



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

**Update prepared by  
Climate Prediction Center / NCEP  
May 14, 2007**



# Outline

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



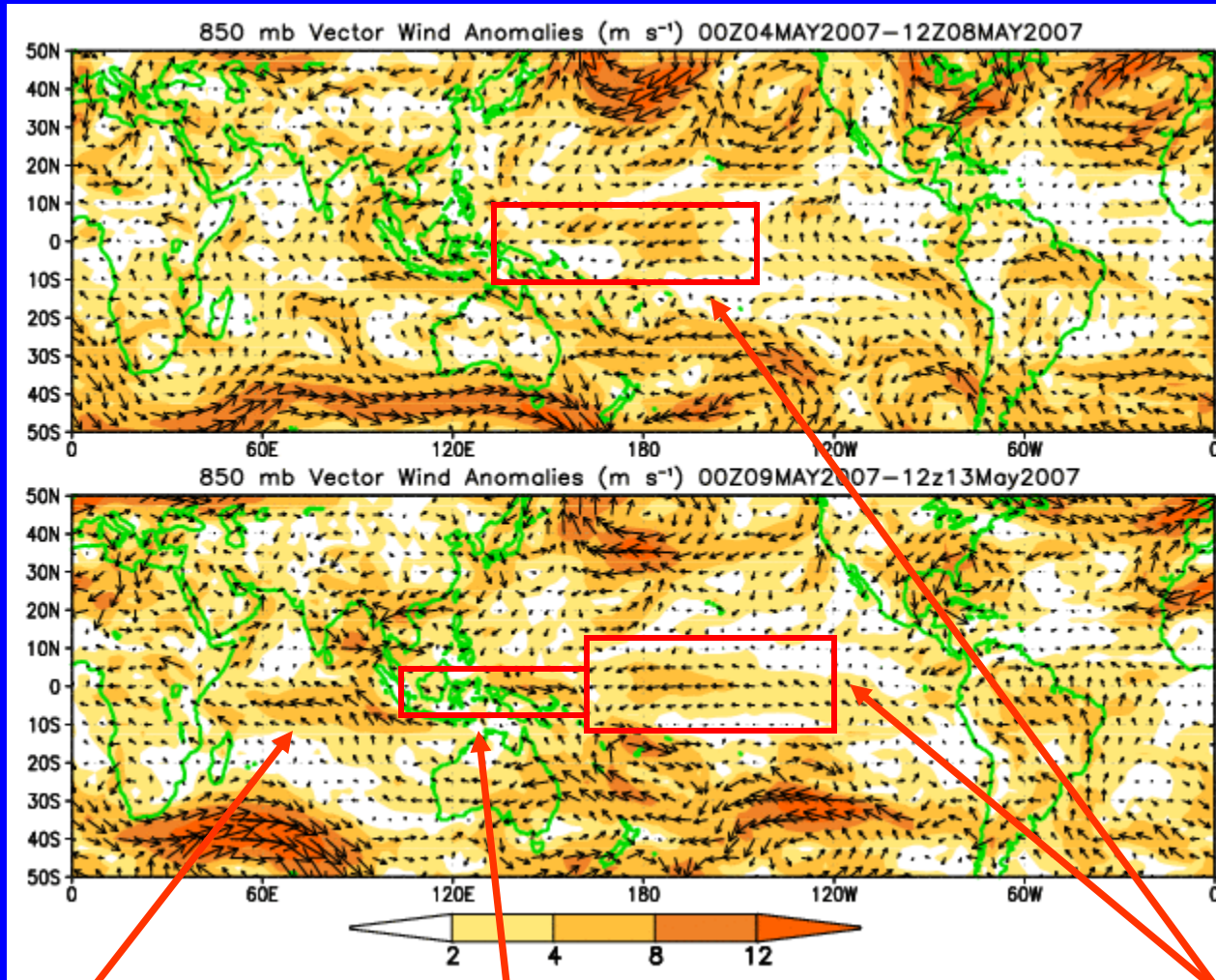
# Overview

- **The MJO remains incoherent.**
- **During the past week, convection has intensified across the far western Pacific Ocean while enhanced rainfall continued across sections of the Bay of Bengal and Southeast Asia.**
- **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



Easterly anomalies are now evident in the Indian Ocean.

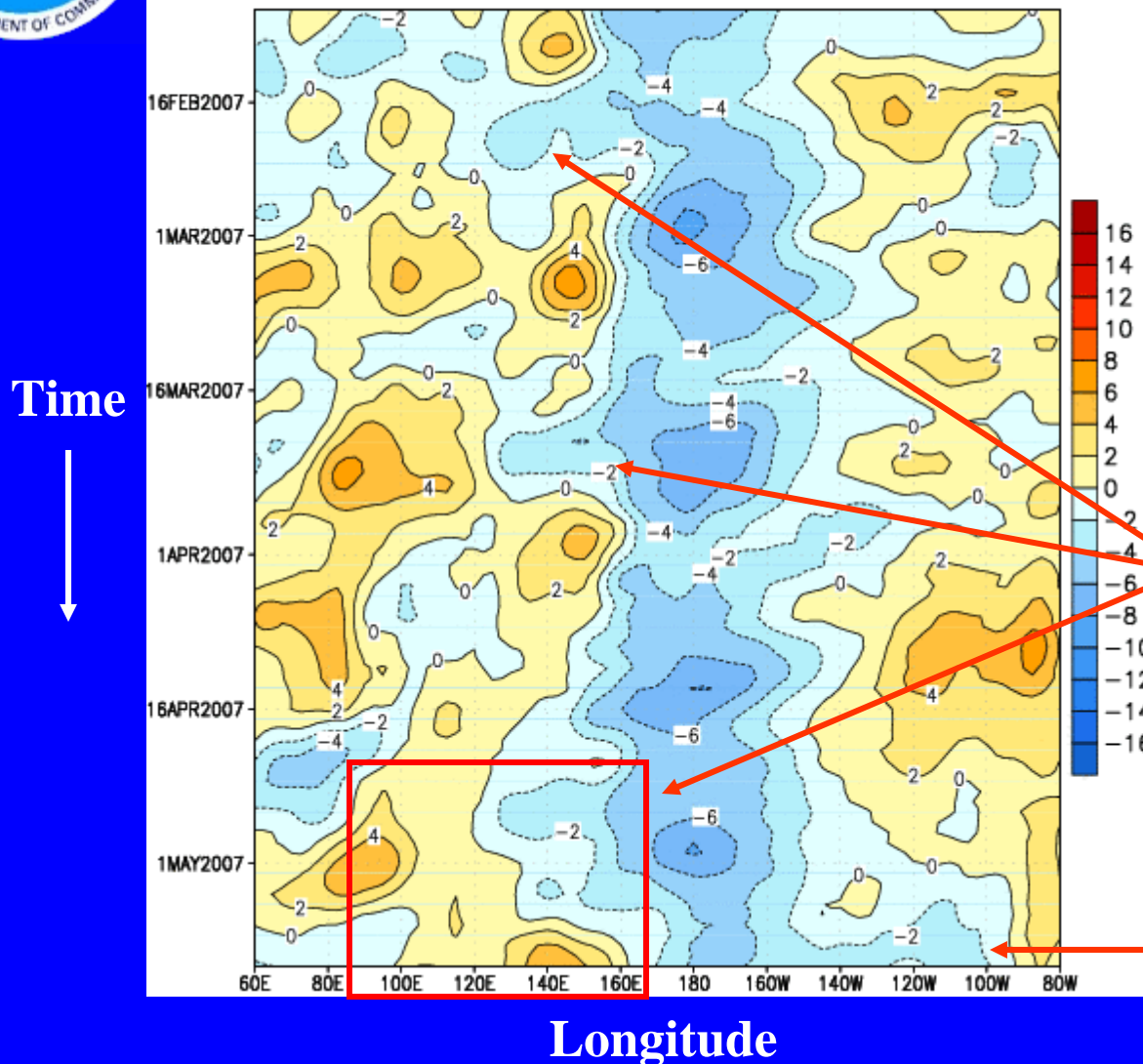
Westerly anomalies are now evident across sections of the Maritime continent.

Easterly anomalies remain in the western Pacific but have decreased during the last five to ten days from their April values.



# 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.

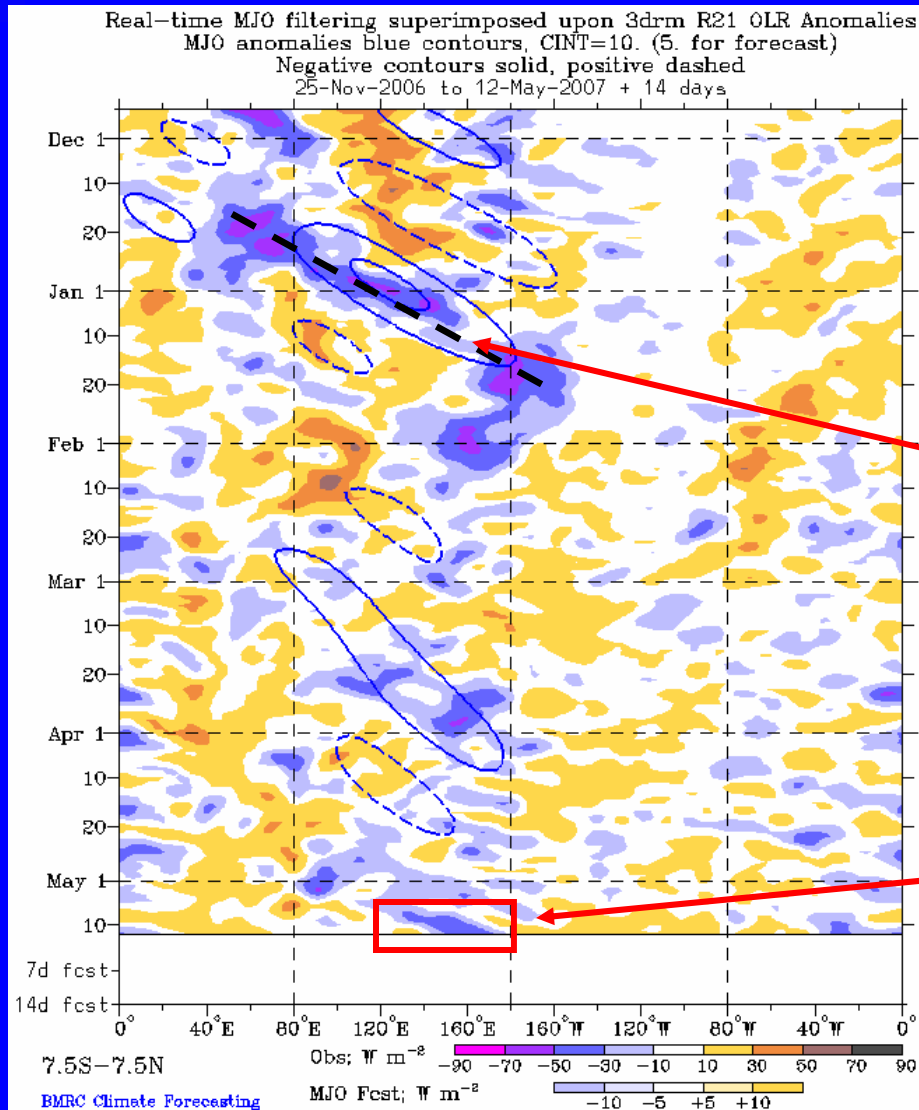
Easterly anomalies have been persistent near the Date Line since the beginning of the year.

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 are now evident across sections of the east 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)**

Enhanced convection, associated with the MJO in late December and January, shifted eastward from the Indian Ocean across the Maritime continent and western Pacific.

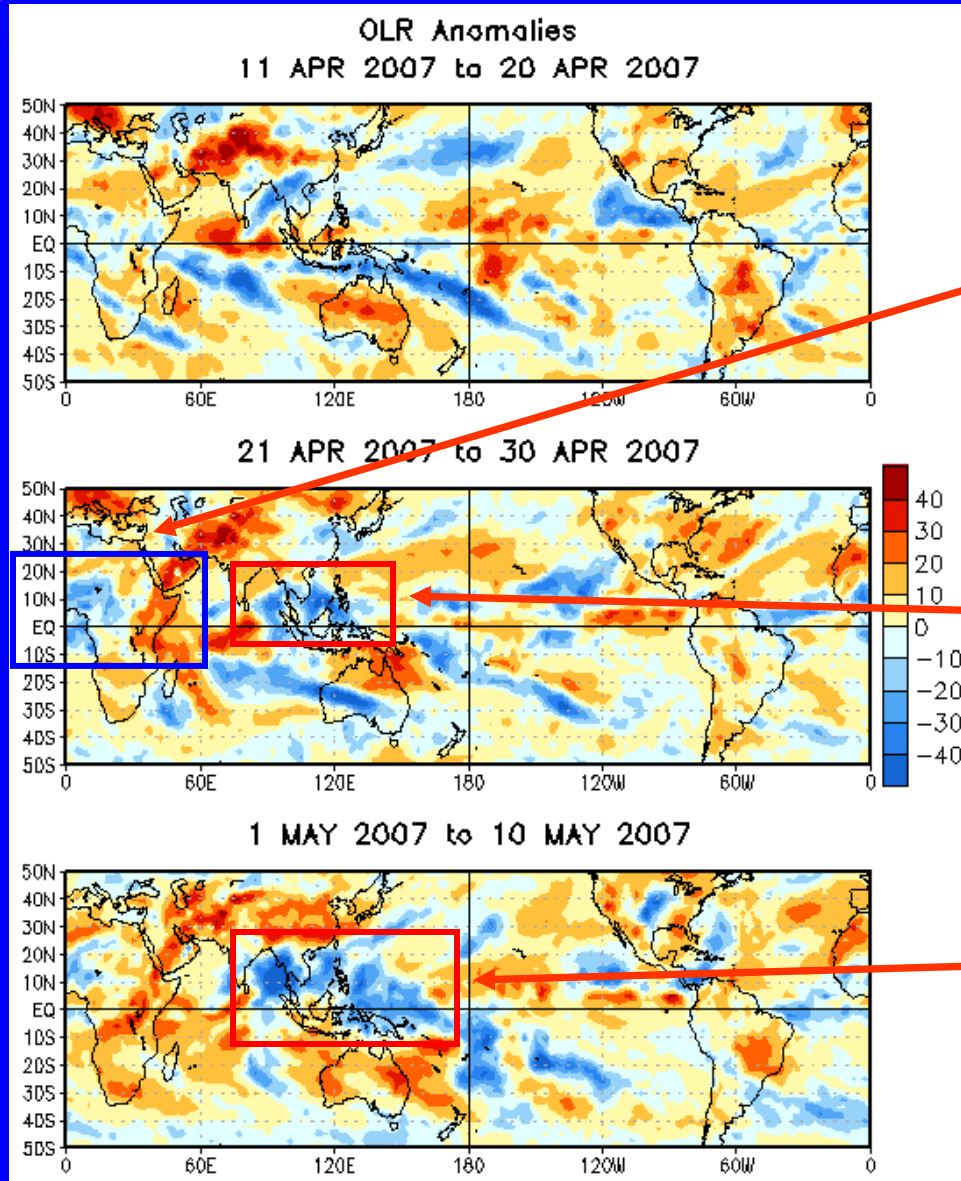
During the past week, enhanced convection is more clearly evident from 130°E to 170°E in the western Pacific.



# OLR Anomalies: Last 30 days

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

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



During the final part of April, the Gulf of Guinea region of Africa has seen wet conditions while dry conditions were seen across East Africa.

During late April, enhanced convection was first observed across the eastern Indian Ocean, the western Maritime continent, and sections of Southeast Asia.

In early May areas of enhanced convection have expanded to include sections of the western Pacific Ocean.

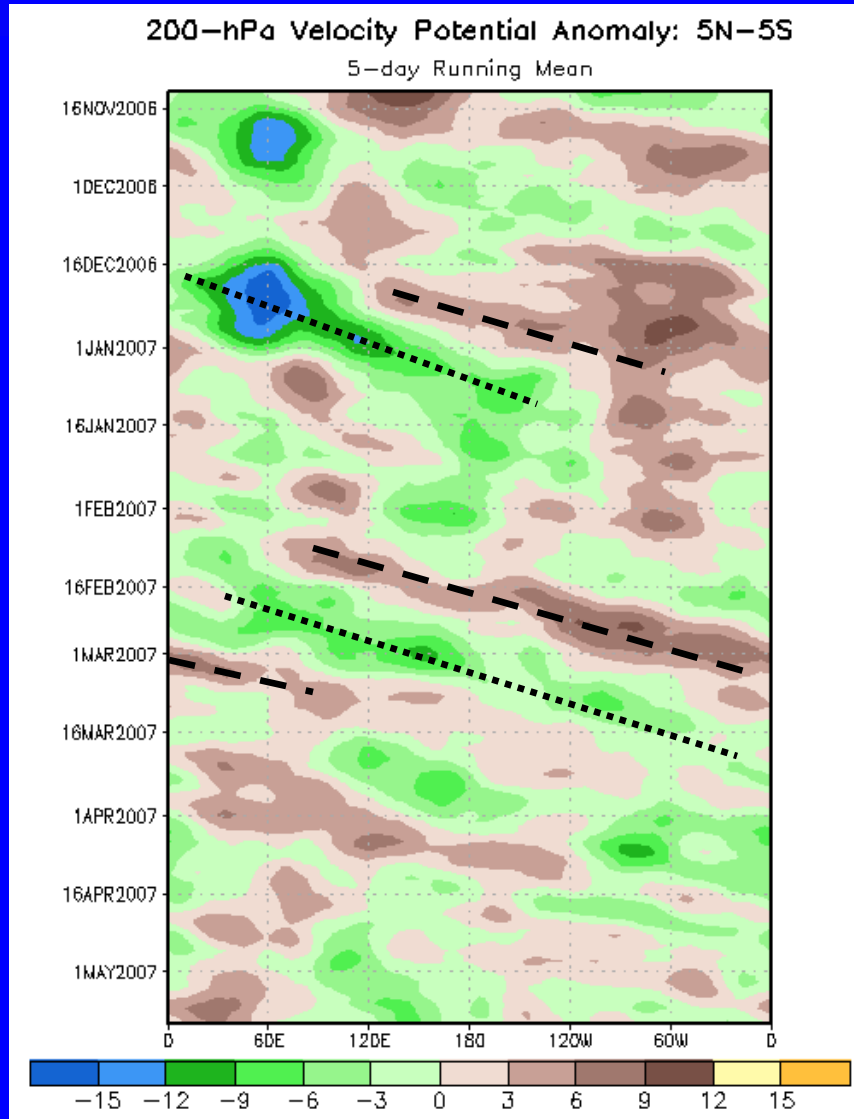


# 200-hPa Velocity Potential Anomalies (5°S-5°N)

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

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

Time



Longitude

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.

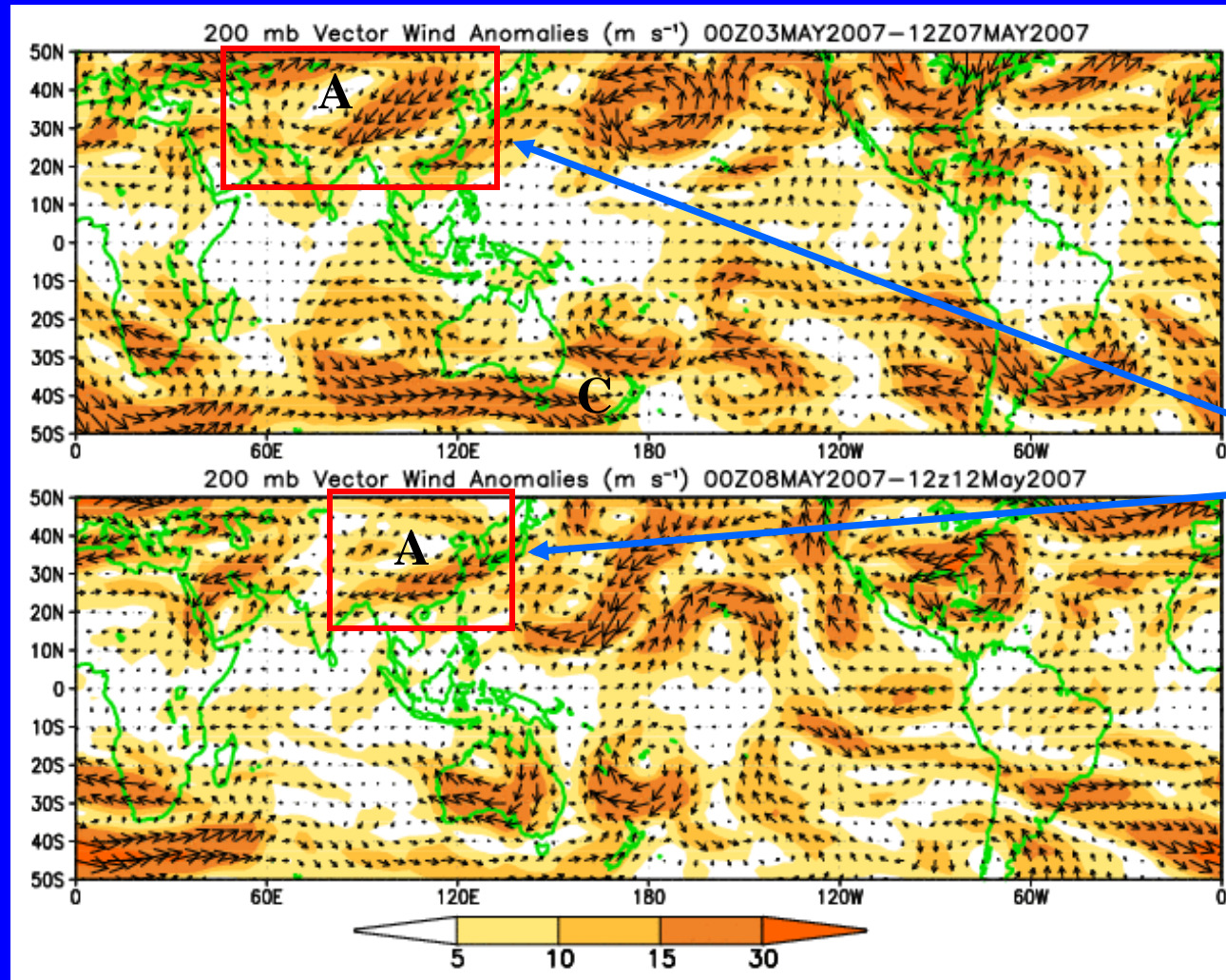
The MJO has been weak or incoherent since mid-March.





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

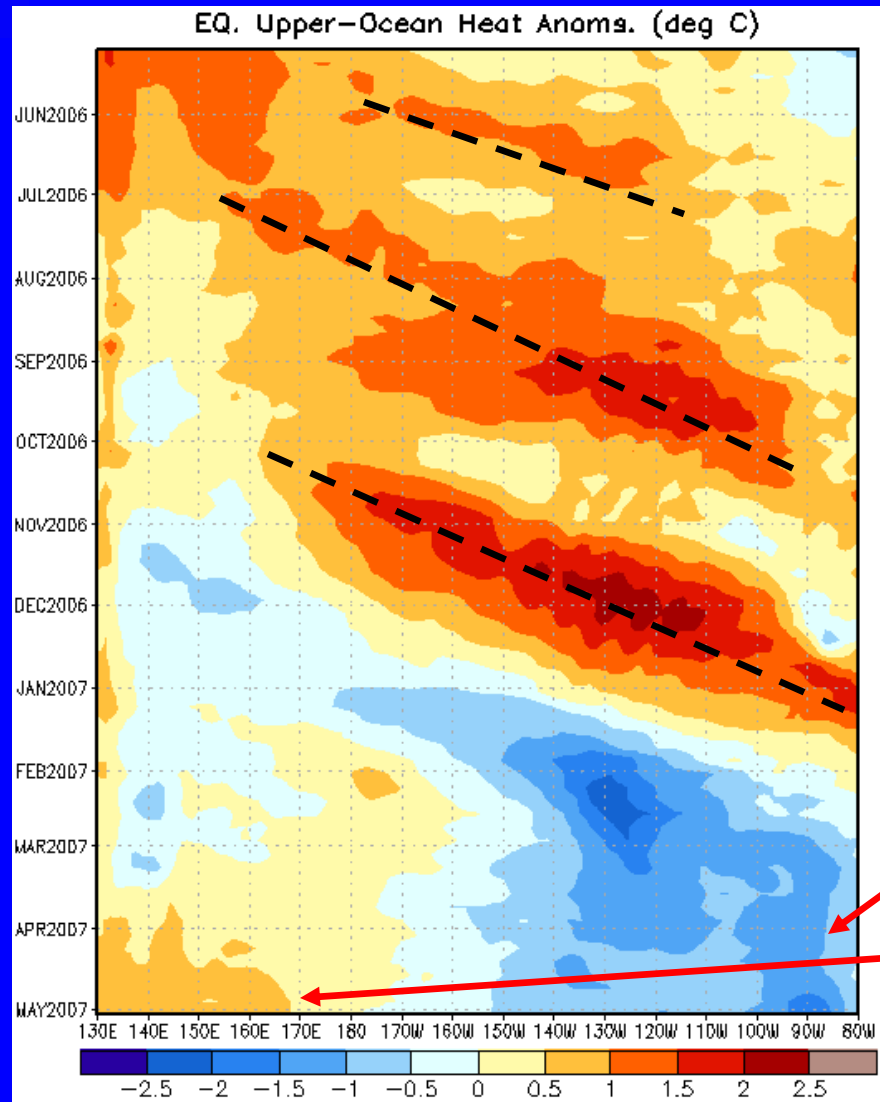
Note that shading denotes the magnitude of the anomalous wind vectors



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



# Weekly Heat Content Evolution in the Equatorial Pacific



Time



Longitude

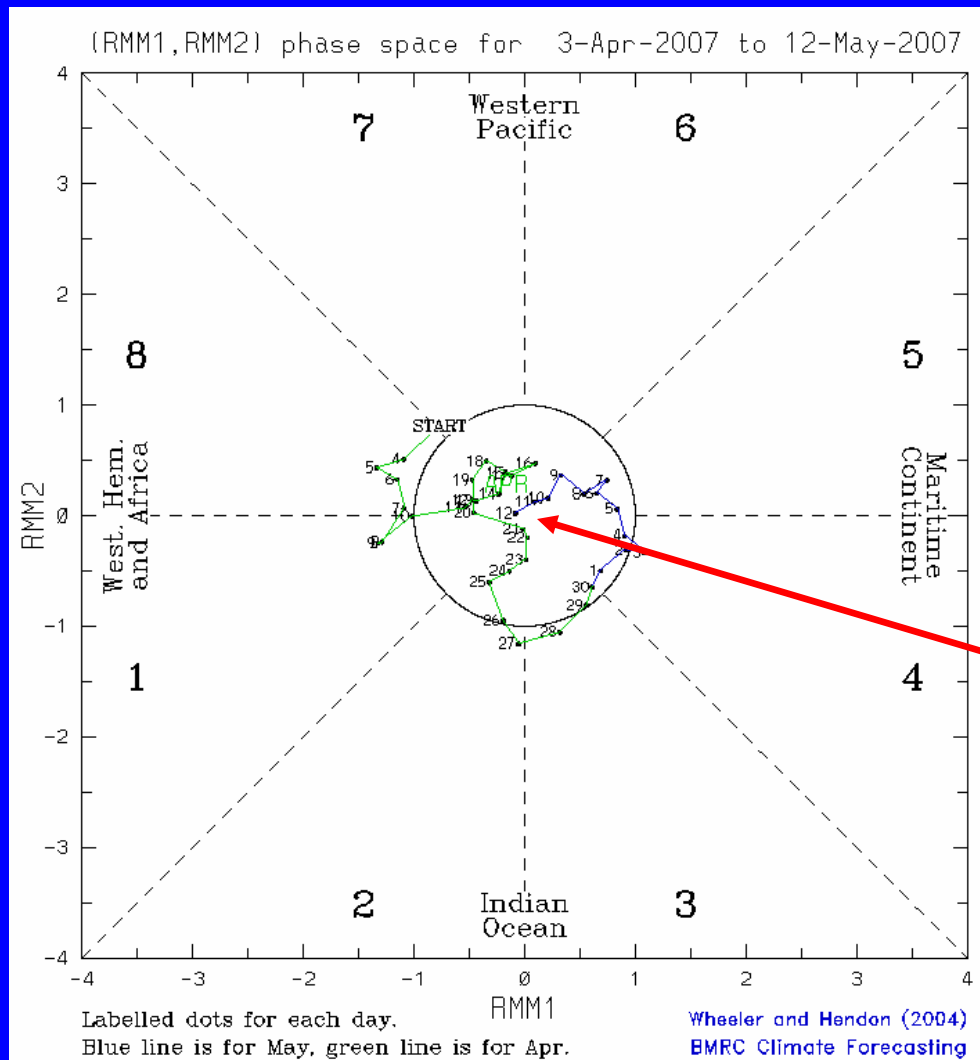
During this period eastward-propagating Kelvin waves (warm phases indicated by dashed lines) have caused considerable month-to-month variability in the upper-ocean heat content.

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).

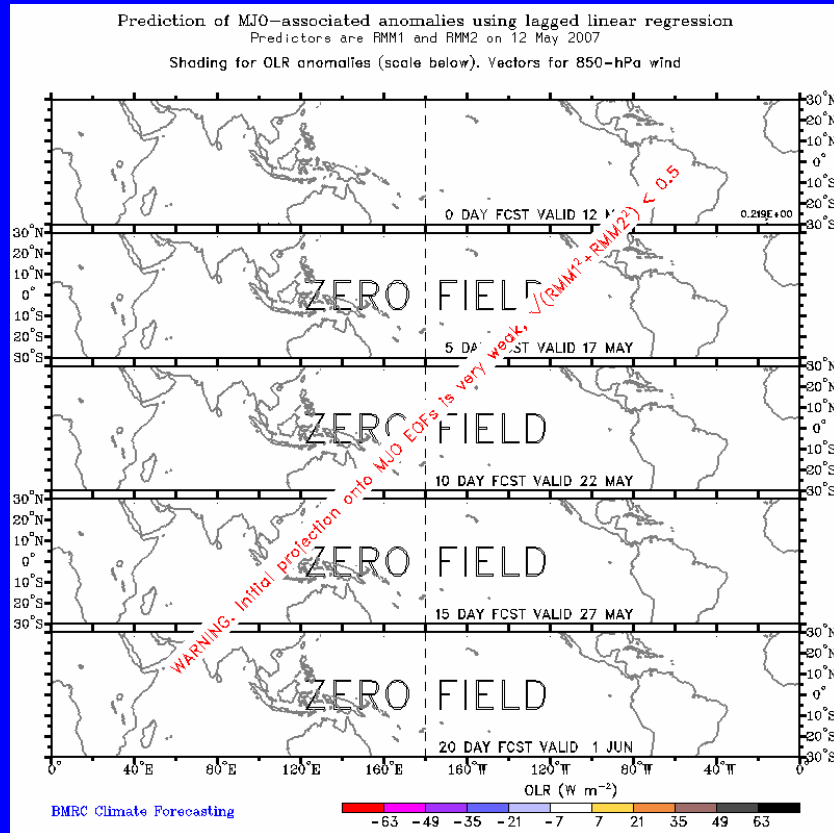
The axes represent the time series of the two leading modes of variability and are used to measure the amplitude while the triangular areas indicate the phase or location of the enhanced phase of the MJO. The farther away from the center of the circle the stronger the MJO. Different color lines indicate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

The MJO index indicates incoherent MJO activity.



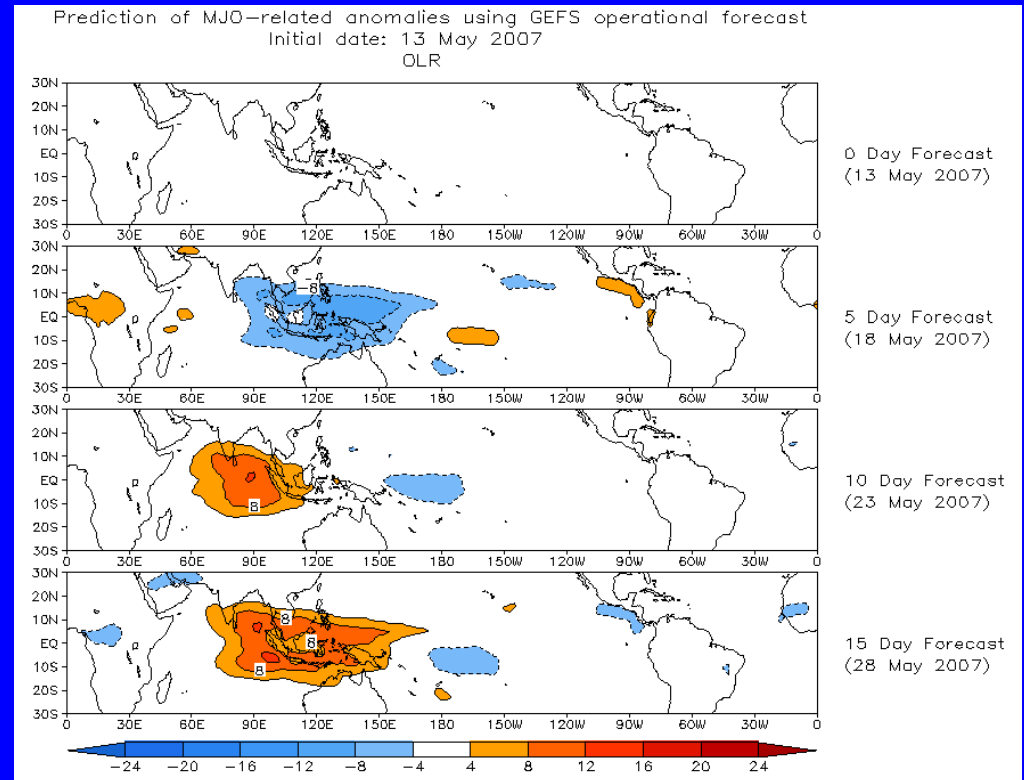
# MJO Forecasts

## Statistical



Weak MJO signal so no forecast can be made.

## GFS

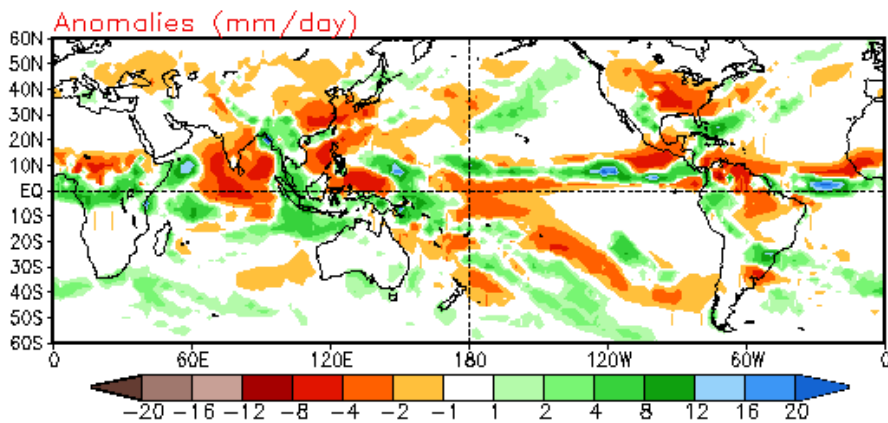
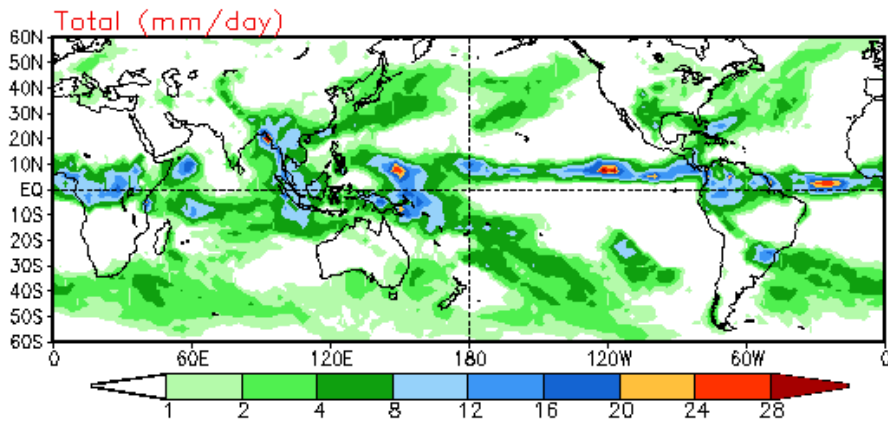


The GFS MJO associated anomalies indicate weak enhanced convection across the Maritime continent during week 1 with drier than average conditions by week 2.

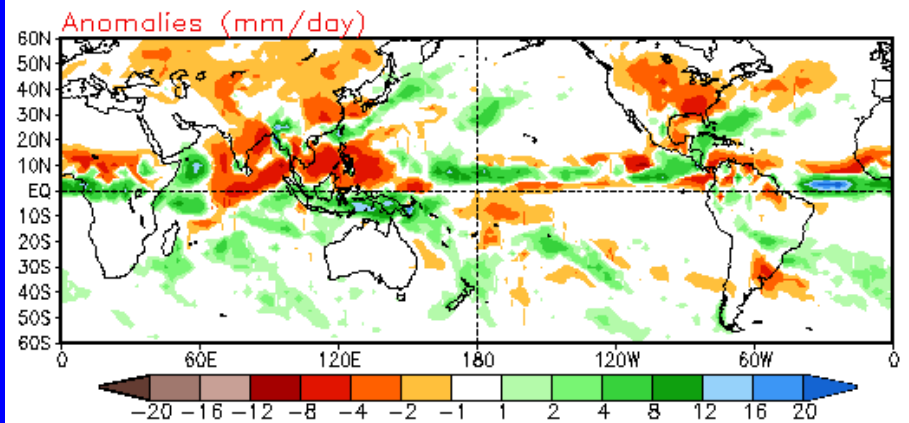
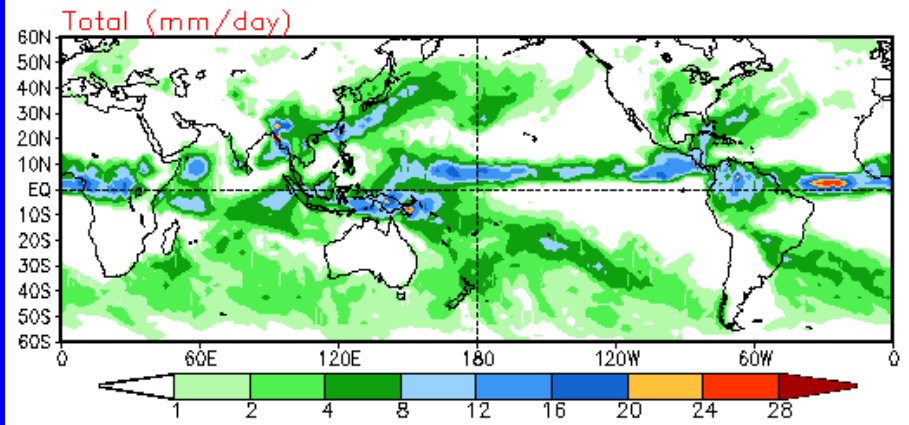


# Experimental Bias-Corrected GFS Precipitation

Week 1 Precipitation  
Forecast from 14May2007



Week 2 Precipitation  
Forecast from 14May2007





# 200–850 hPa Vertical Wind Shear

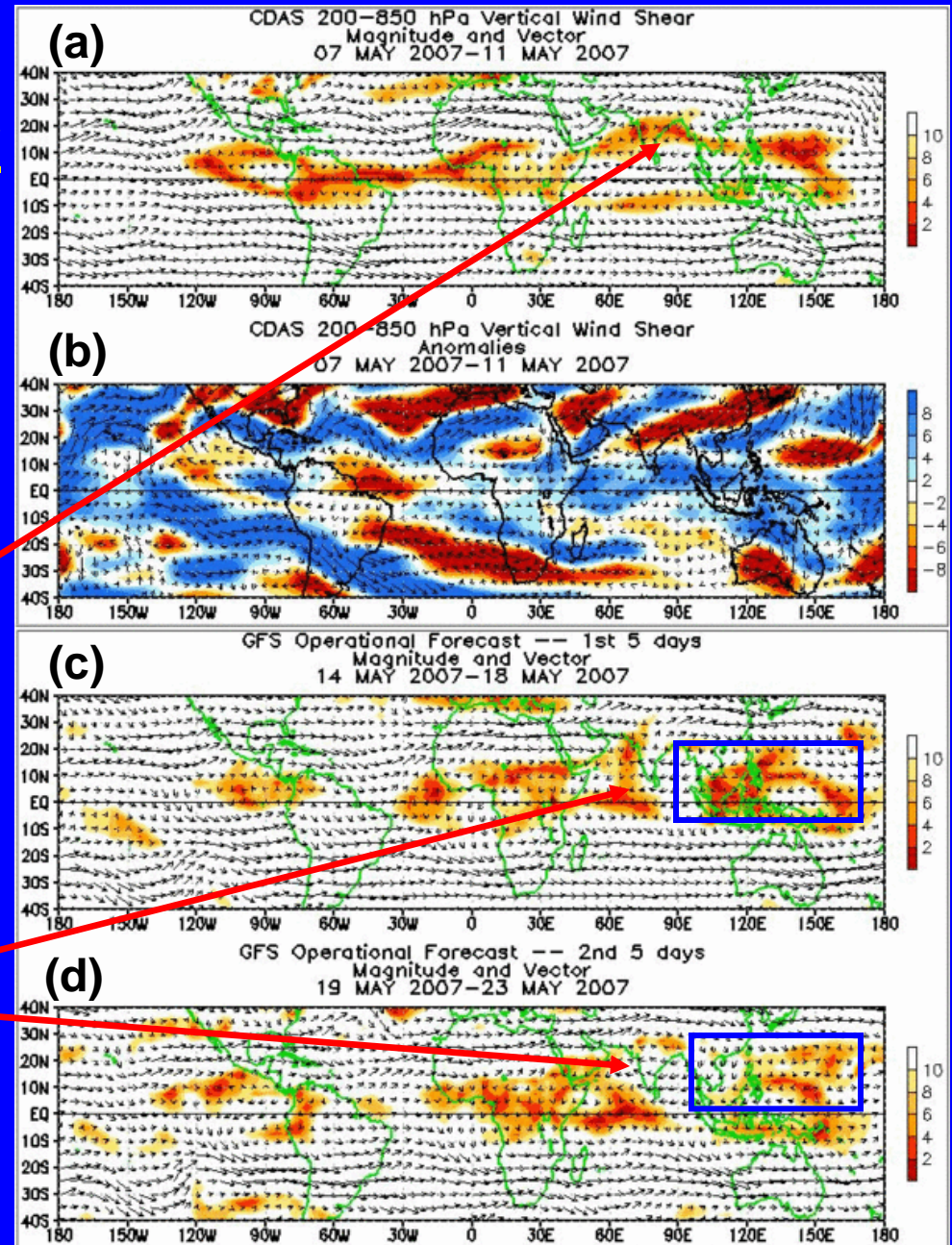
All plots: Shading denotes magnitude of vectors

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 in the central and northern Bay of Bengal during the last five days contributing to the development of a tropical cyclone in this area.

Areas of the western Pacific Ocean are expected to have low-moderate shear throughout the period. This area needs to be monitored as convection is expected to remain active in this region.





## **\*\*\*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](mailto:Jon.Gottschalck@noaa.gov)**