



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

**Update prepared by  
Climate Prediction Center / NCEP  
June 11, 2007**



# Outline

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



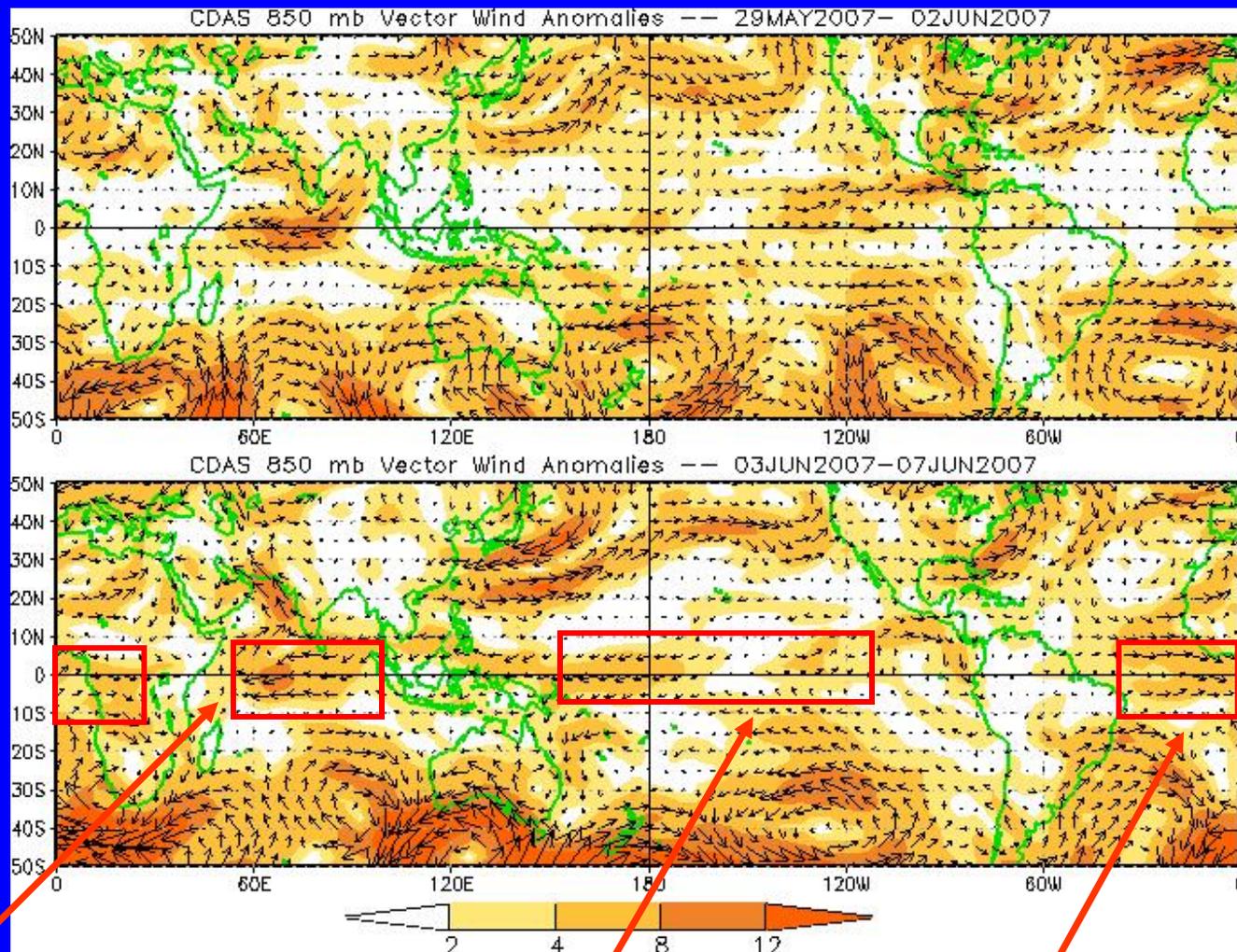
# Overview

- **The MJO remains weak.**
- **Convection remained active across sections of equatorial Africa and the Arabian Sea during the past week. Also, in recent days areas of enhanced convection have increased across the eastern Indian Ocean.**
- **Based on the latest monitoring and forecast tools, weak MJO activity is expected 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



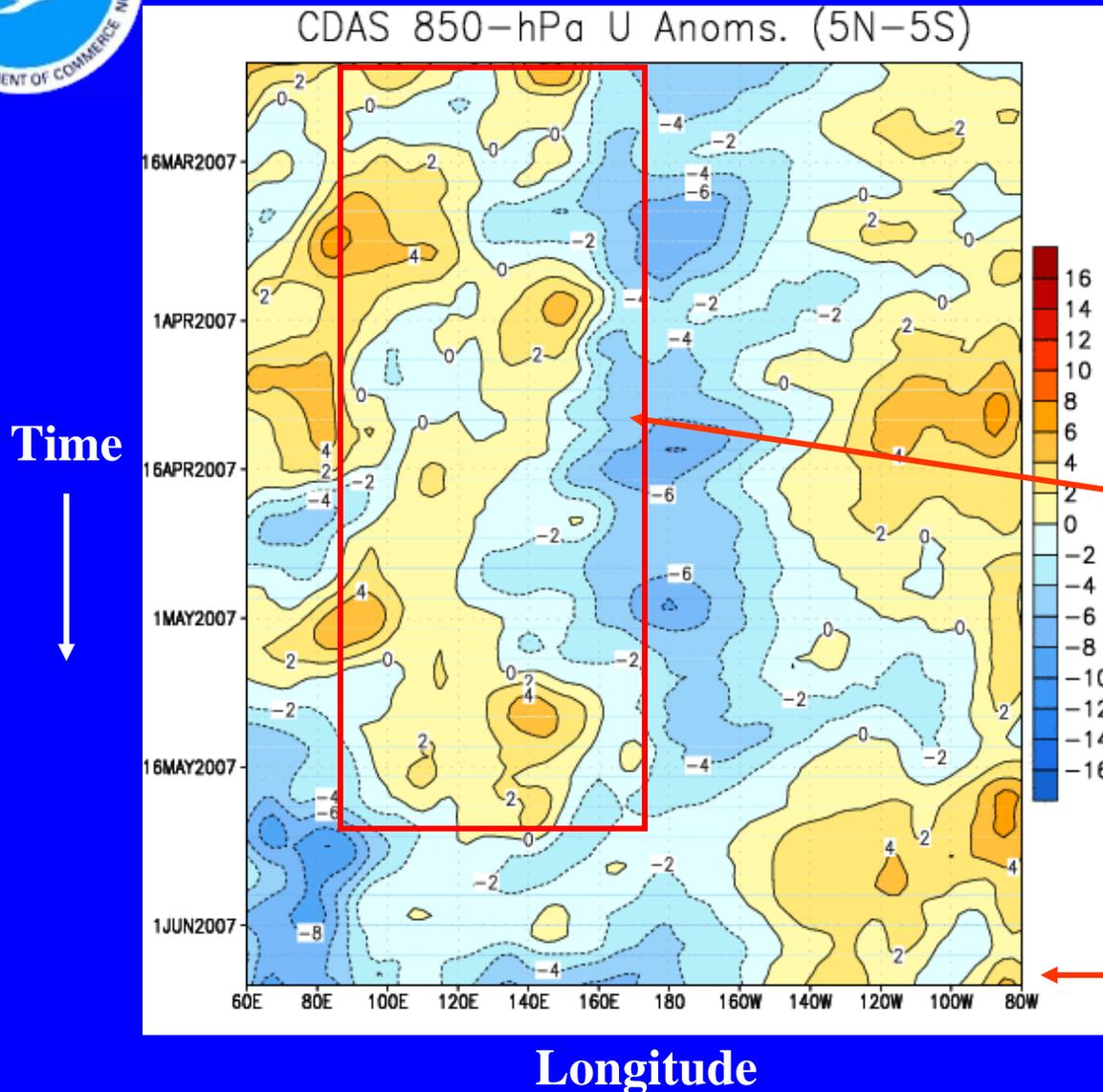
Easterly anomalies remain in the central equatorial Indian Ocean.

Easterly (westerly) anomalies remain evident in the west-central (eastern) Pacific Ocean near the equator.

Westerly anomalies increased across the tropical Atlantic and western Africa.



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



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

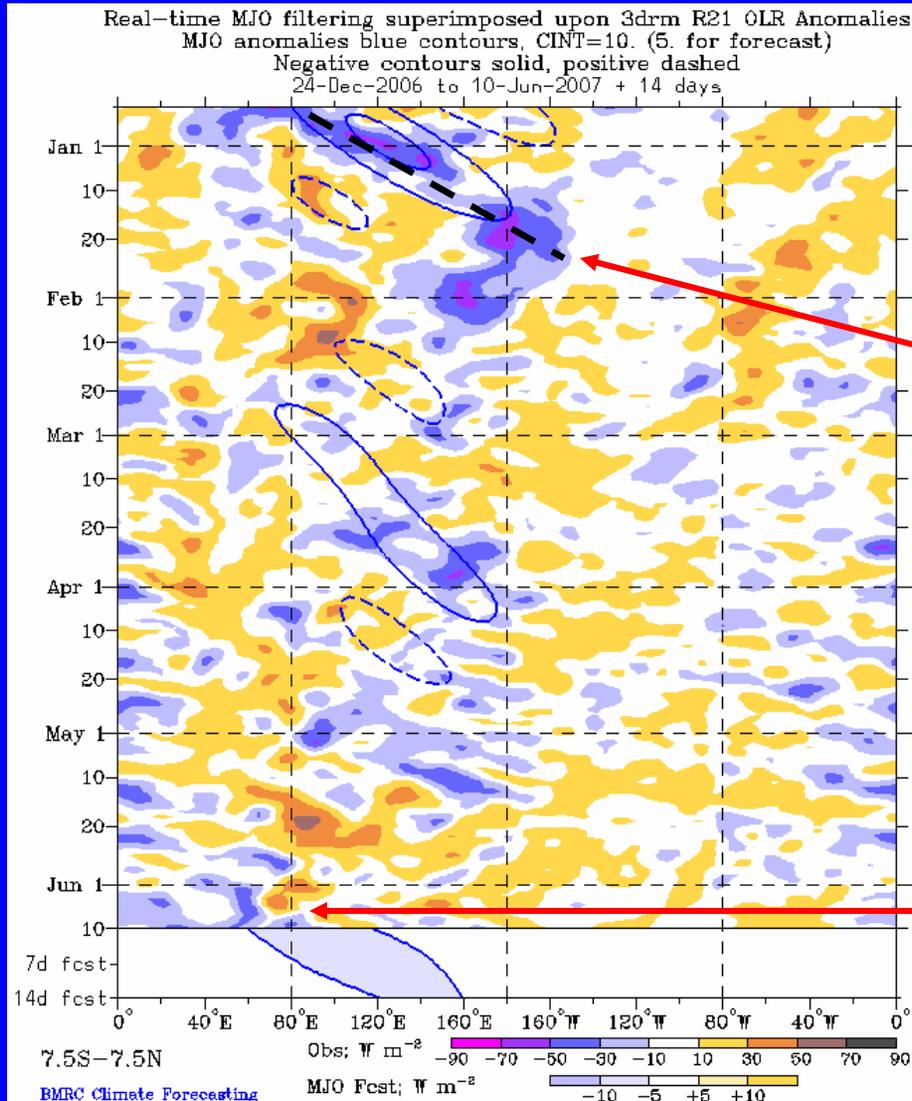
Easterly anomalies (blue shading) represent anomalous east-to-west flow.

During late March, April, and early-mid May, an extension of easterly anomalies to the west followed by the development of westerly anomalies across Indonesia into the far western Pacific Ocean has occurred.

Westerly anomalies remain evident in the eastern Pacific Ocean. Easterly anomalies increased in the western Pacific during the past week.



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



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

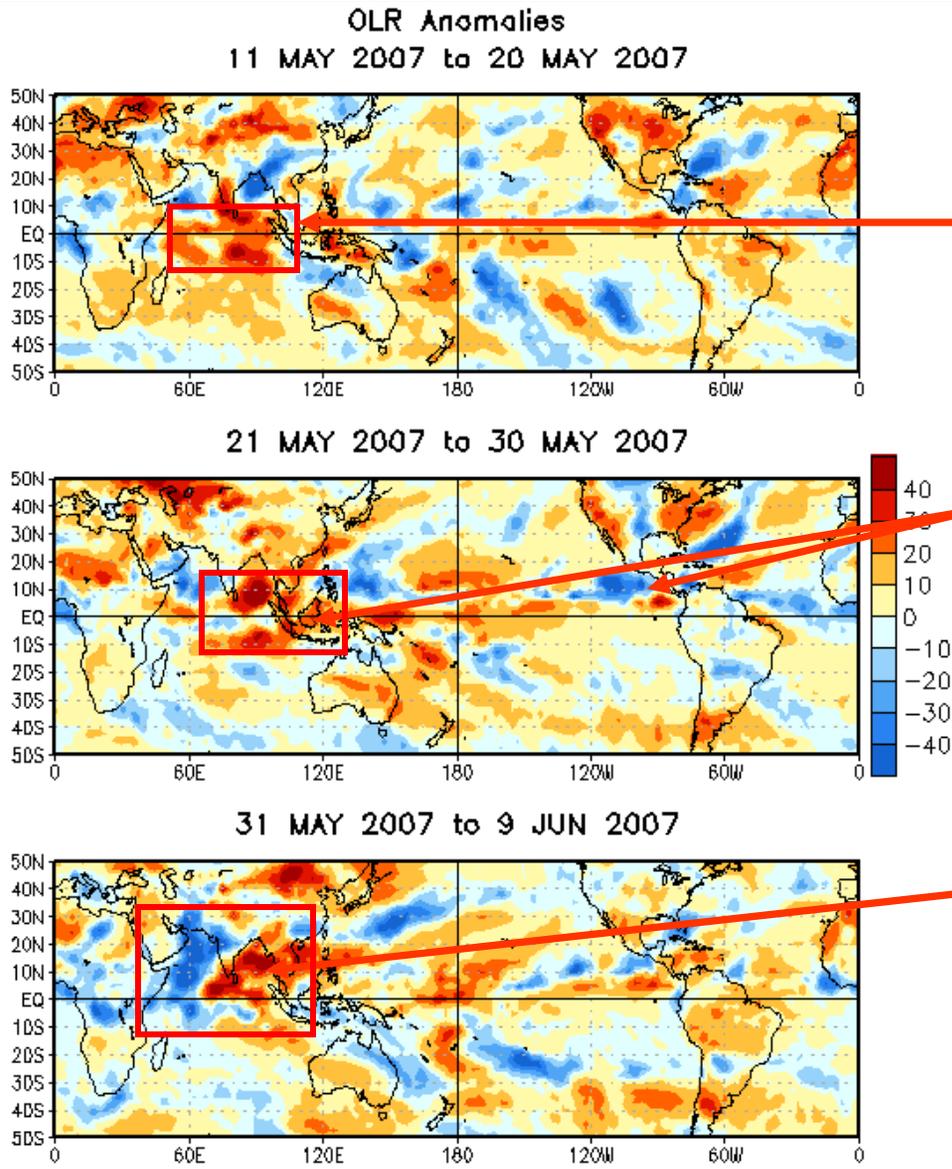
**Wetter-than-normal conditions, negative OLR anomalies (blue shading)**

**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 been evident across Africa and the western Indian Ocean. Over the last few days, this area has expanded to include sections of the eastern Indian Ocean.**



# OLR Anomalies: Last 30 days



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

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

In mid May, dry conditions were observed across the Indian Ocean.

During late May, enhanced rainfall occurred across the eastern Pacific Ocean, Caribbean Sea, the West Indies, and off of the southeast US coast. The dry conditions in the eastern Indian Ocean propagated northward into the Bay of Bengal.

During early June, dry conditions were evident across the central Indian Ocean, Bay of Bengal, southeast Asia, South China Sea, and the Philippines while the Arabian Sea and sections of Africa have been quite wet.

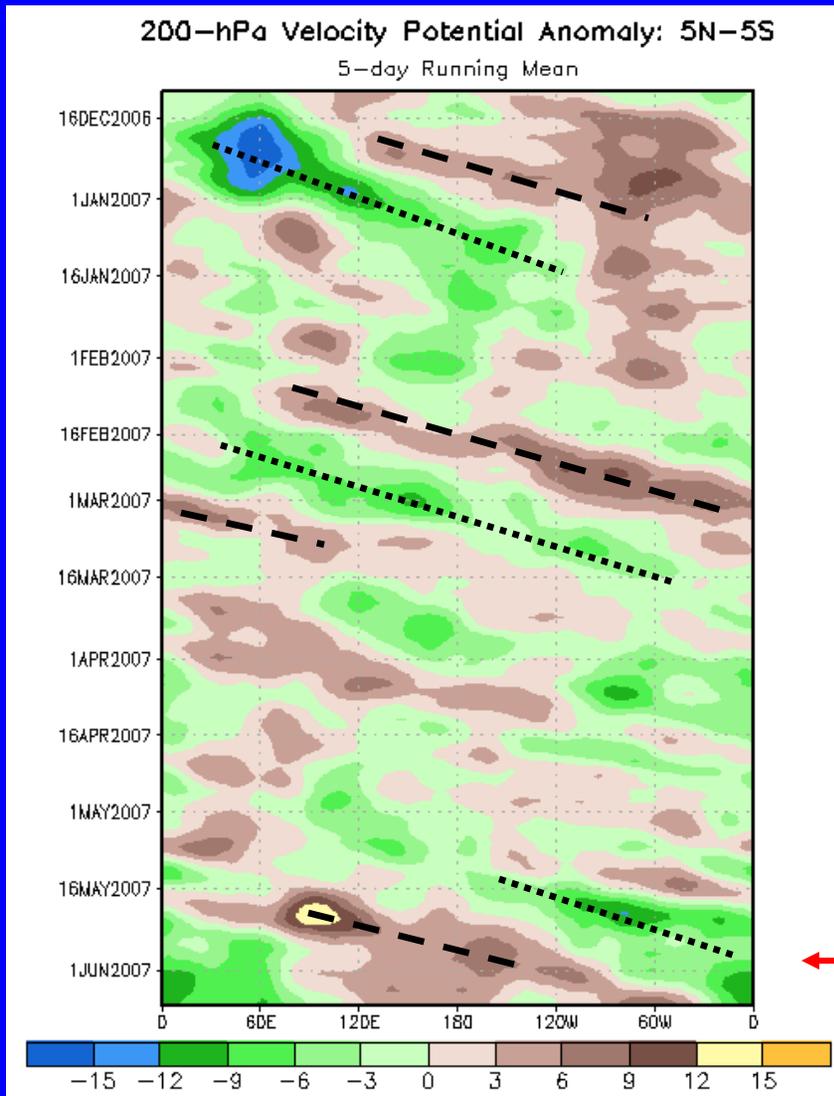


# 200-hPa Velocity Potential Anomalies (5°S-5°N)

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

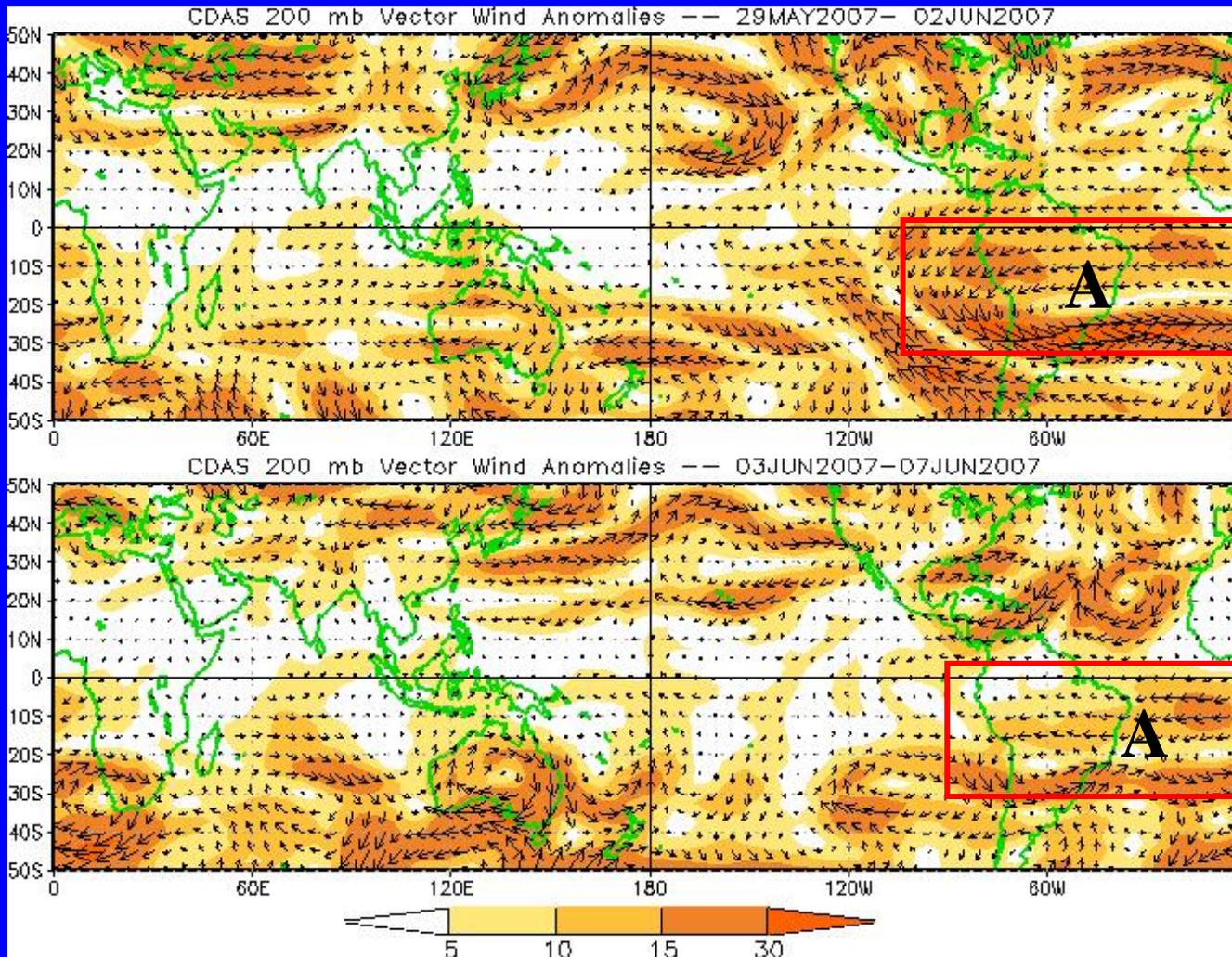
The MJO strengthened in late May as velocity potential anomalies increased and shifted eastward. Most recently, the pattern has become more stationary.

Longitude



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

Note that shading denotes the magnitude of the anomalous wind vectors

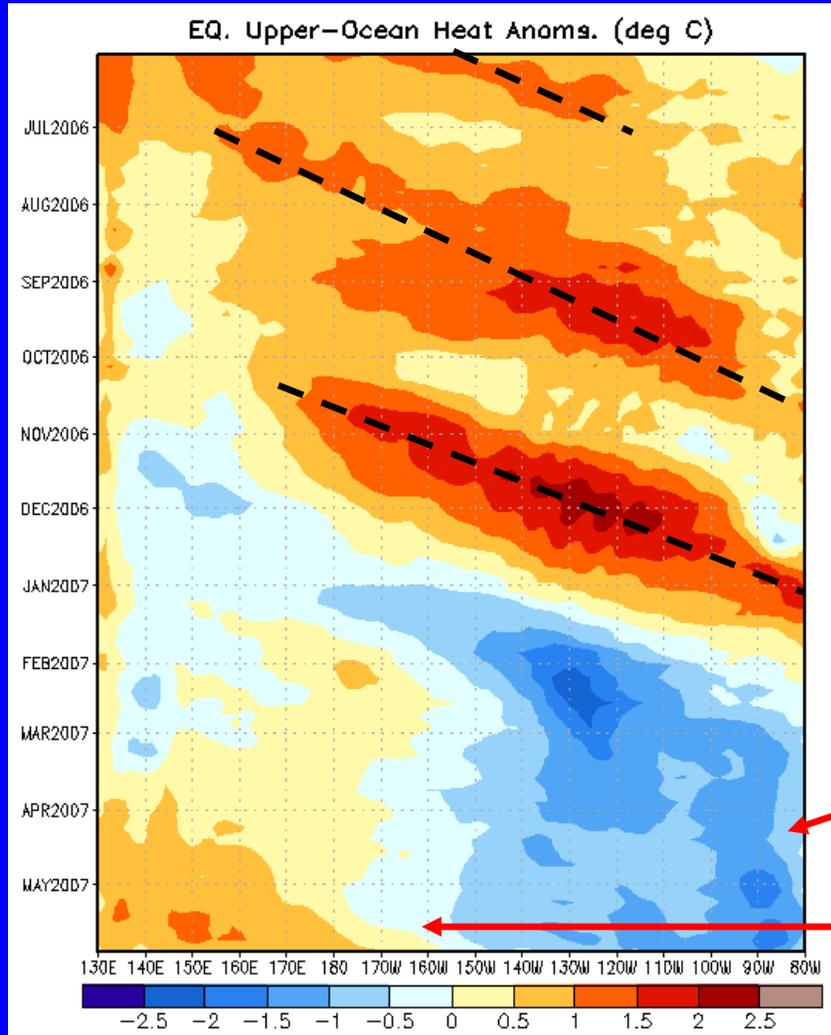


Anomalous anticyclonic circulation south of the equator has weakened and shifted slightly eastward during the last five days.



# 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, larger positive anomalies are evident in the far western Pacific Ocean and a slight eastward expansion is evident during the past few weeks.

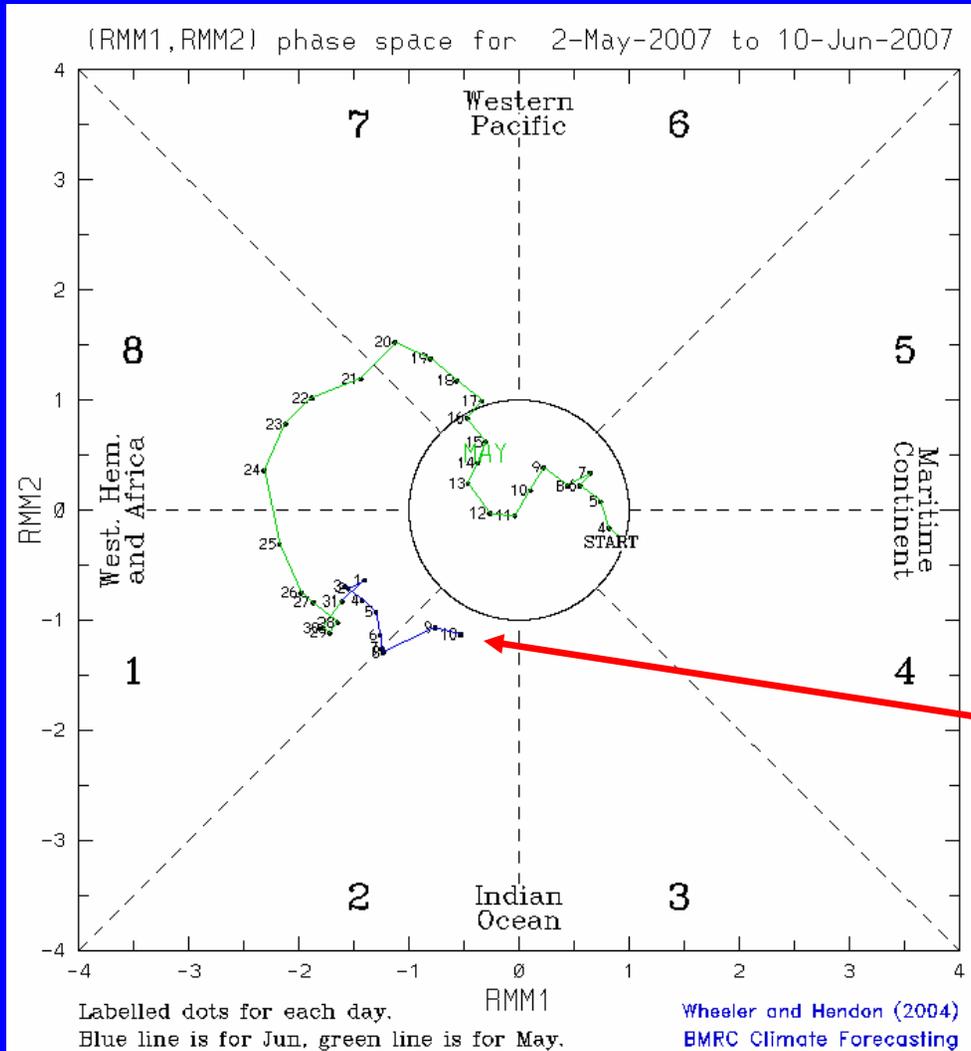


# MJO Index

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).

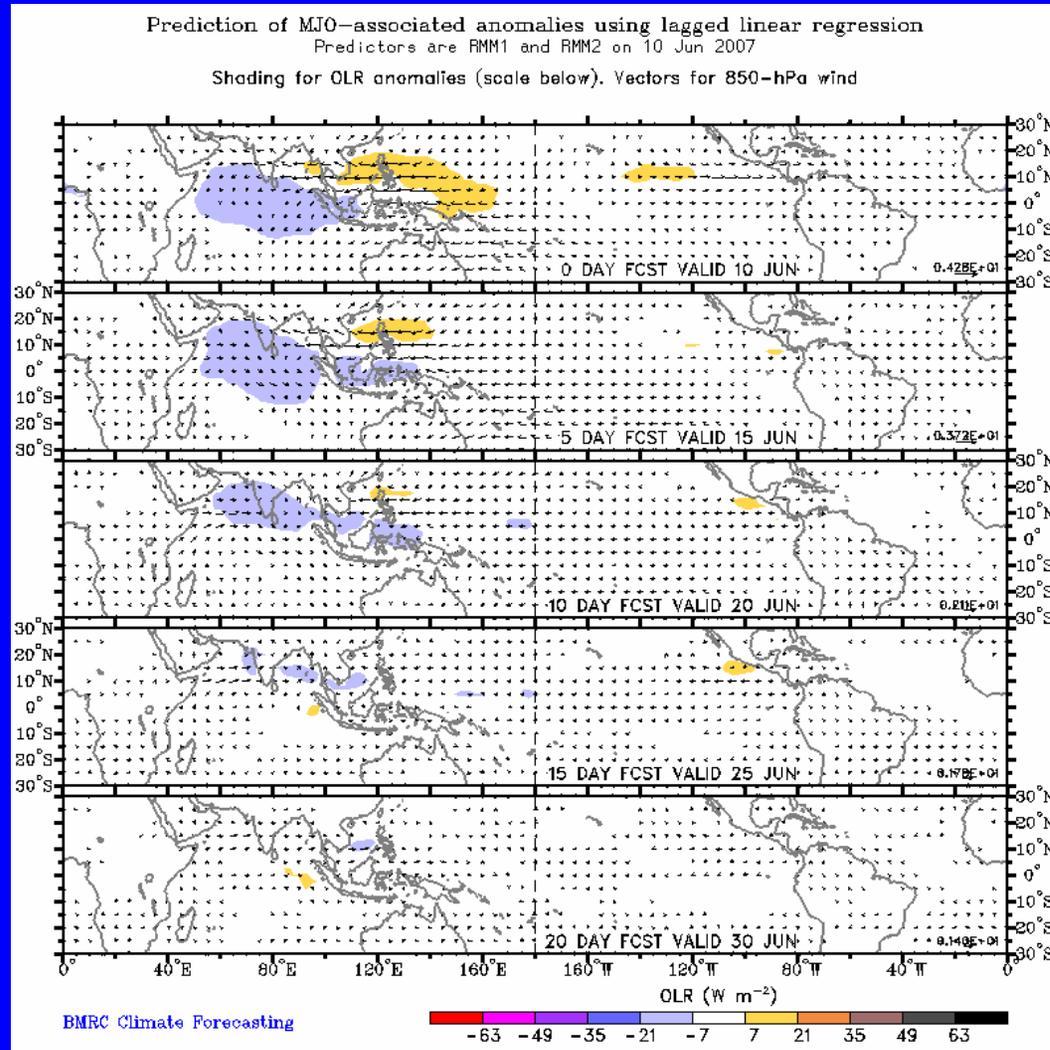
The axes represent the time series of the two leading modes of variability and are used to measure the amplitude while the triangular areas indicate the phase or location of the enhanced phase of the MJO. The farther away from the center of the circle the stronger the MJO. Different color lines indicate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

The MJO index indicates slow eastward propagation with a weaker amplitude during the past few days.





# MJO OLR Forecast

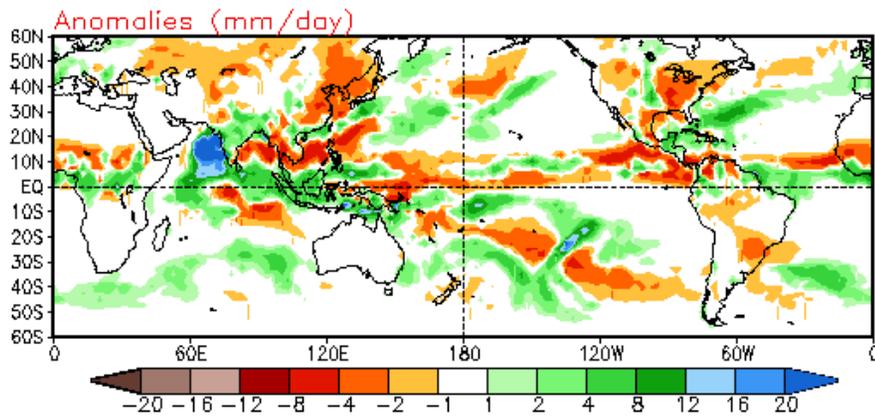
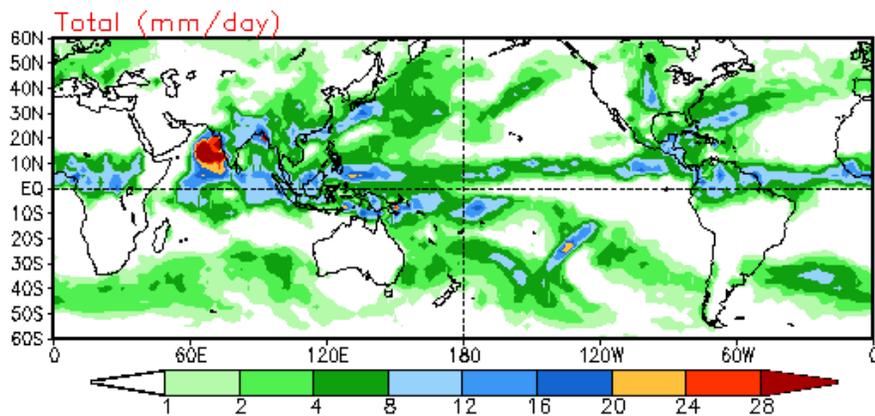


The forecast indicates enhanced convection across sections of the Indian Ocean, the Maritime Continent, and southern India during the first 10 days.

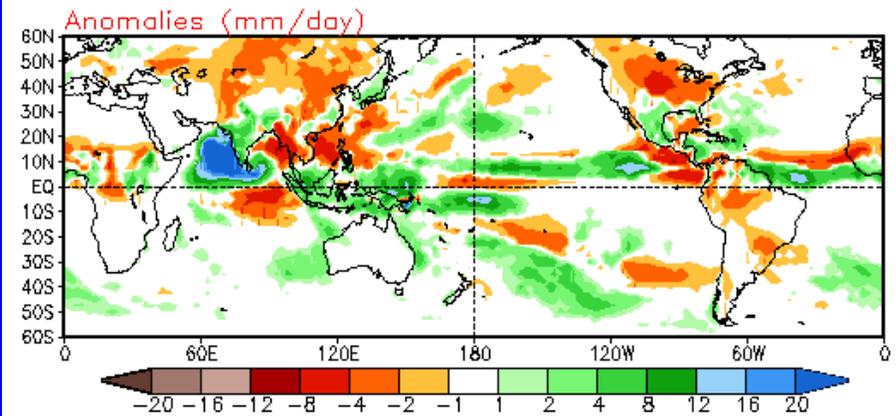
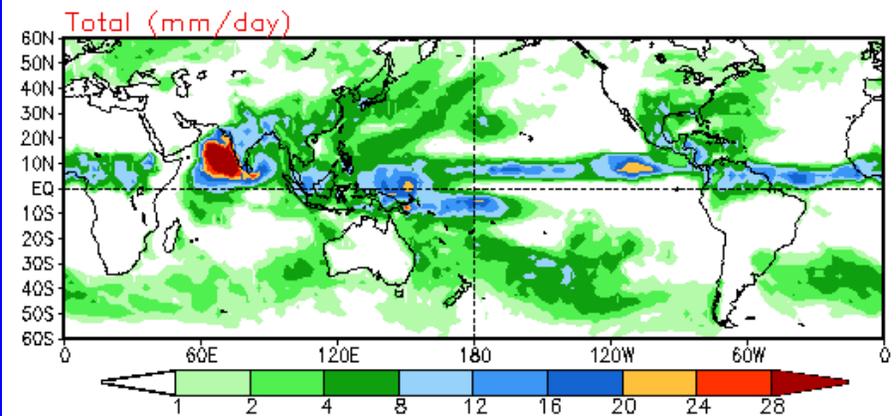


# Experimental Bias-Corrected GFS Precipitation

Week 1 Precipitation  
Forecast from 11Jun2007



Week 2 Precipitation  
Forecast from 11Jun2007





# 200–850 hPa Vertical Wind Shear

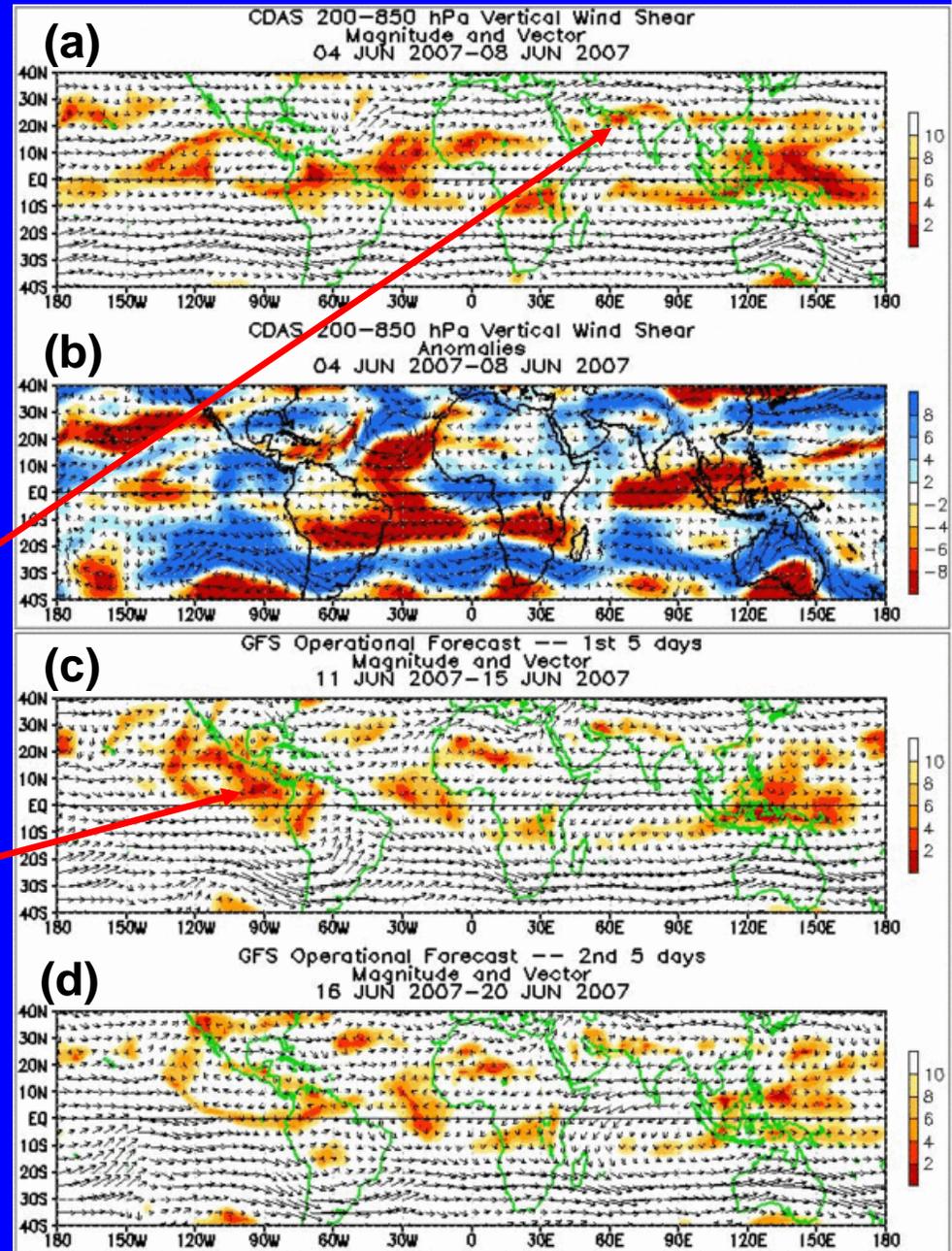
All plots: Shading denotes magnitude of vectors

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

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

Vertical wind shear during early June was weak to moderate aiding the rapid intensification of tropical cyclone Gonu this past week.

Shear is forecast to be weak across sections of the eastern Pacific Ocean during the upcoming five 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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