



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

**Update prepared by
Climate Prediction Center / NCEP
May 28, 2007**



Outline

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



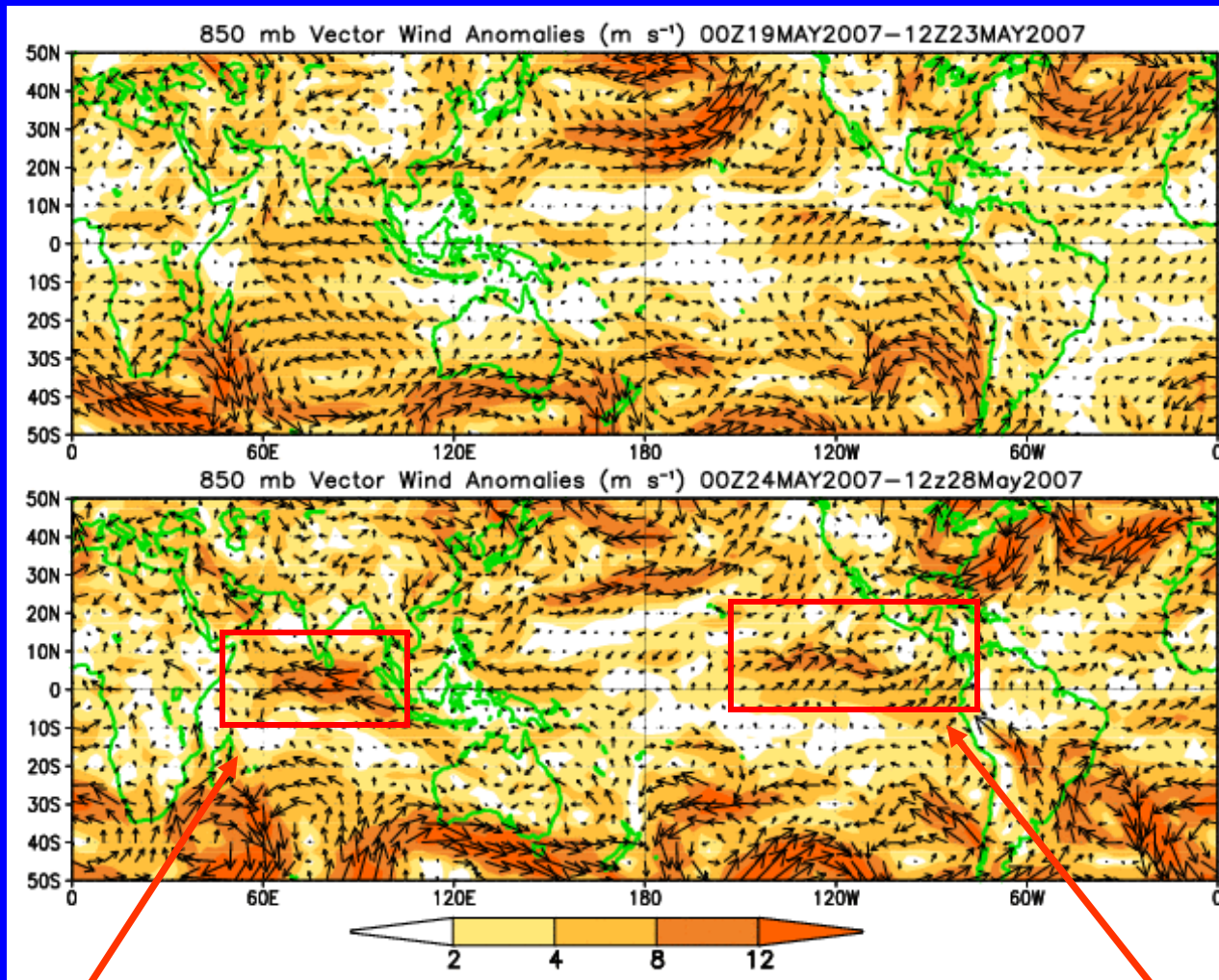
Overview

- **Some indicators show that the MJO has strengthened during the past week and a more well-established MJO may be developing.**
- **Enhanced convection has developed across sections of the Indian Ocean while weak suppressed conditions have shifted east into the western Pacific Ocean.**
- **Based on the latest monitoring and forecast tools, weak to moderate MJO activity is expected during the upcoming 1-2 week period.**



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

Note that shading denotes the magnitude of the anomalous wind vectors



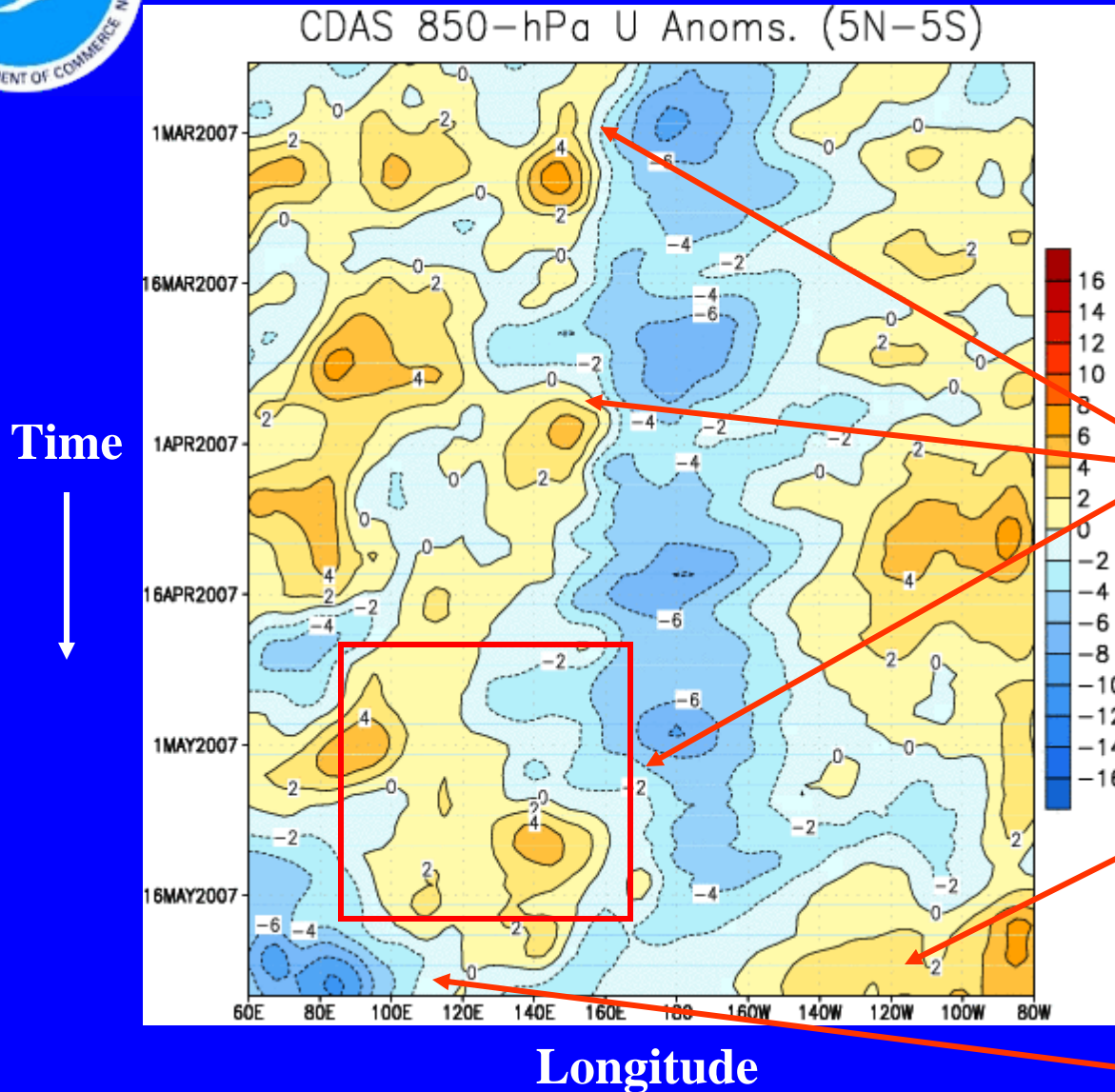
Easterly anomalies have increased in the equatorial Indian Ocean.

West-southwesterly anomalies are evident across the east Pacific Ocean.



850-hPa Zonal Wind Anomalies (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.

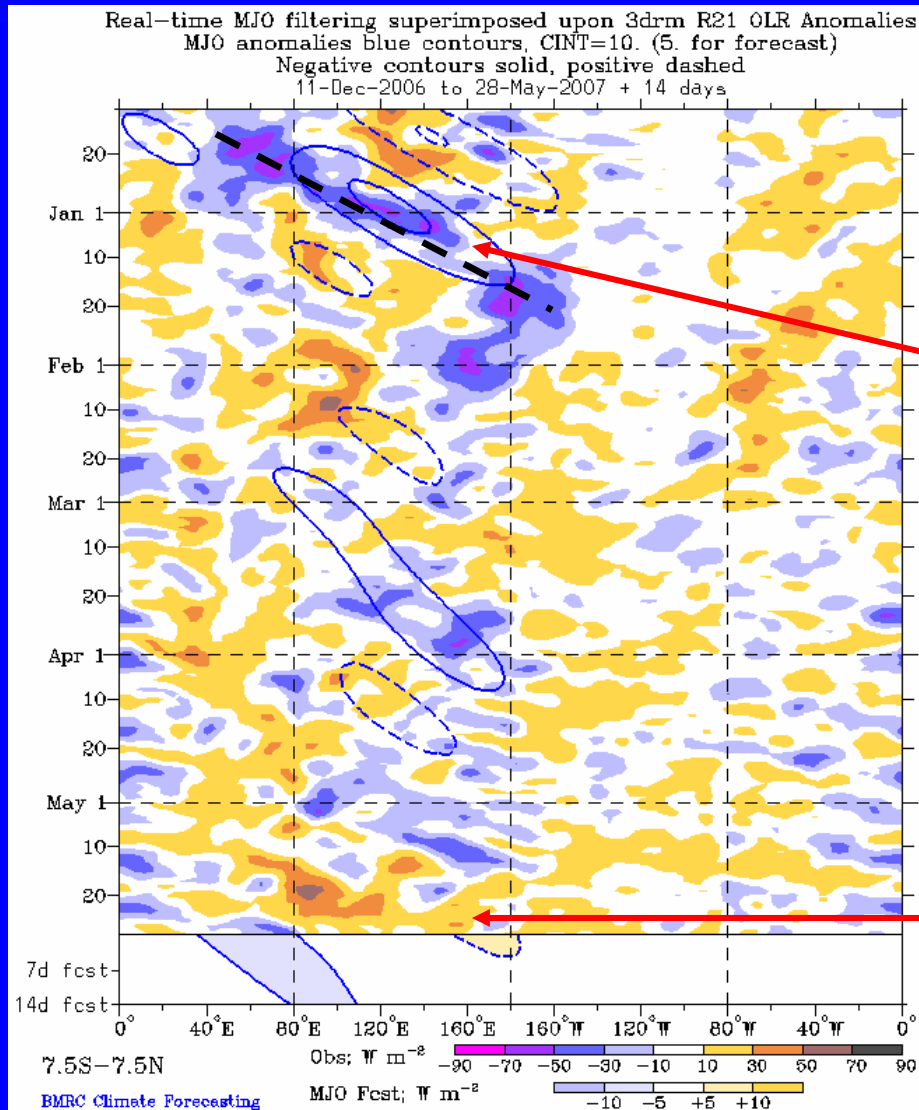
On three occasions during the past few months, there has been an extension of easterly anomalies to the west followed by the development of westerly anomalies across Indonesia into the far western Pacific Ocean. This pattern was observed in late February, March and April.

Westerly anomalies have strengthened in the eastern Pacific Ocean similar to early April.

The largest easterly anomalies of the last few months are now evident in the Indian Ocean.



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



Drier-than-normal conditions, positive OLR anomalies (yellow/orange shading)

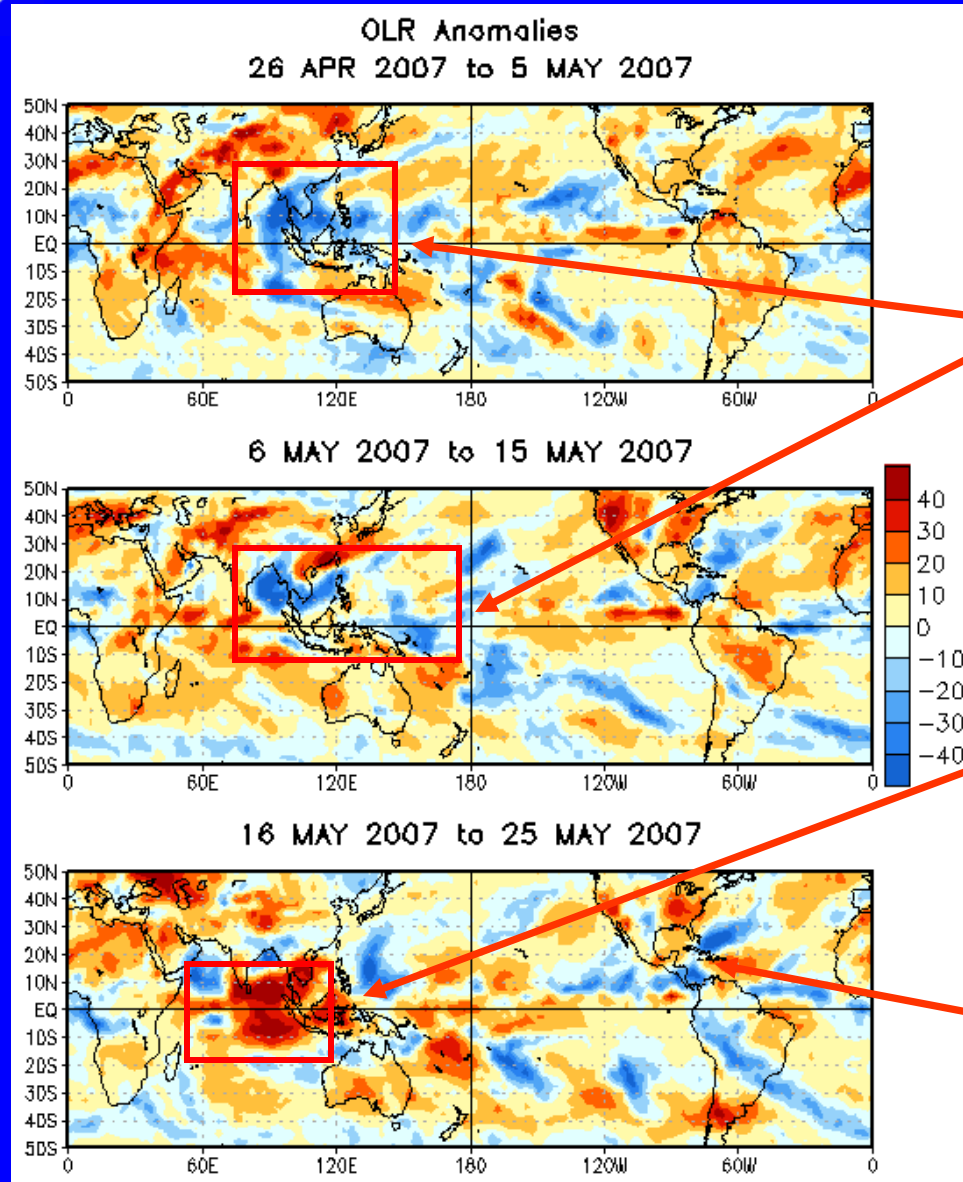
Wetter-than-normal conditions, negative OLR anomalies (blue shading)

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 has rapidly developed in the western Indian Ocean while suppressed conditions have shifted eastward into the 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)

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 sections of the western Pacific Ocean.

Dry conditions were evident across the Indian Ocean during the mid-late May.

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

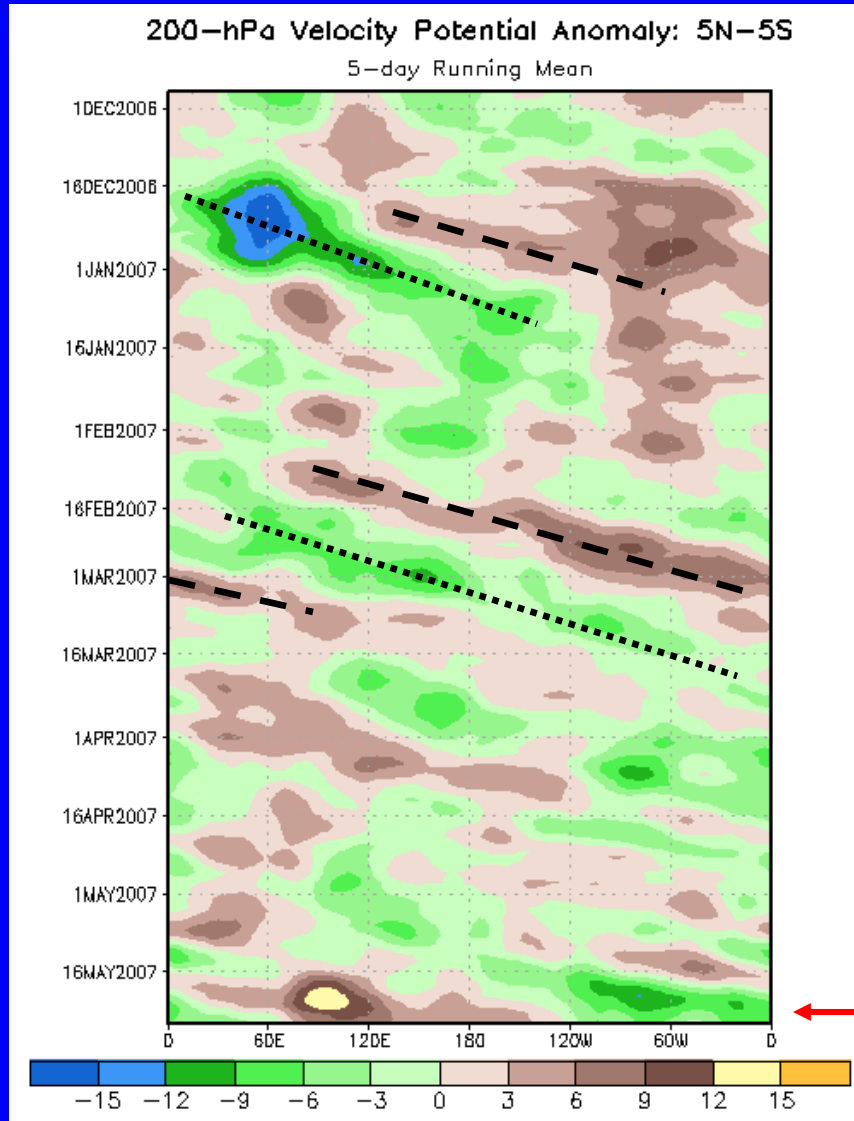


200-hPa Velocity Potential Anomalies (5°S-5°N)

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.

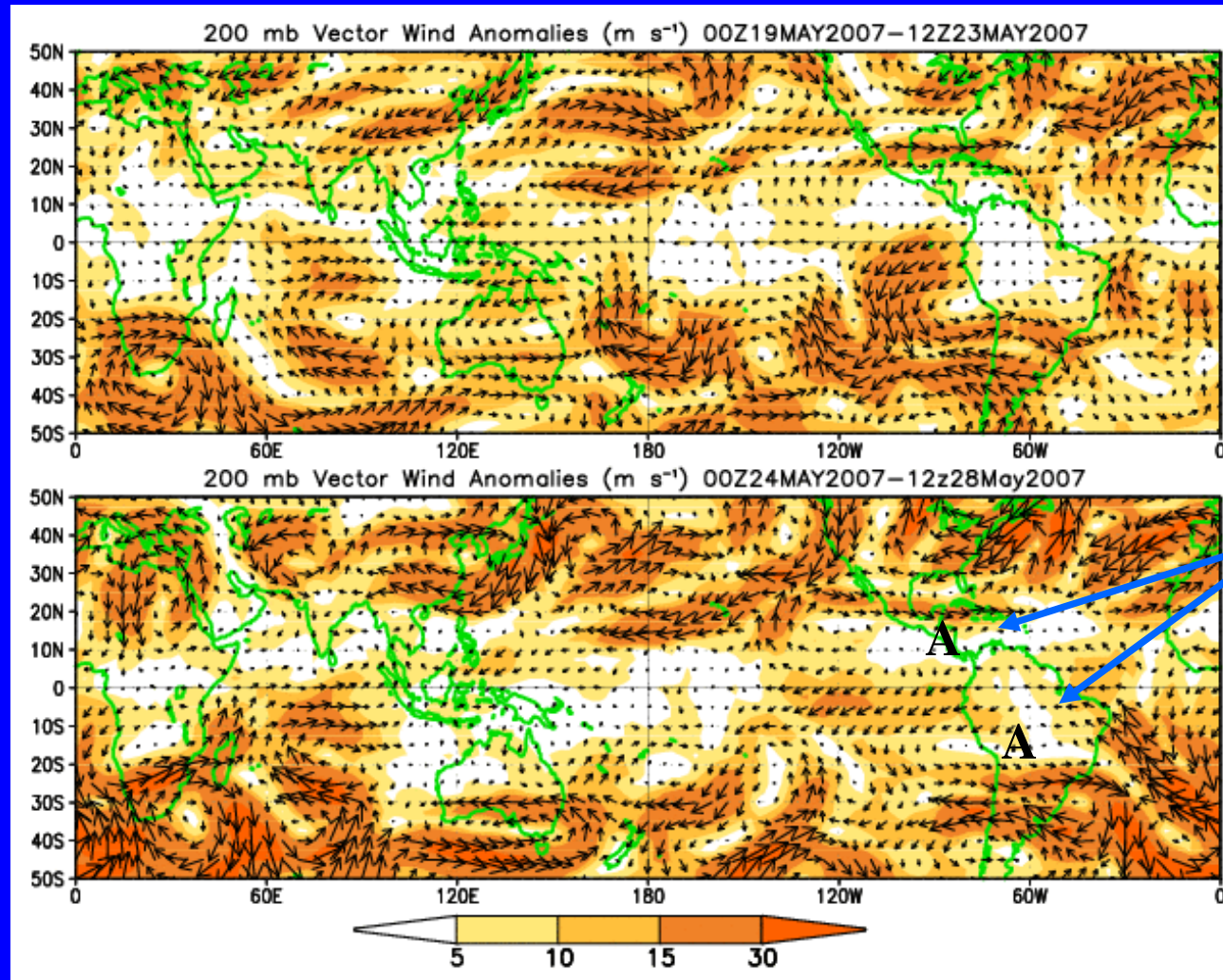
The MJO has been weak or incoherent since mid-March but recently the MJO has showed signs of strengthening as velocity potential anomalies have increased and shifted eastward.

Longitude



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

Note that shading denotes the magnitude of the anomalous wind vectors

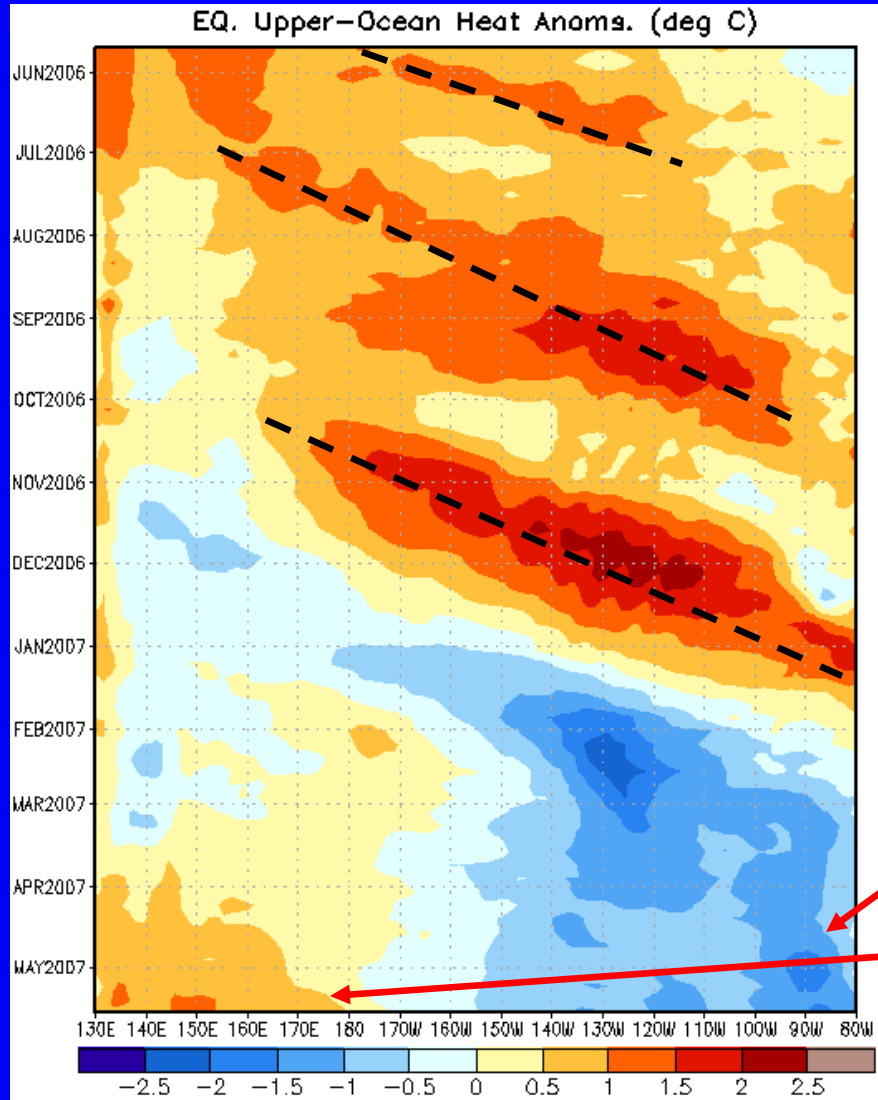


Anomalous anti-cyclonic circulations across the western hemisphere north and south of the equator during the last five days in part due to enhanced convection.



Weekly Heat Content Evolution in the Equatorial Pacific

Time



Longitude

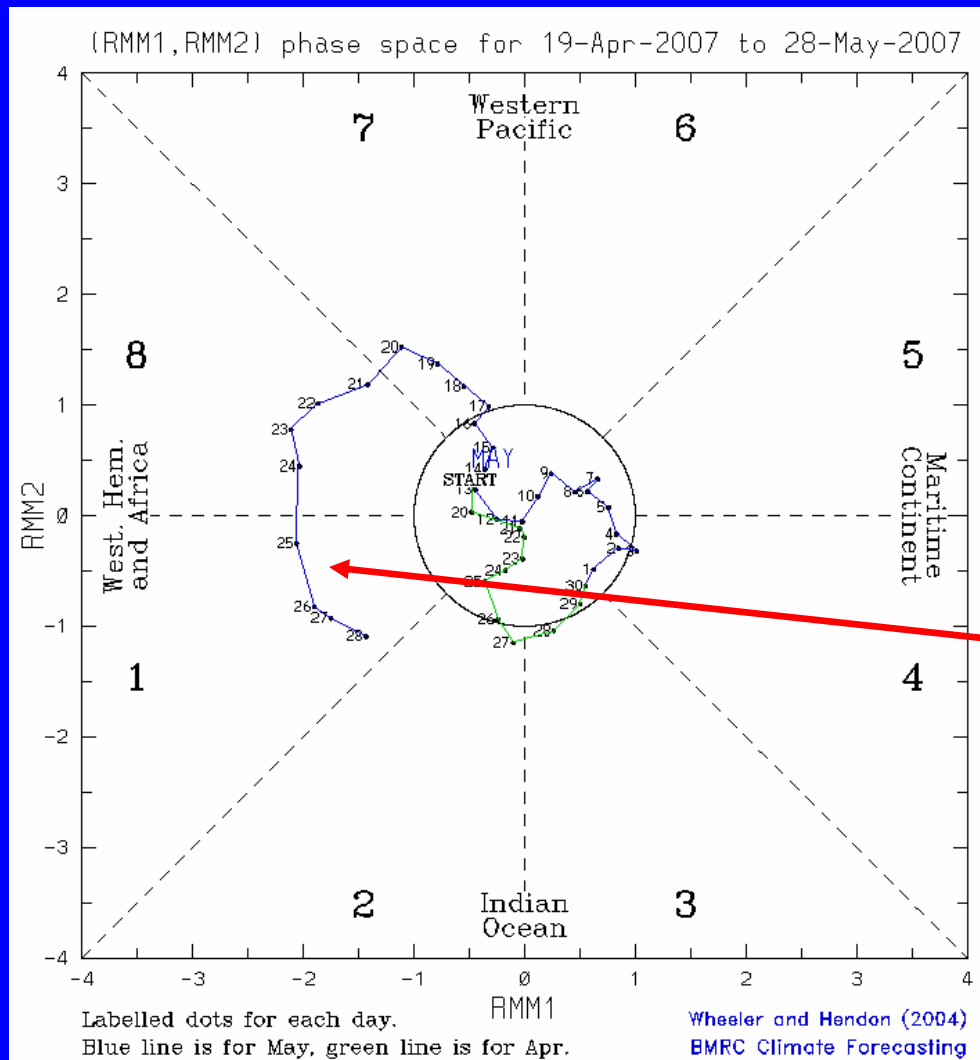
During this period eastward-propagating Kelvin waves (warm phases indicated by dashed lines) have caused considerable month-to-month variability in the upper-ocean heat content.

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

Since late March, 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).

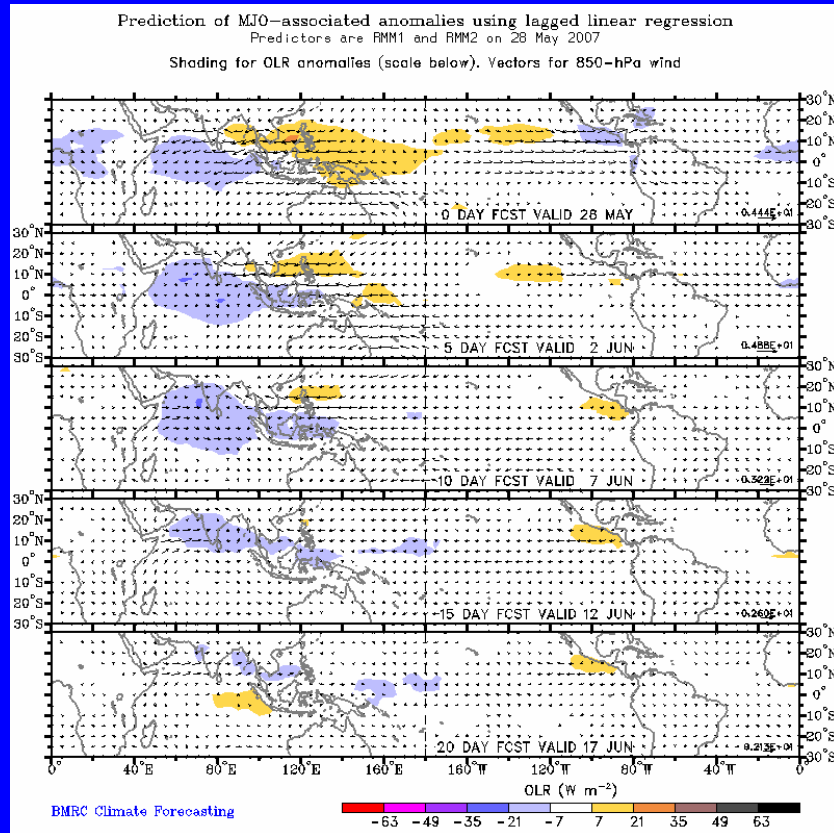
The axes represent the time series of the two leading modes of variability and are used to measure the amplitude while the triangular areas indicate the phase or location of the enhanced phase of the MJO. The farther away from the center of the circle the stronger the MJO. Different color lines indicate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

The MJO index has increased in amplitude and shows eastward propagation indicating that the MJO has strengthened.



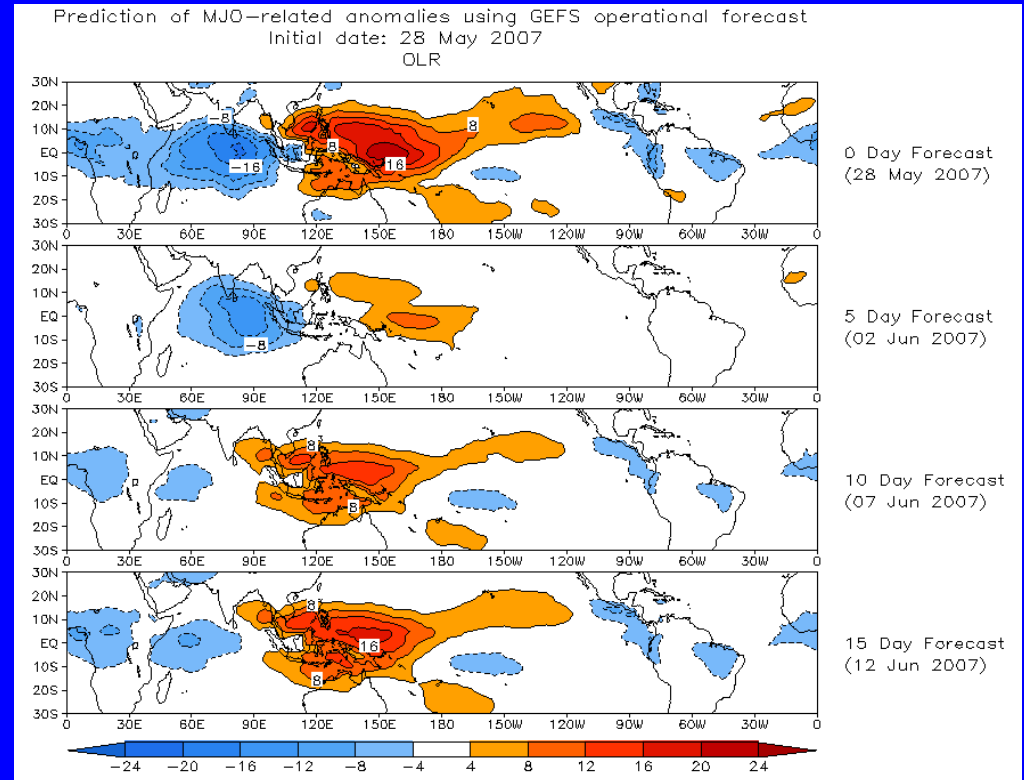
MJO Forecasts

Statistical



The forecast indicates enhanced convection across sections of the Indian Ocean throughout much of the period.

GFS

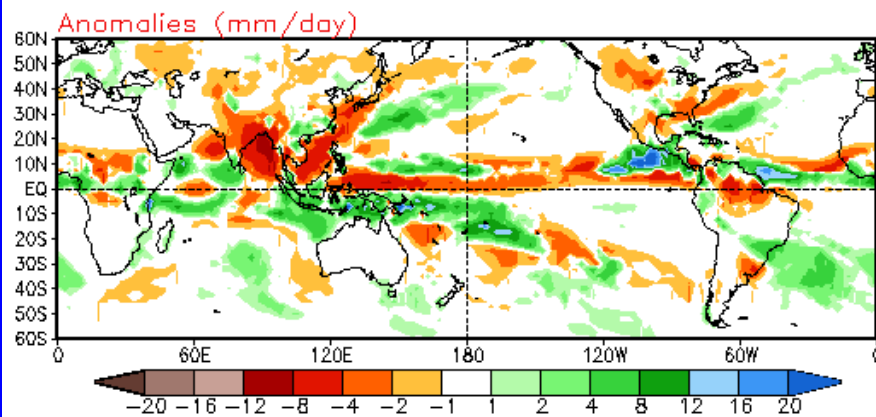
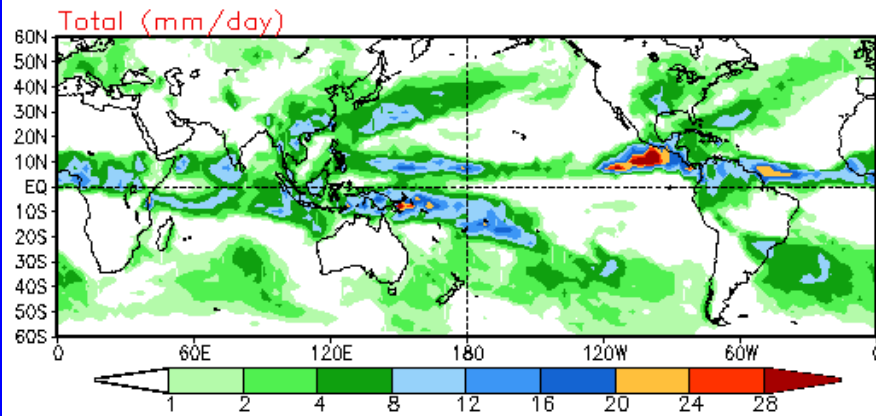


The GFS MJO associated anomalies indicate enhanced convection across the Indian Ocean during week 1.

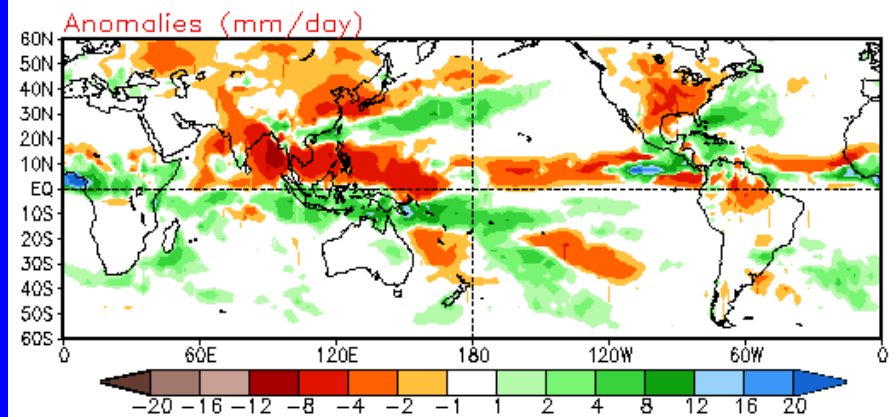
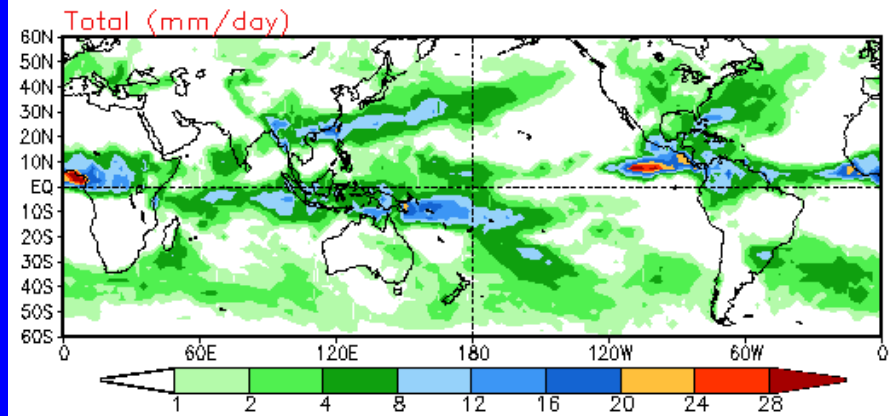


Experimental Bias-Corrected GFS Precipitation

Week 1 Precipitation
Forecast from 28May2007



Week 2 Precipitation
Forecast from 28May2007





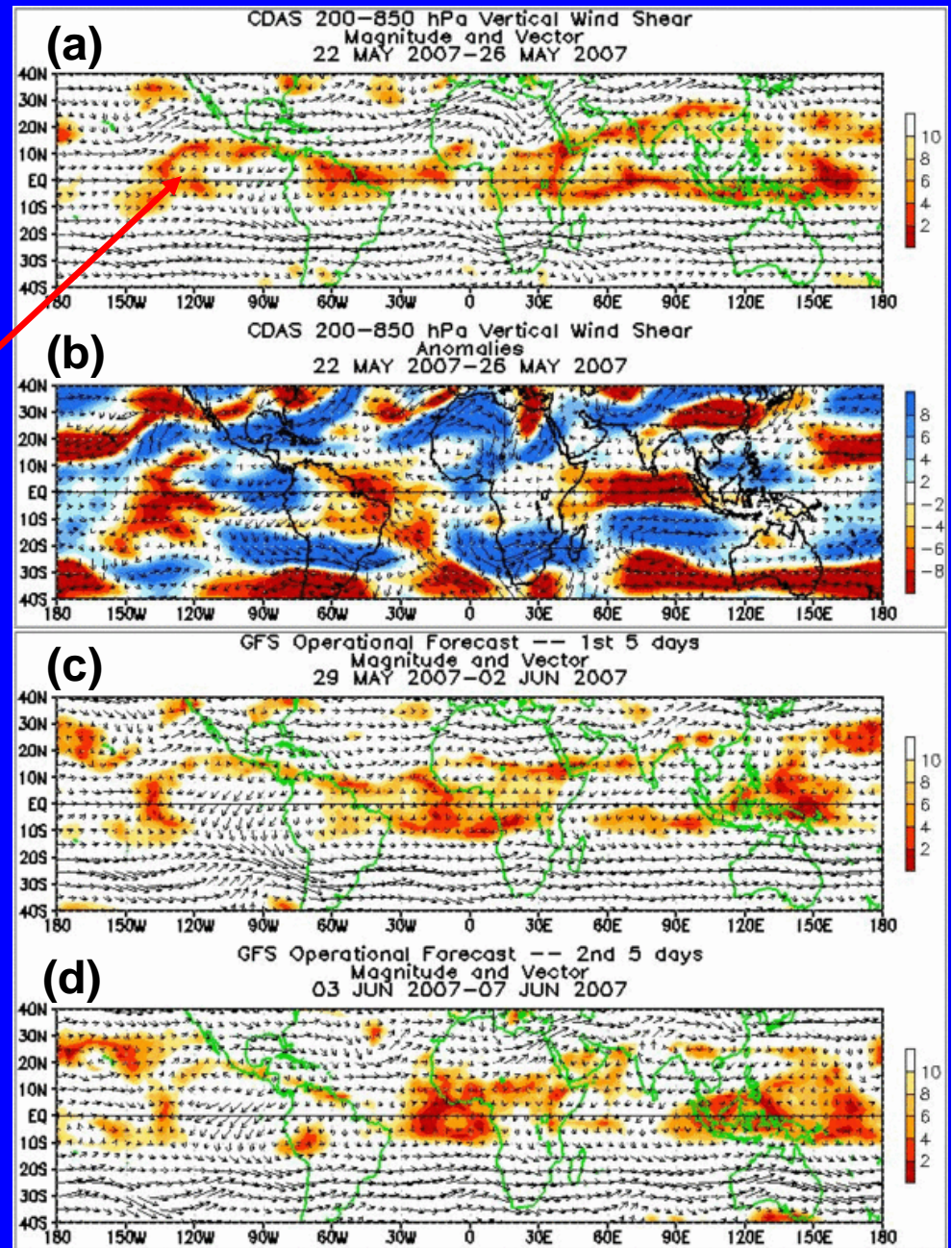
200–850 hPa Vertical Wind Shear

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 eastern Pacific Ocean during the last five days aiding in the development of a tropical storm 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

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