



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

**Update prepared by  
Climate Prediction Center / NCEP  
September 3, 2007**



# Outline

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



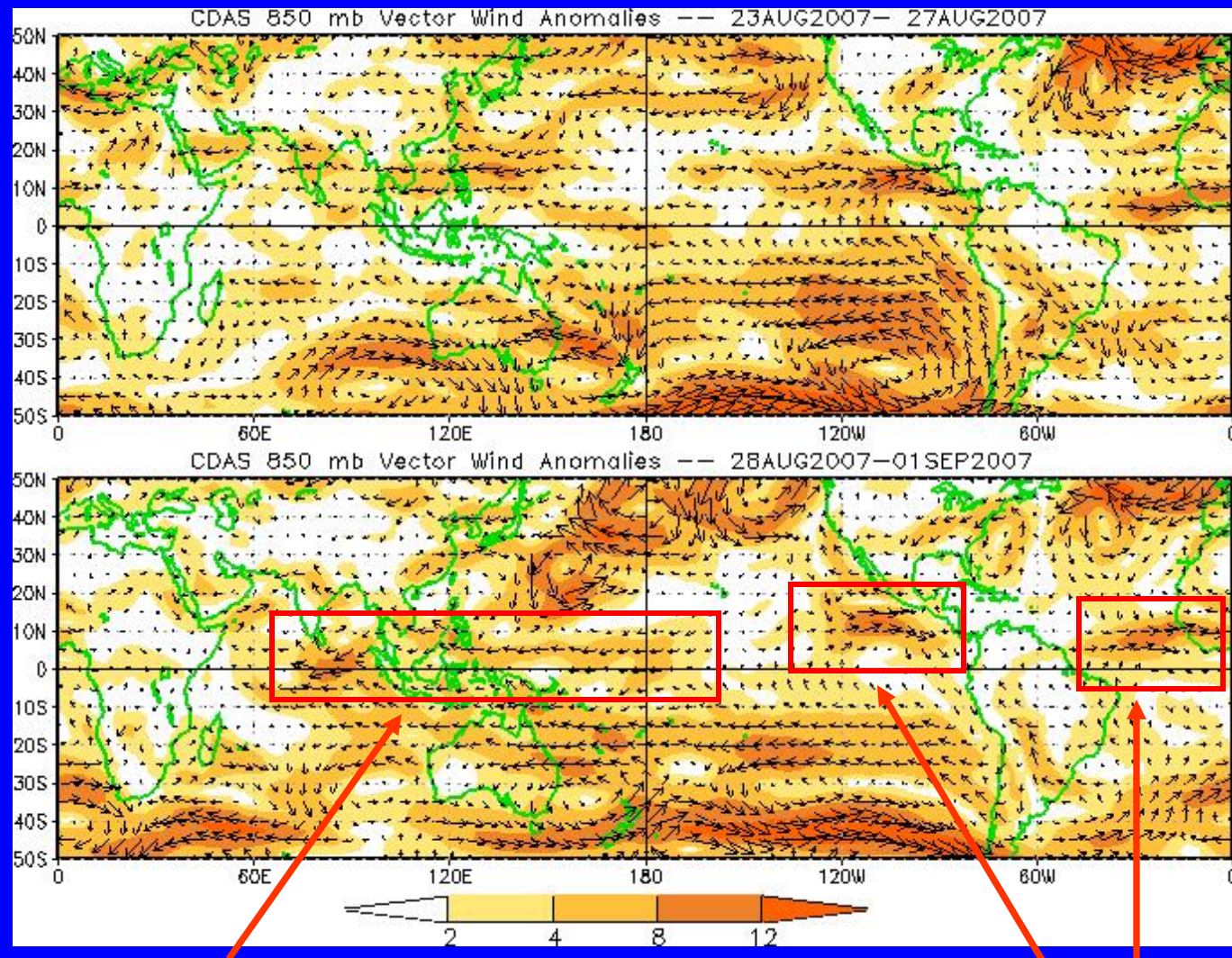
# Overview

- **The latest observations indicate that the MJO is incoherent.**
- **Enhanced convection has developed across much of western Africa and the Indian Ocean during the past week. Rather dry conditions were observed across the far western Pacific Ocean.**
- **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

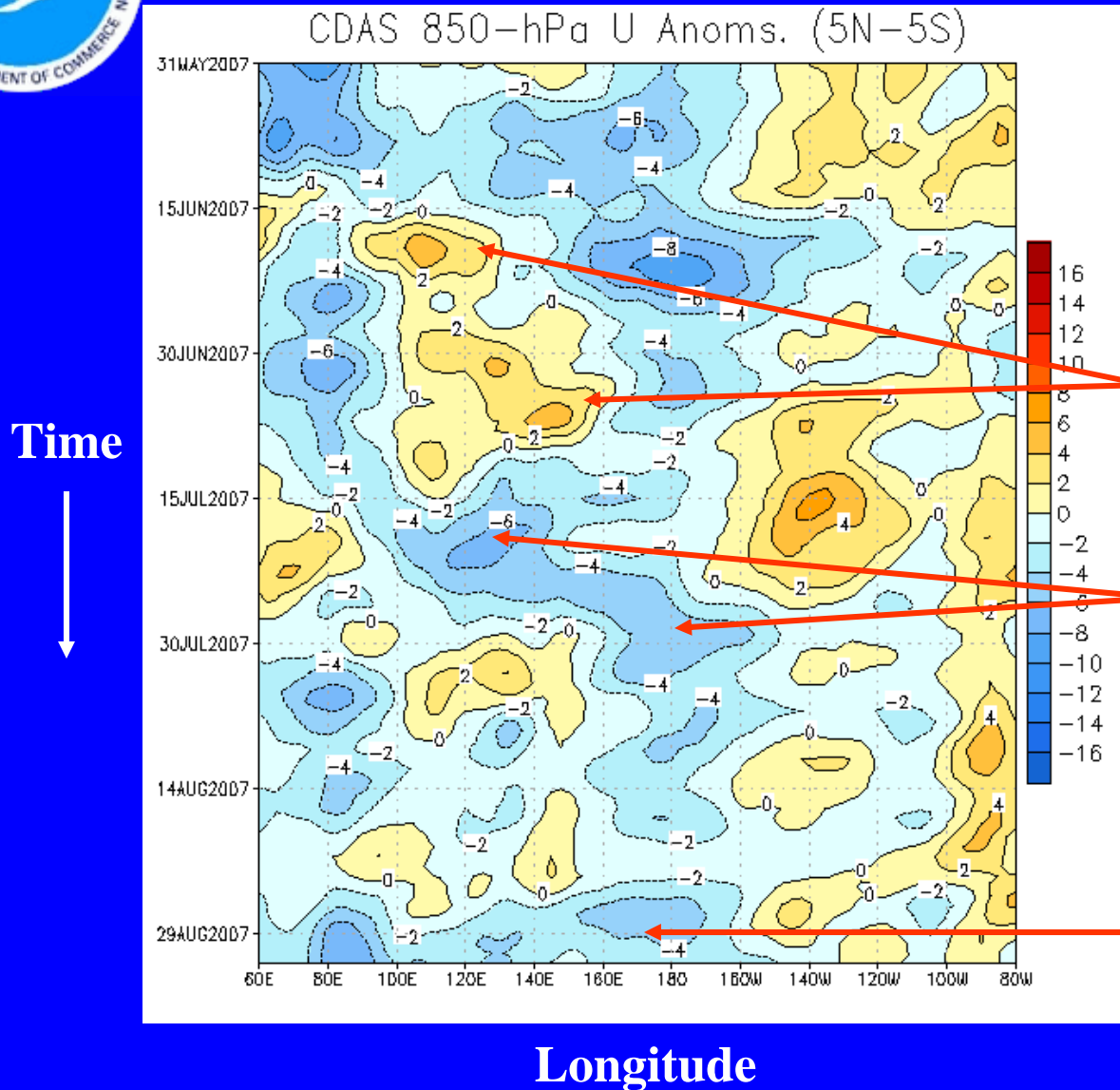


Easterly anomalies are now oriented more along the equator and strengthened especially across the Indian Ocean.

Westerly anomalies continue in the Atlantic deep tropics and eastern Pacific.



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



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

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

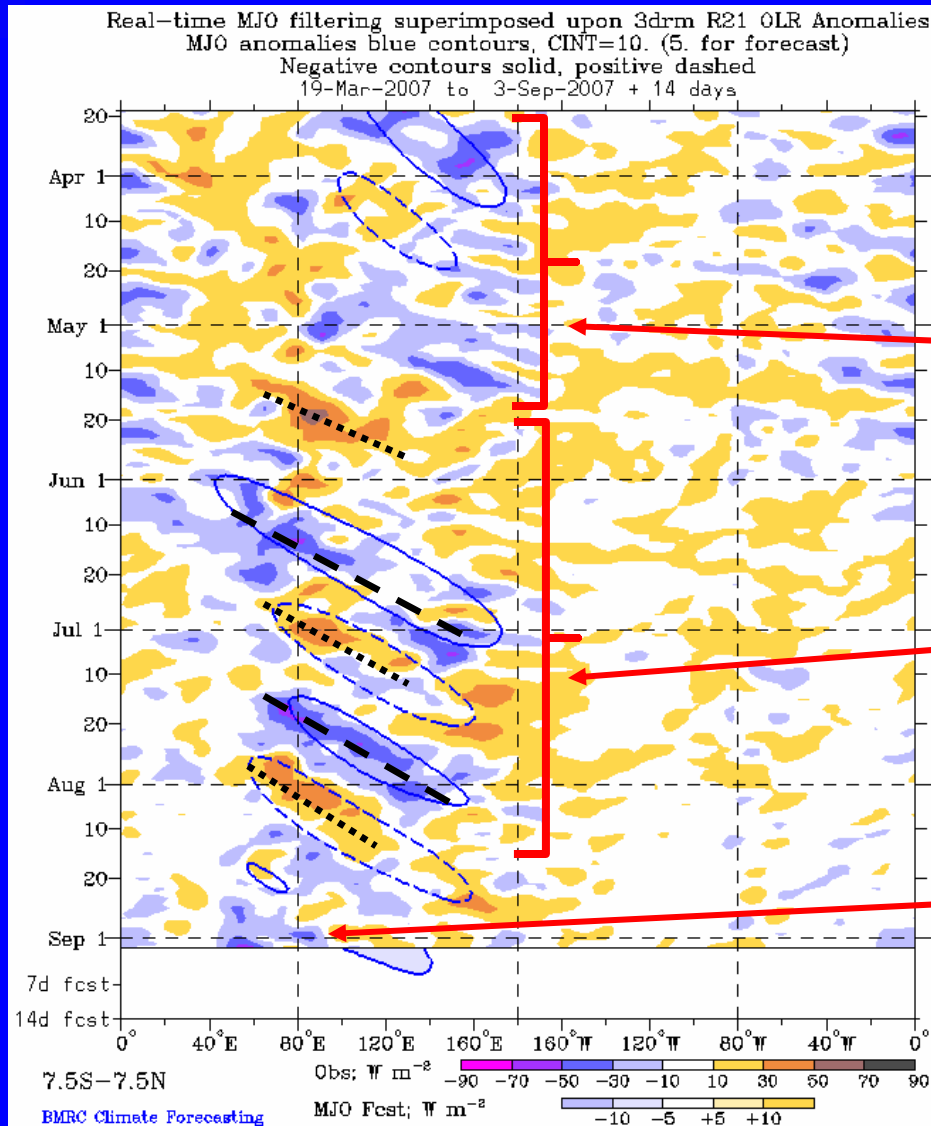
Westerly anomalies were evident across sections of the Maritime continent and the western Pacific Ocean from the latter half of June into mid-July.

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

Anomalous easterly low level winds have strengthened from near the Date Line to the Indian Ocean. Winds are near-average in the eastern 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)**

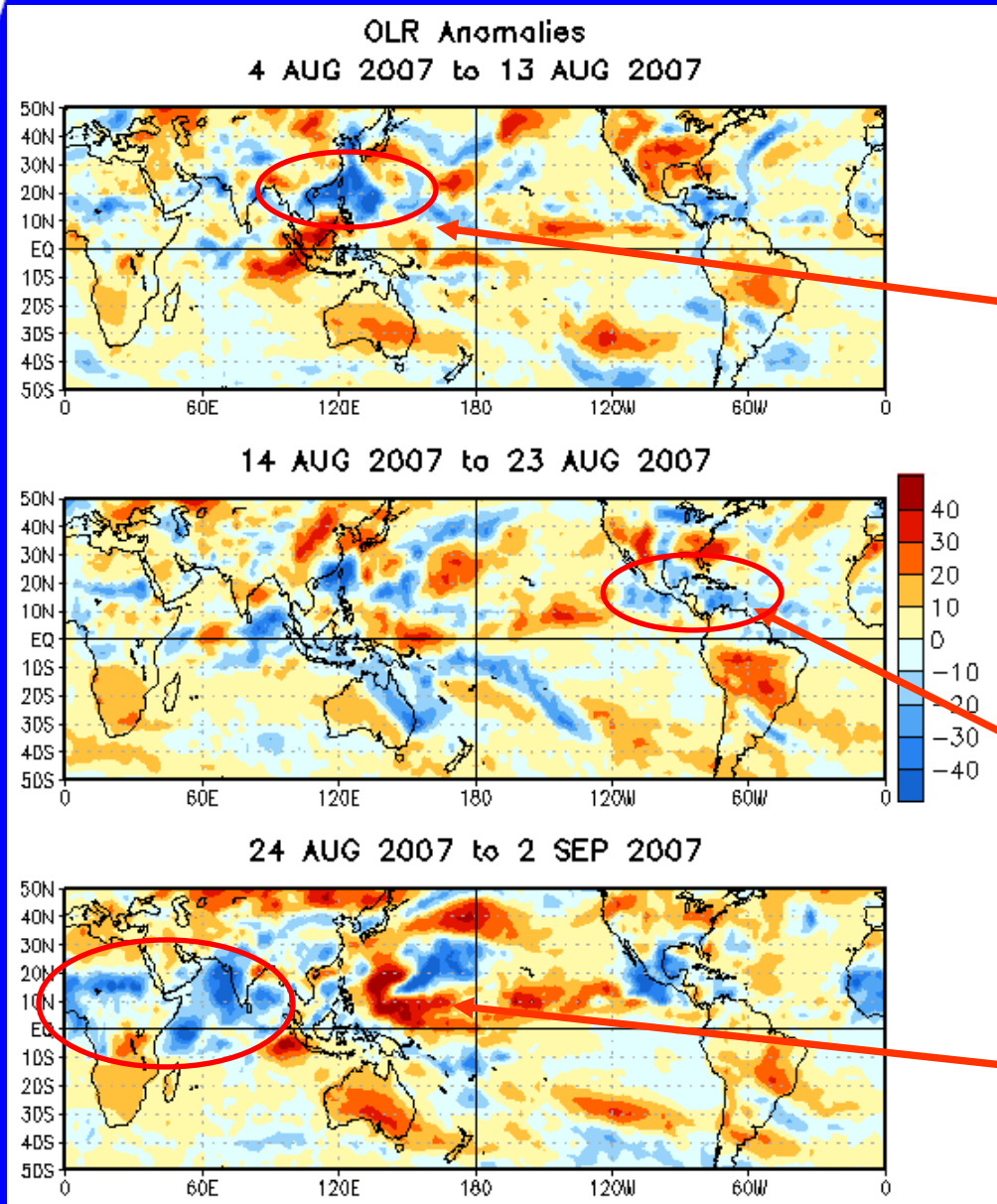
**Intermittent periods of enhanced convection were evident in the western Pacific Ocean from late March into May.**

**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.**

**Convection has increased markedly across sections of Africa and the Indian Ocean during the past week while convection elsewhere is near average.**



# 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 August, wet conditions were evident in the far western Pacific near the Philippines. Dry conditions prevailed across the Maritime continent.

Anomalous convection was highly variable across the eastern hemisphere during mid-August.

Wet conditions were observed across the Caribbean Sea, Mexico, and the eastern Pacific.

Beginning in late August, wet conditions have been widespread across much of Africa and the western Indian Ocean while dry conditions have prevailed across the west Pacific.

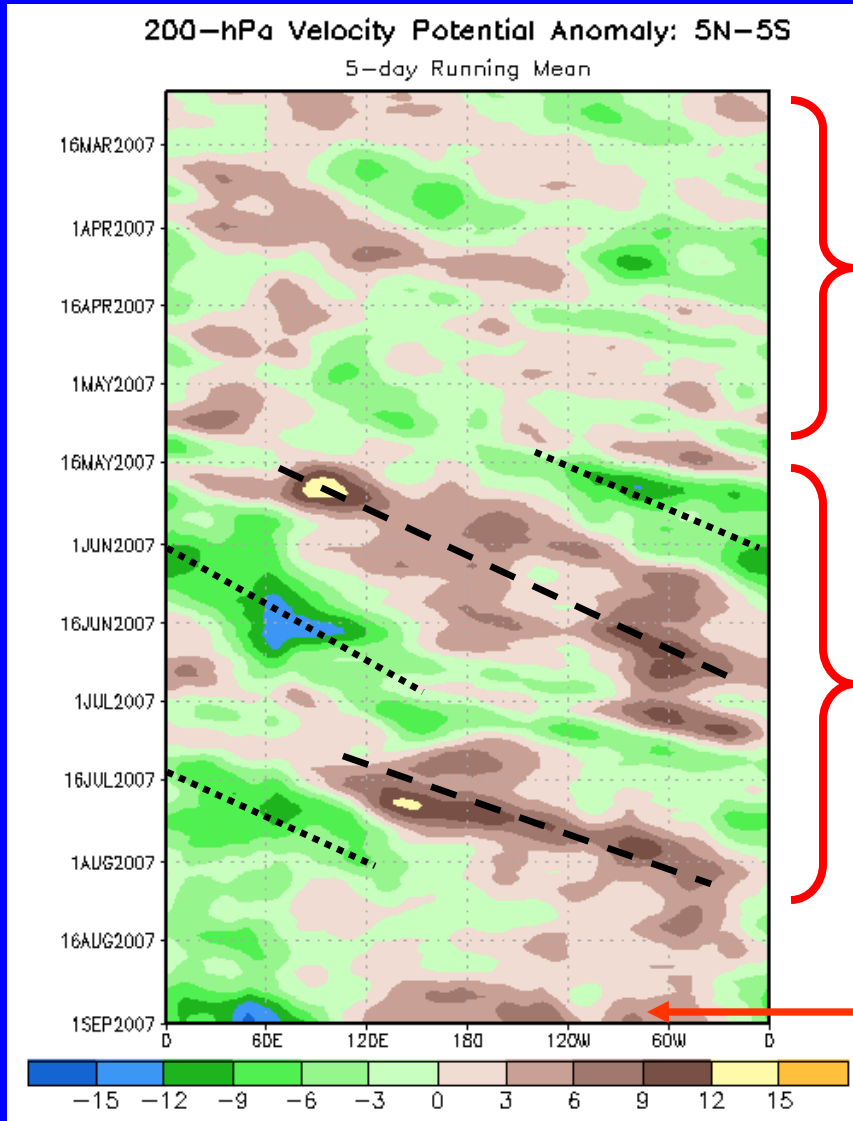


# 200-hPa Velocity Potential Anomalies (5°S-5°N)

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

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

Time  
↓



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

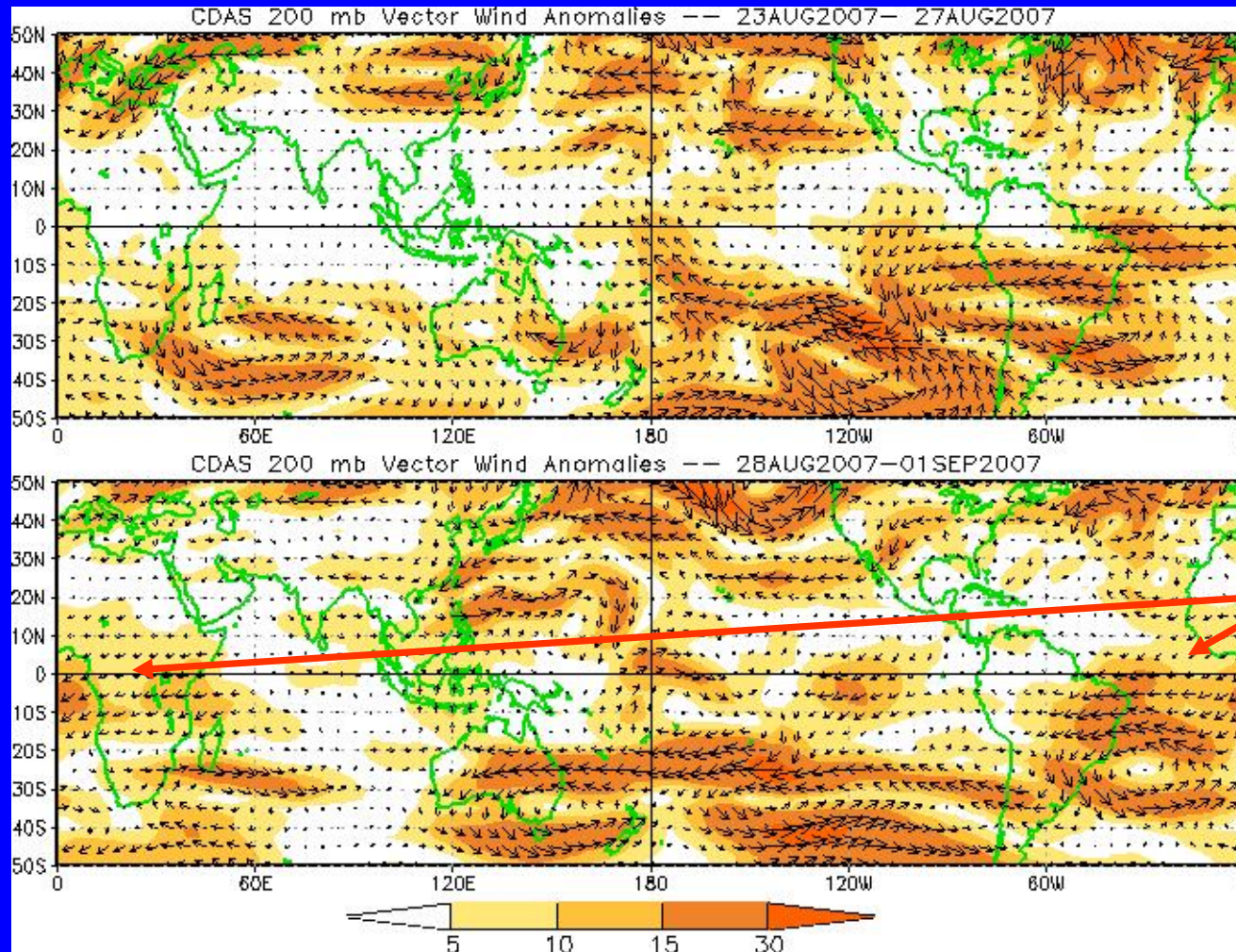
From mid-May into early August, weak to moderate MJO activity was observed as velocity potential anomalies increased and propagated eastwards.

Recently, anomalous upper-level convergence has developed across the Pacific Ocean while anomalous divergence has been observed over equatorial Africa and the western Indian Ocean.





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



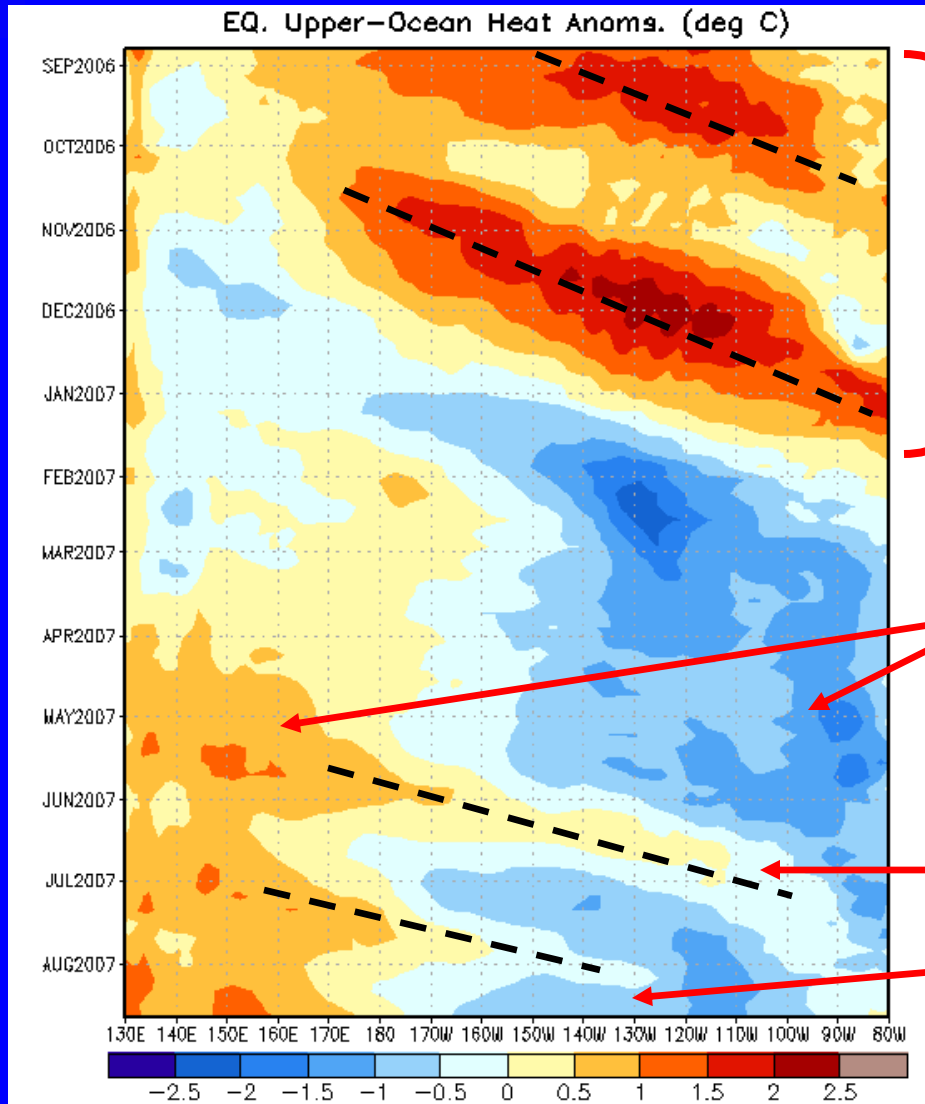
Note that shading denotes the magnitude of the anomalous wind vectors

Easterly wind anomalies have strengthened along the equator over the Atlantic Ocean and Africa.



# Weekly Heat Content Evolution in the Equatorial Pacific

Time  
↓



Longitude

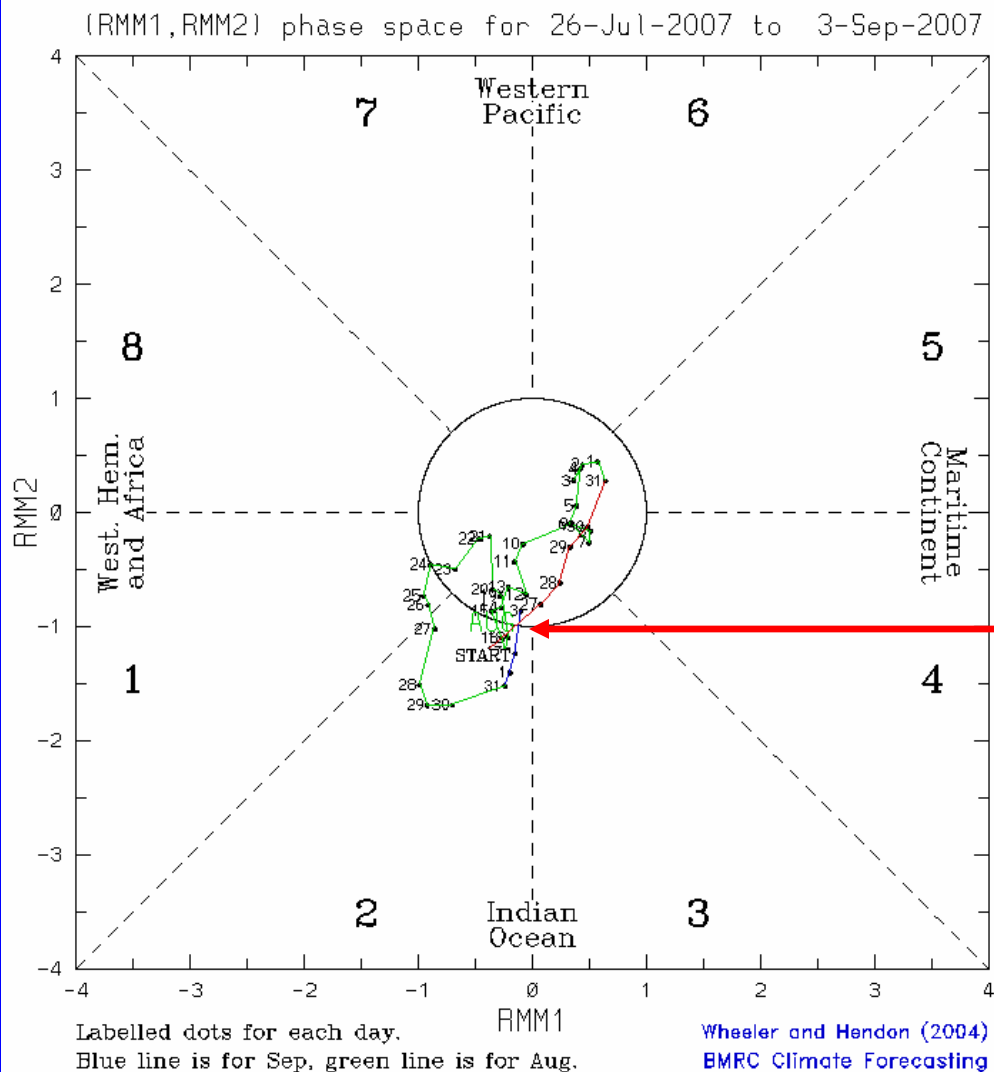
During late 2006, eastward-propagating Kelvin waves (warm phases indicated by dashed lines) have caused considerable month-to-month variability in the upper-ocean heat content.

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.

Weak Kelvin wave activity has been observed since mid-May. Currently below average heat content anomalies are consistent with the upwelling portion of the most recent Kelvin wave.



# MJO Index



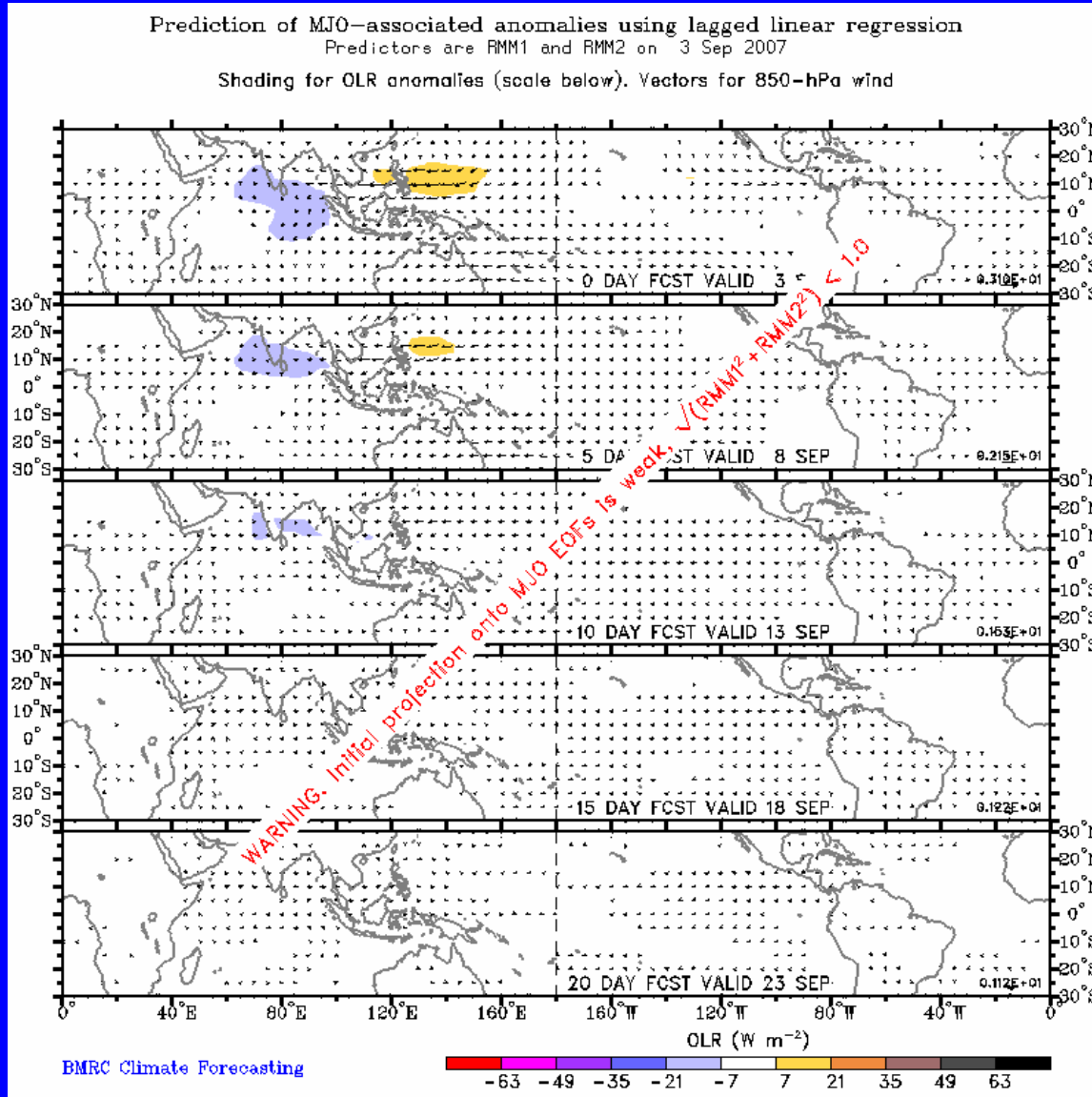
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850-hPa and 200-hPa zonal wind and outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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 substantially during the last several days.



# MJO OLR Forecast



The statistical method forecast indicates weak enhanced convection over the Indian Ocean during the next 5-10 days. Dry conditions are expected near and east of the Philippines.



## **\*\*\*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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