



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

**Update prepared by  
Climate Prediction Center / NCEP  
May 21, 2007**



# Outline

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



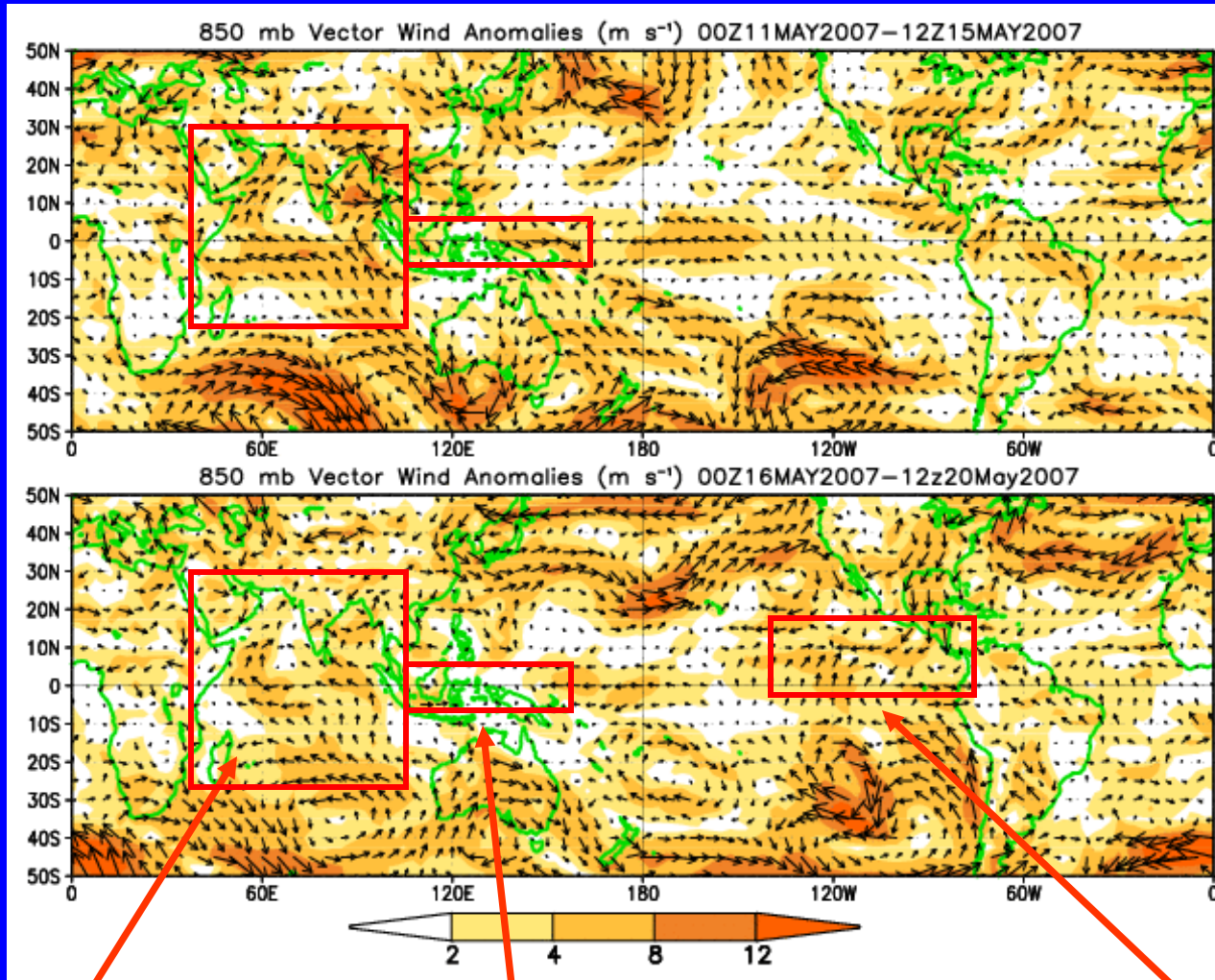
# Overview

- **The MJO remains incoherent.**
- **In general, convection across the far western Pacific Ocean, the Maritime continent, the Bay of Bengal and Southeast Asia has decreased to near or below average levels during the past week.**
- **Based on the latest monitoring and forecast tools, the MJO is expected to remain weak during the upcoming 1-2 week period.**



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

Note that shading denotes the magnitude of the anomalous wind vectors



Enhanced cross-equatorial flow and Somali Jet during the last ten days.

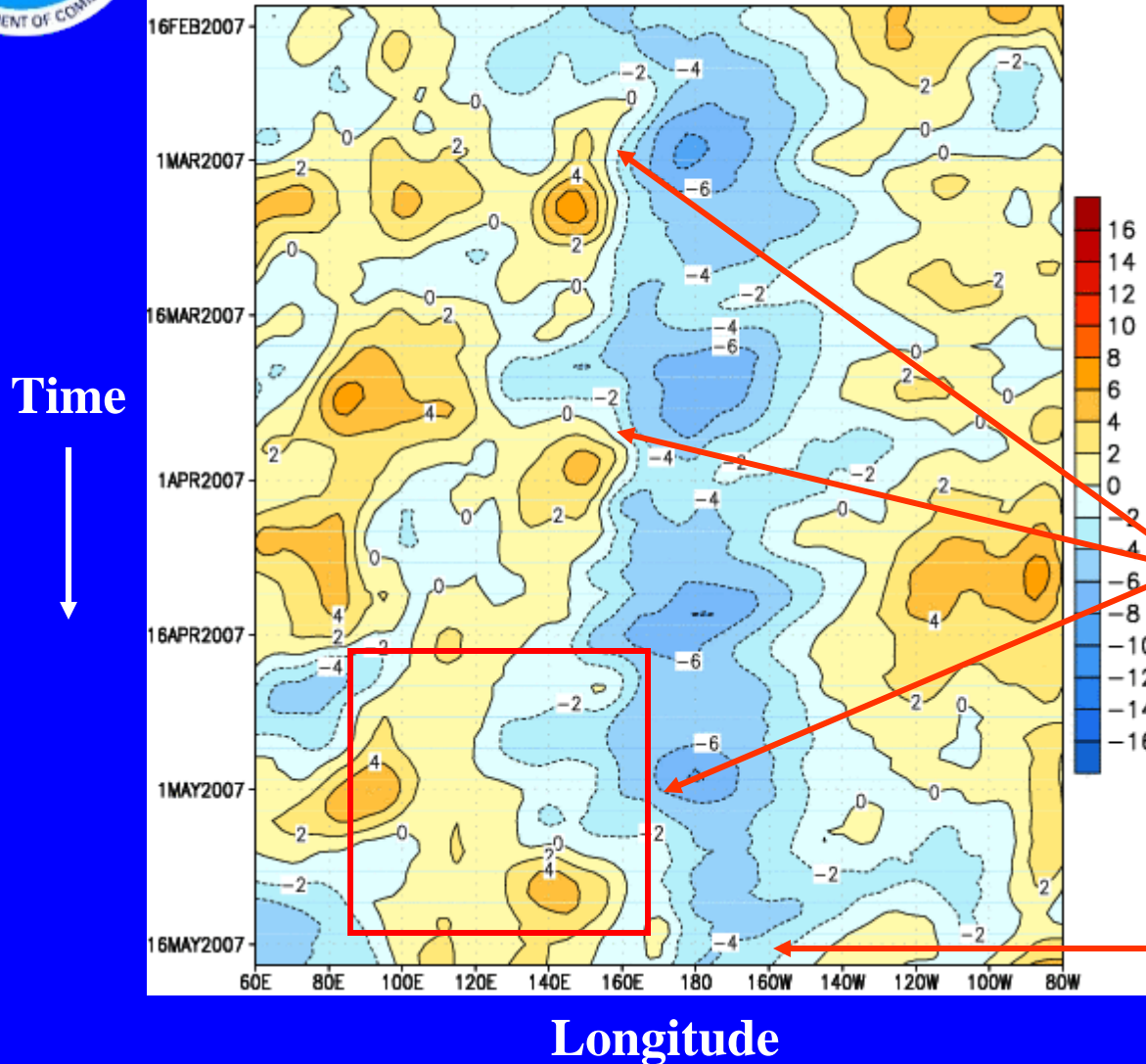
Westerly anomalies have weakened considerably during the last five days across the Maritime continent and the far western Pacific.

Anomalous low-level convergence has been evident across the east Pacific Ocean.



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

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.

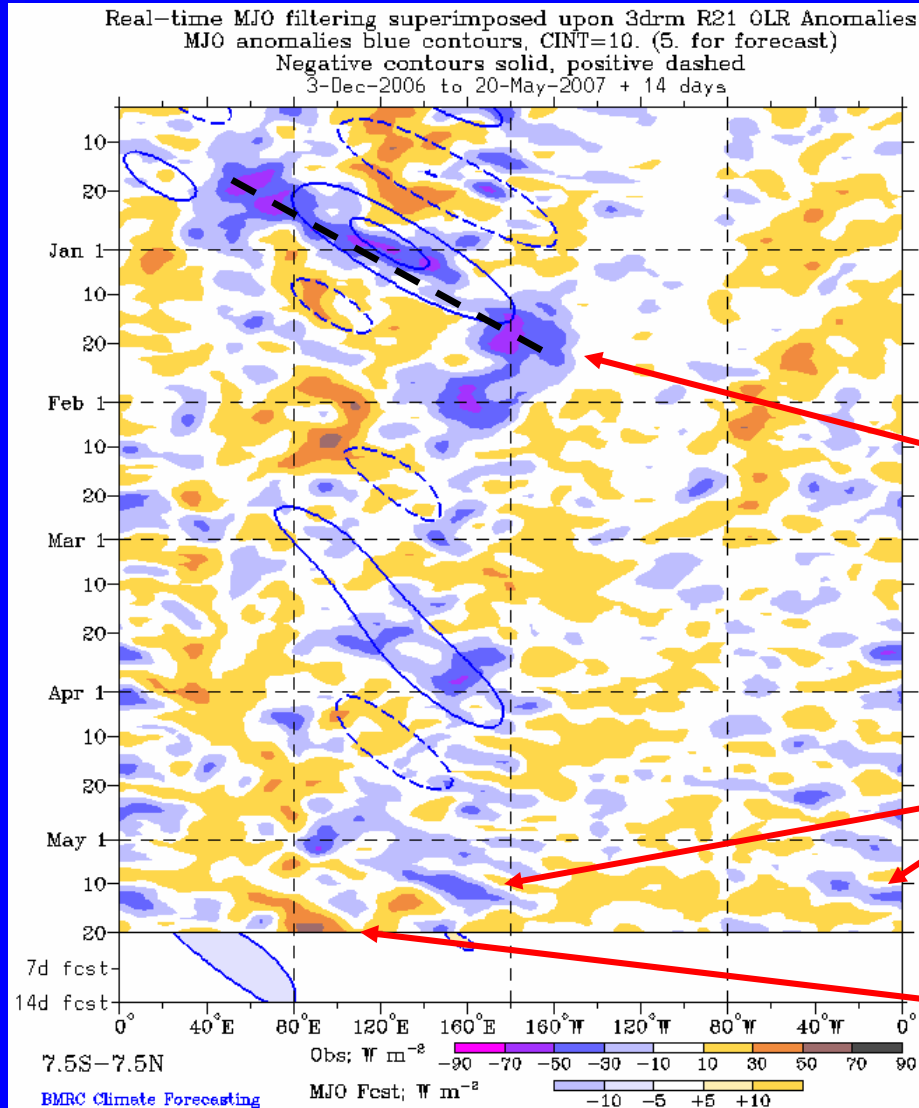
Easterly anomalies have been persistent near the Date Line since the beginning of the year.

During the past few weeks, an extension of easterly anomalies to the west followed by the development westerly anomalies across Indonesia into the far western Pacific Ocean has occurred. This pattern was observed in late February and late March.

Easterly anomalies near the Date Line have weakened.



# 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.

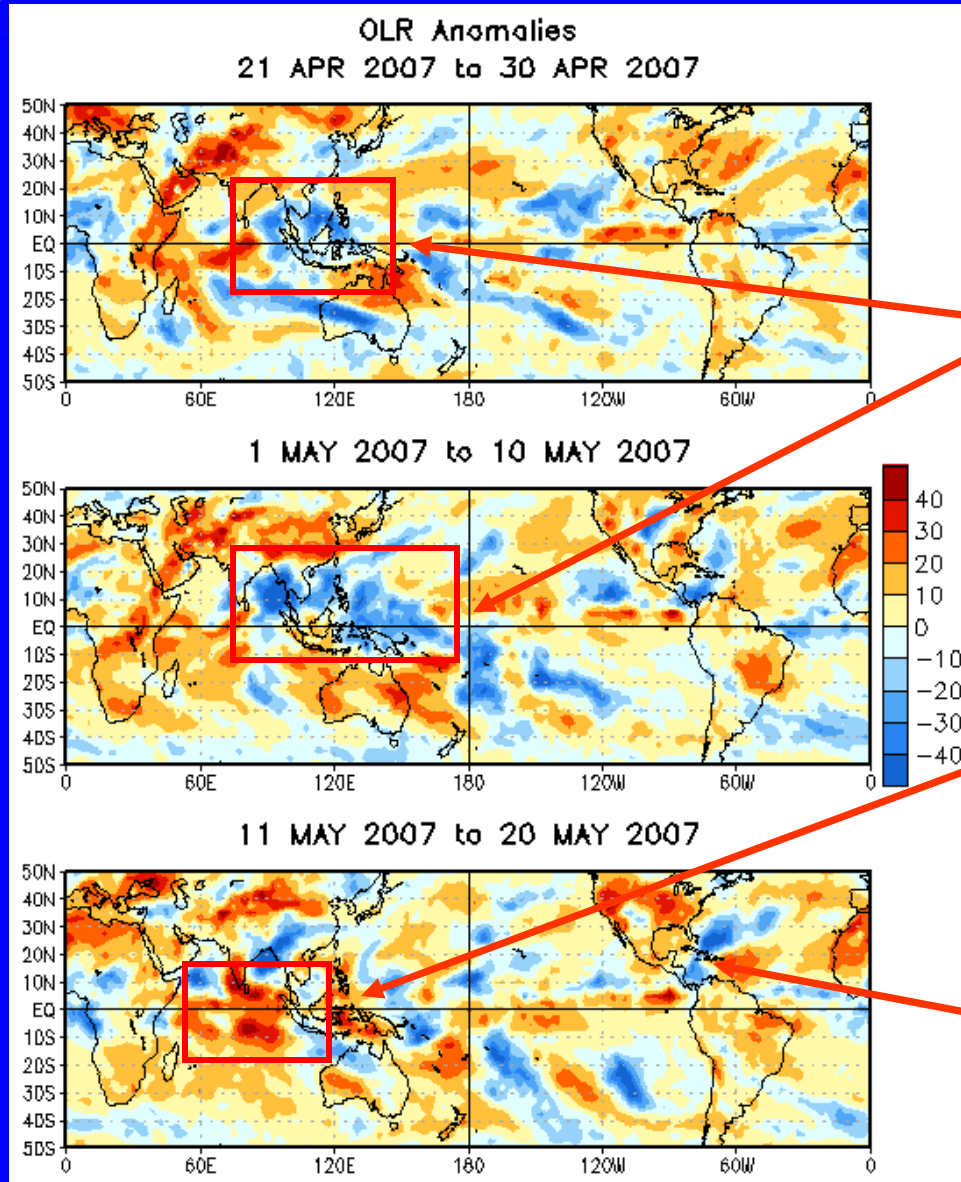
During the past ten days, areas of enhanced convection have affected sections of the western Pacific Ocean and Africa.

Suppressed convection is now evident across sections of the Indian Ocean from 80°E - 110°E.





# OLR Anomalies: Last 30 days



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

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

Beginning in late April, enhanced convection was observed across the eastern Indian Ocean, the Bay of Bengal, the western Maritime continent, and sections of Southeast Asia. In early May, that area then expanded to include the western Pacific Ocean.

Dry conditions were evident across the Indian Ocean during the second ten days of May.

During May, enhanced rainfall has occurred across the Caribbean Sea, the West Indies, and off of the southeast US coast.

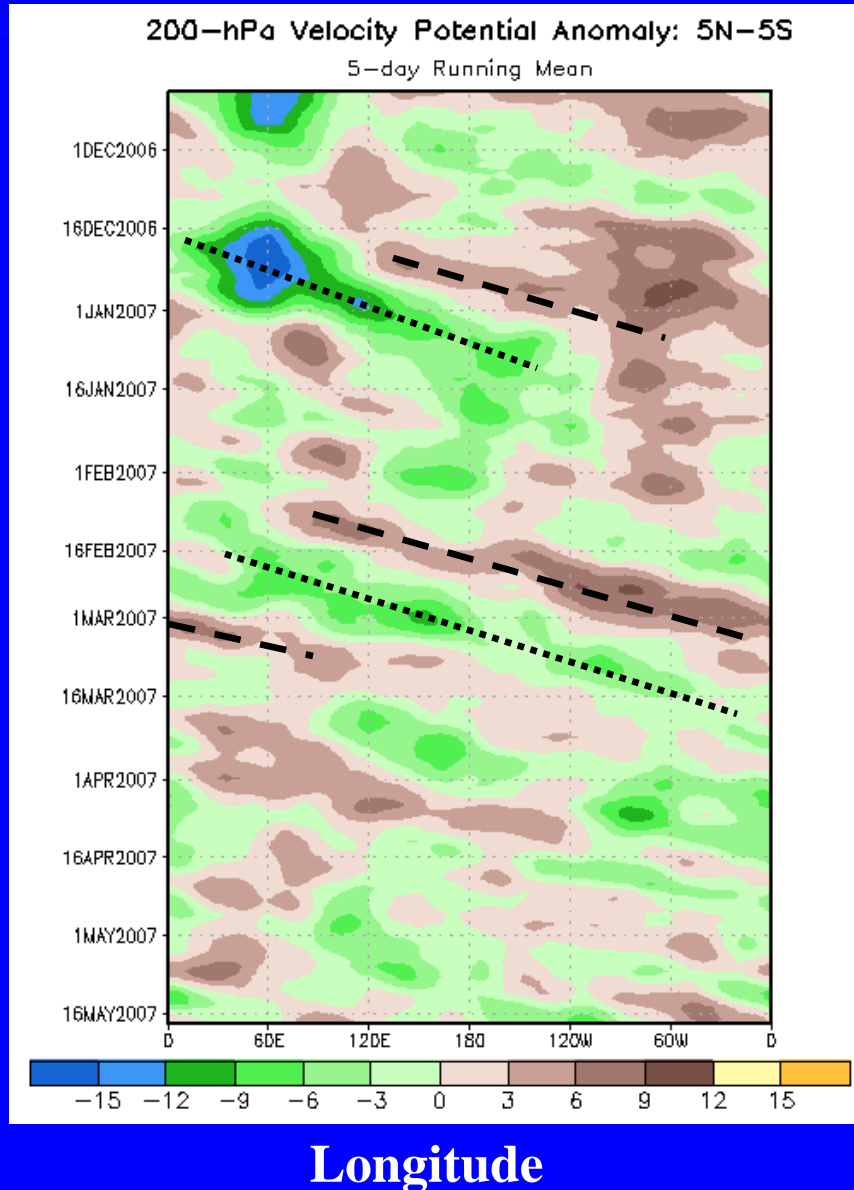


# 200-hPa Velocity Potential Anomalies (5°S-5°N)

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

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

Time



The MJO intensified in late December 2006. Negative OLR anomalies shifted eastward from the Maritime continent into the central tropical Pacific.

Weak to moderate MJO activity was observed during late February and early March as velocity potential anomalies shifted eastward.

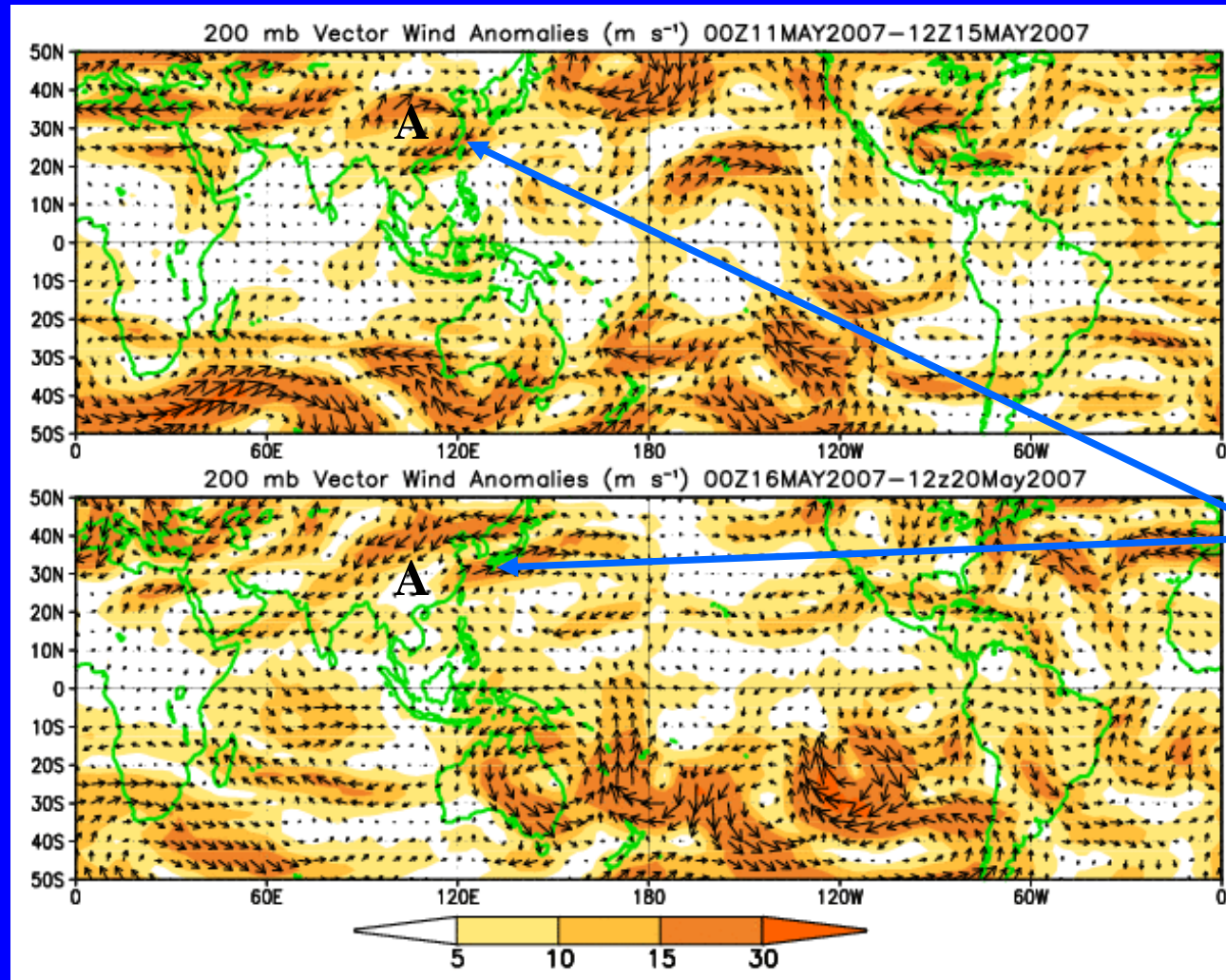
The MJO has been weak or incoherent since mid-March.





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

Note that shading denotes the magnitude of the anomalous wind vectors

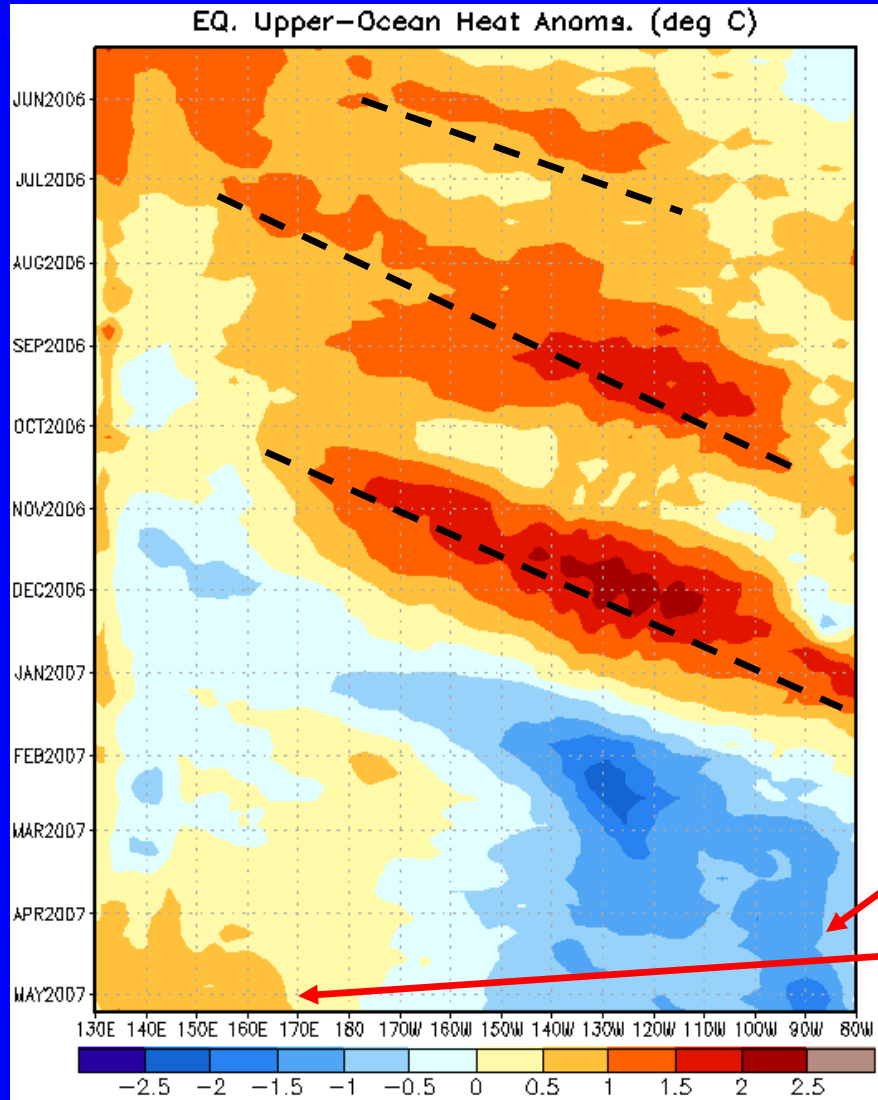


Anomalous anti-cyclonic circulation across southern Asia has weakened during the last five days.



# Weekly Heat Content Evolution in the Equatorial Pacific

Time



Longitude

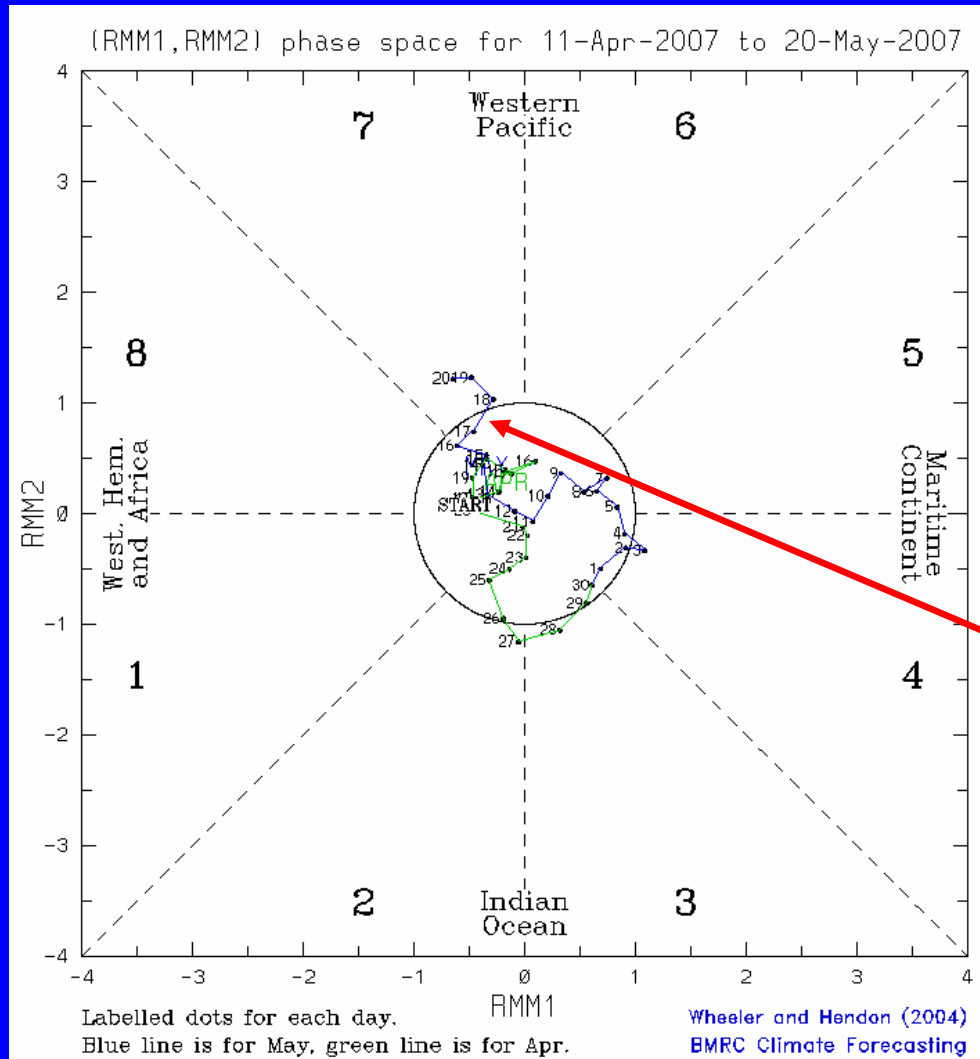
During this period eastward-propagating Kelvin waves (warm phases indicated by dashed lines) have caused considerable month-to-month variability in the upper-ocean heat content.

Since January, negative heat content anomalies are evident across the eastern equatorial Pacific.

Since late March, slightly larger positive anomalies are evident in the far western Pacific Ocean.



# 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).

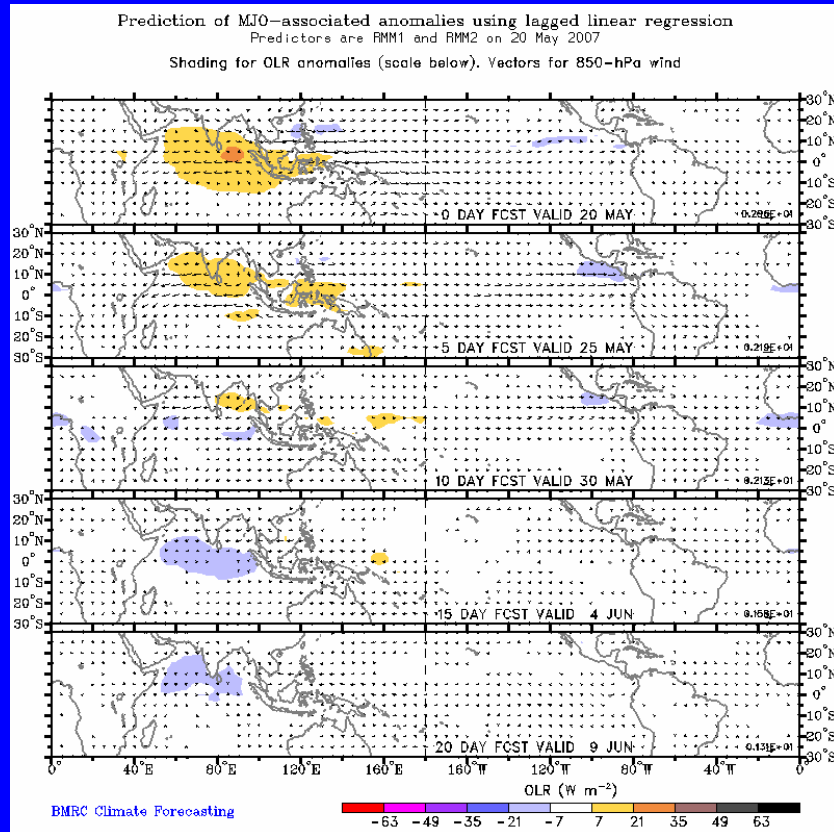
The axes represent the time series of the two leading modes of variability and are used to measure the amplitude while the triangular areas indicate the phase or location of the enhanced phase of the MJO. The farther away from the center of the circle the stronger the MJO. Different color lines indicate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

The MJO index has strengthened in recent days but the MJO remains weak.



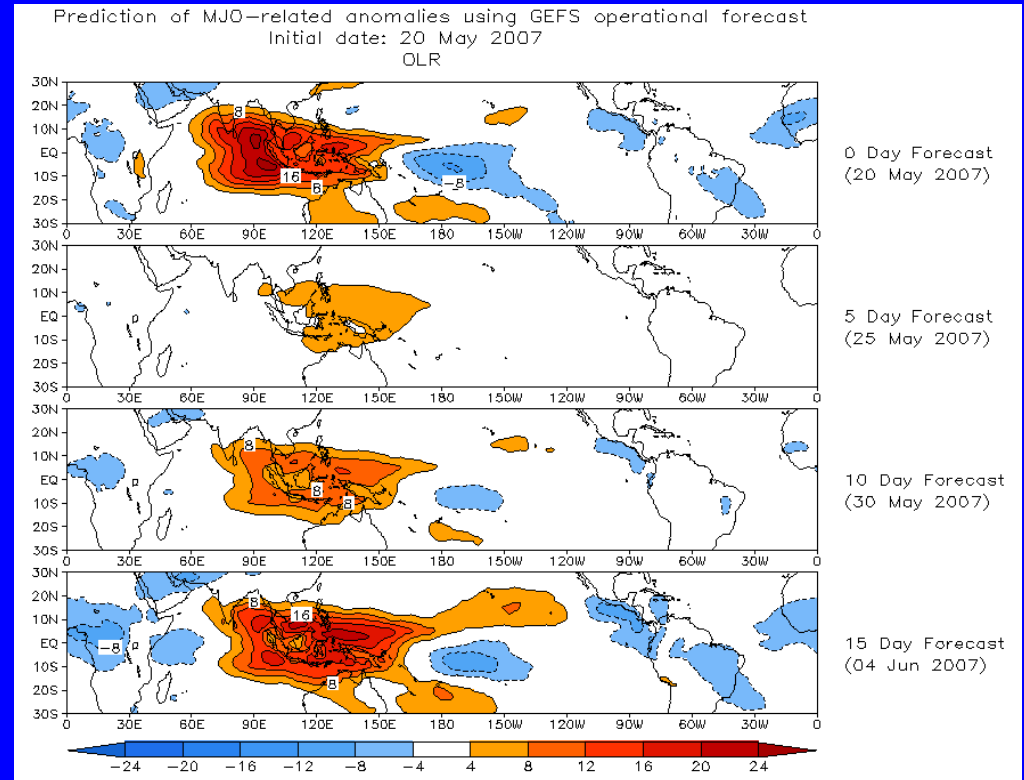
# MJO Forecasts

## Statistical



The forecast indicates suppressed convection across the Indian Ocean and the Maritime continent during the next week.

## GFS



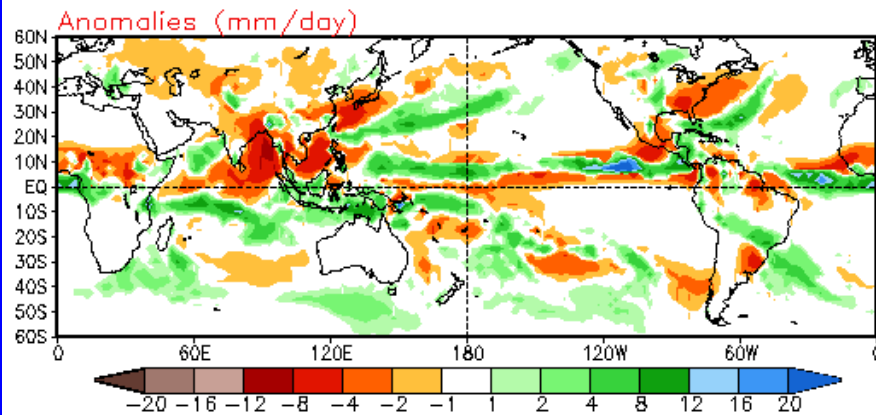
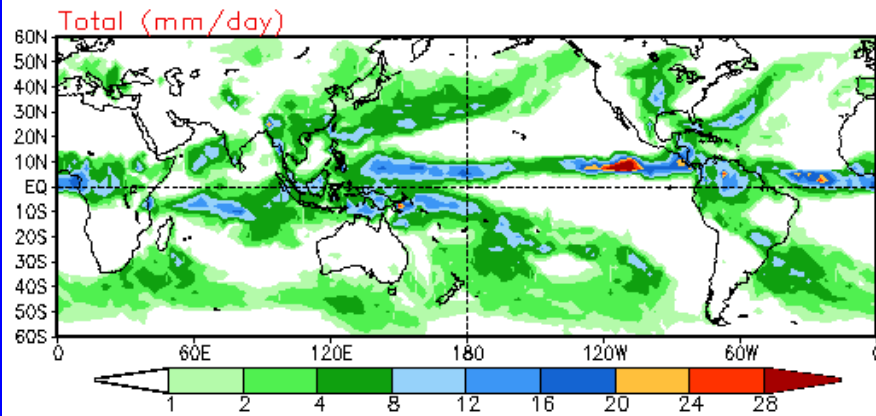
The GFS MJO associated anomalies indicate suppressed convection across sections of the eastern Indian Ocean and Maritime continent throughout much of the period.



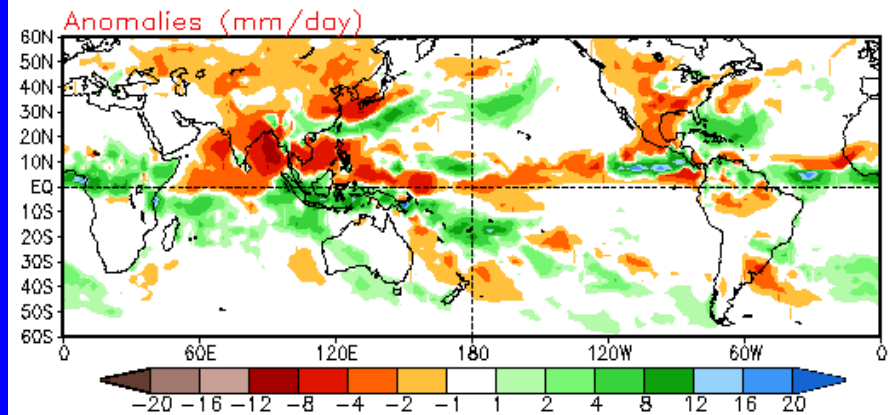
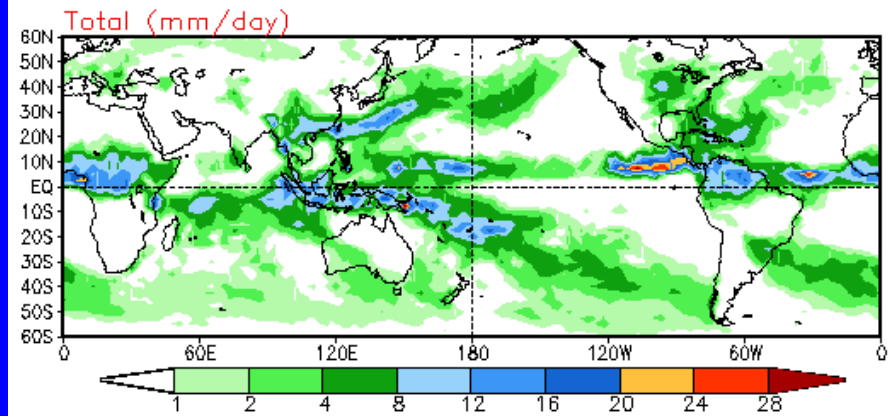


# Experimental Bias-Corrected GFS Precipitation

Week 1 Precipitation  
Forecast from 21May2007



Week 2 Precipitation  
Forecast from 21May2007







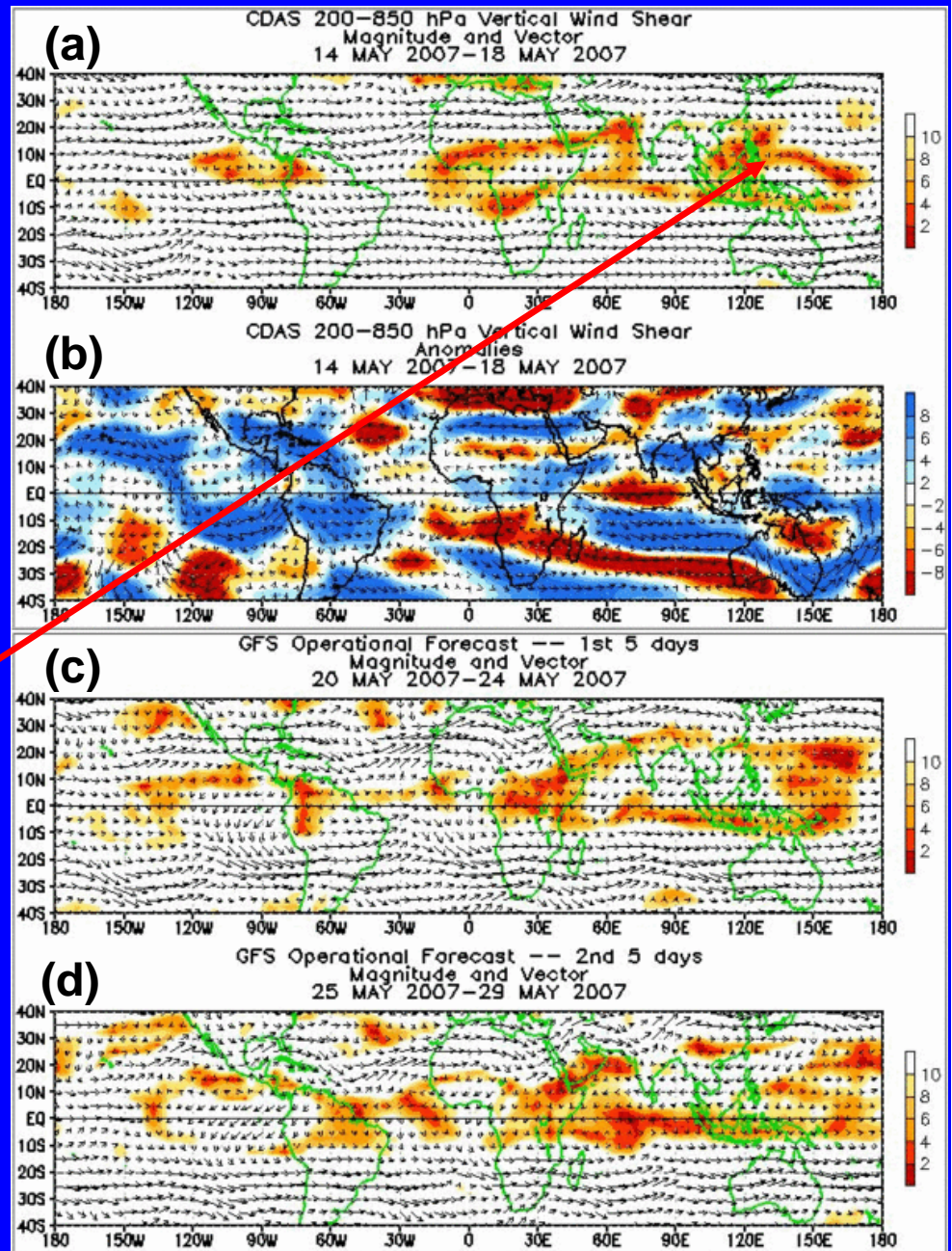
# 200–850 hPa Vertical Wind Shear

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 vertical wind shear has been weak to moderate across sections of the western Pacific Ocean contributing to the development of a tropical cyclone in this area.





## **\*\*\*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**

**Jon.Gottschalck@noaa.gov**