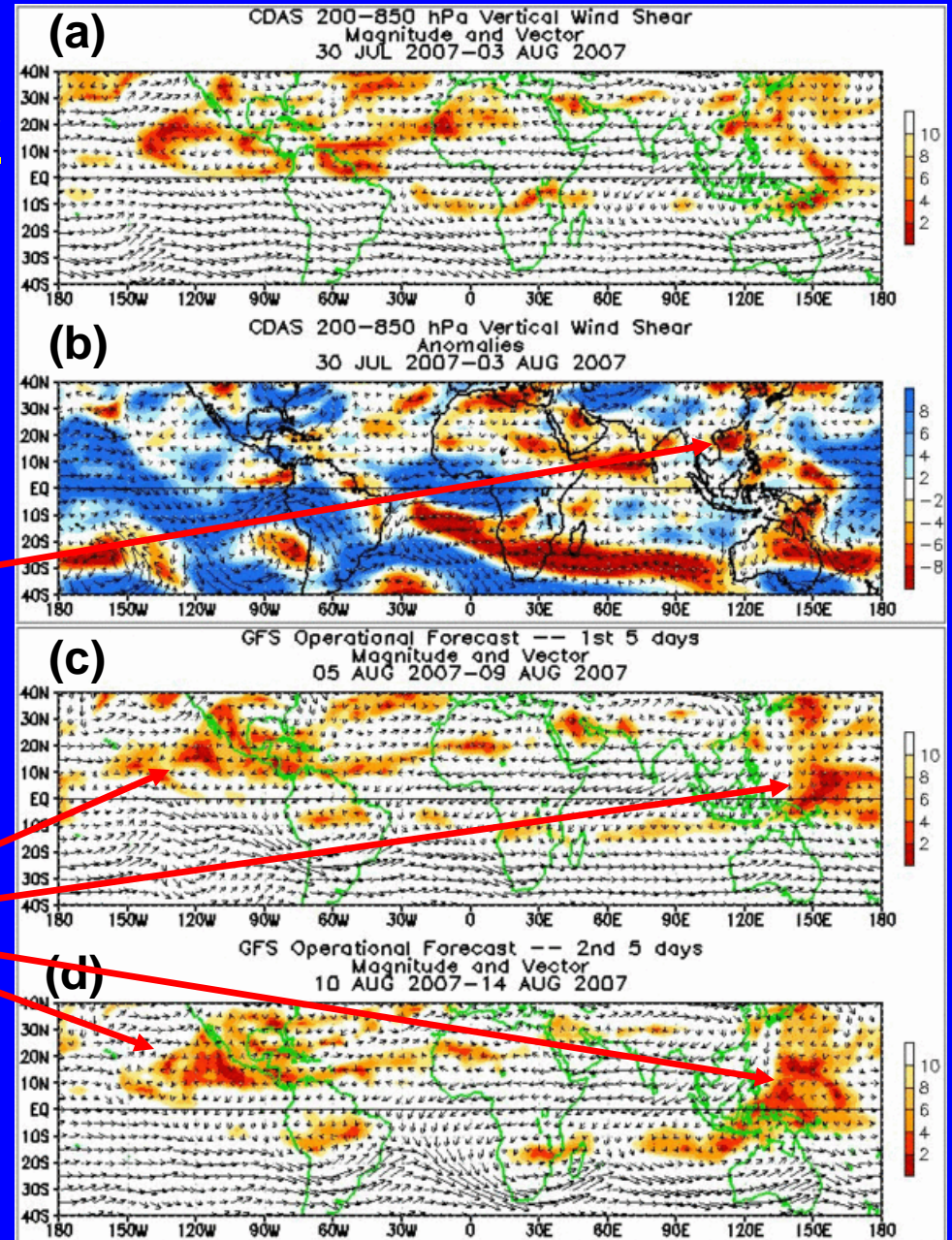
All plots: Shading denotes magnitude of vectors

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

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

Anomalously lower shear across the South China Sea aided in the development of a tropical storm in the South China Sea during the past week.

The GFS forecast indicates areas of low shear across parts of the western and eastern Pacific Ocean during the next 10 days.





## **\*\*\*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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