



# **Madden/Julian Oscillation:** **Recent Evolution, Current** **Status and Forecasts**

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**Climate Prediction Center / NCEP**  
**May 15, 2006**



# Outline

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



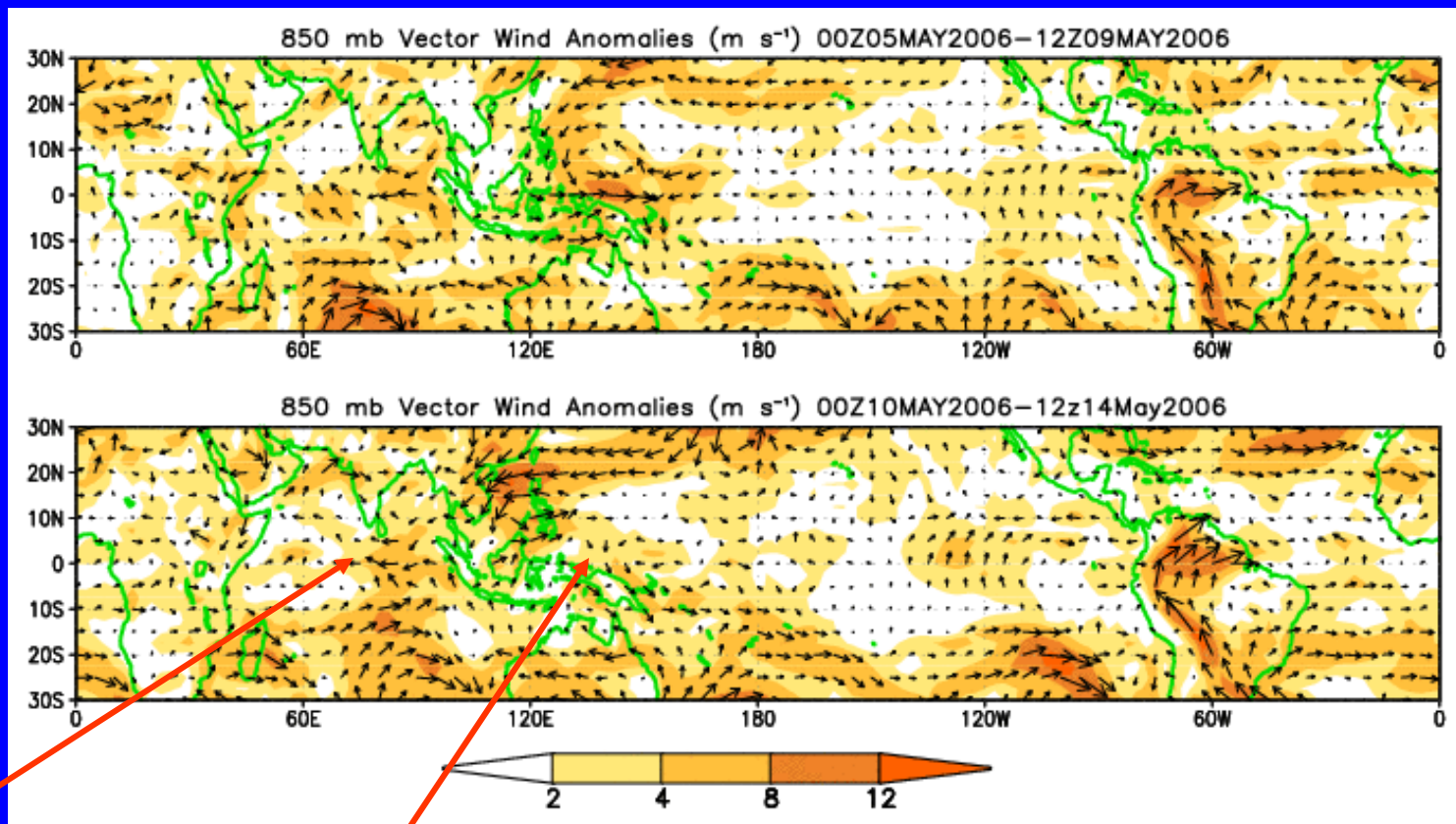
# Overview

- The latest observations indicate that the MJO remains weak.
- Based on the latest observational evidence, the MJO is expected to remain weak during the next 1-2 weeks.
- Potential hazards/benefits across the global tropics during week 1 include increased chances of above normal rainfall in equatorial Africa, the South China Sea, northern Philippines southeast China, and Central America. An increased likelihood of below normal rainfall exists across sections of Indonesia. Also, Typhoon Chanchu will impact southeast China early in the period.
- Increased chances of above normal rainfall are expected to develop in the equatorial eastern Indian Ocean, maritime continent, and tropical south western Pacific during week 2. Also, both the eastern Pacific Ocean and Bay of Bengal need to be closely monitored for tropical cyclogenesis as conditions may become favorable by or during week 2.



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

Note that shading denotes the magnitude of the anomalous wind vectors

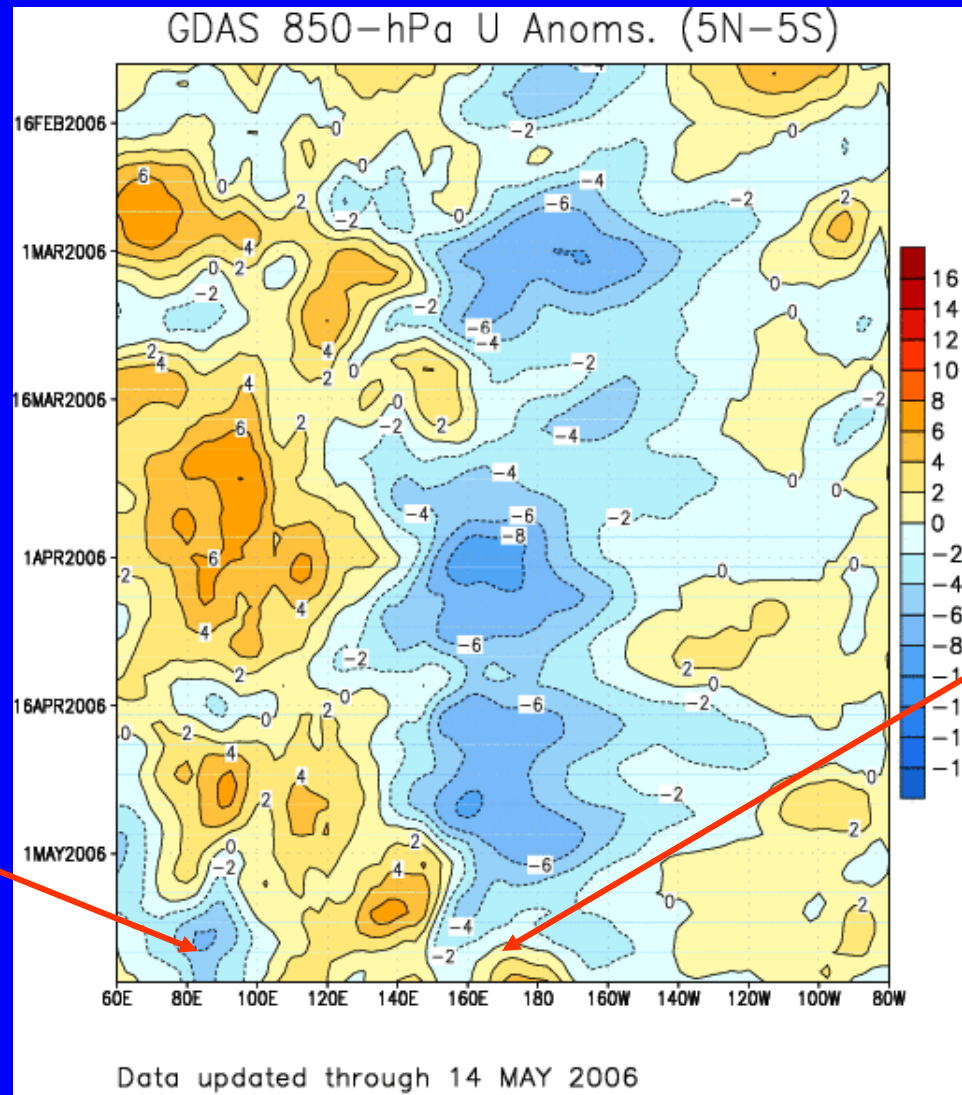


Easterly anomalies remained in the central and eastern Indian Ocean.

Westerlies (easterlies) over maritime continent (western Pacific) have weakened.



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



Weaker-than-average easterlies or westerlies (orange/red shading)

Stronger-than-average easterlies (blue shading)

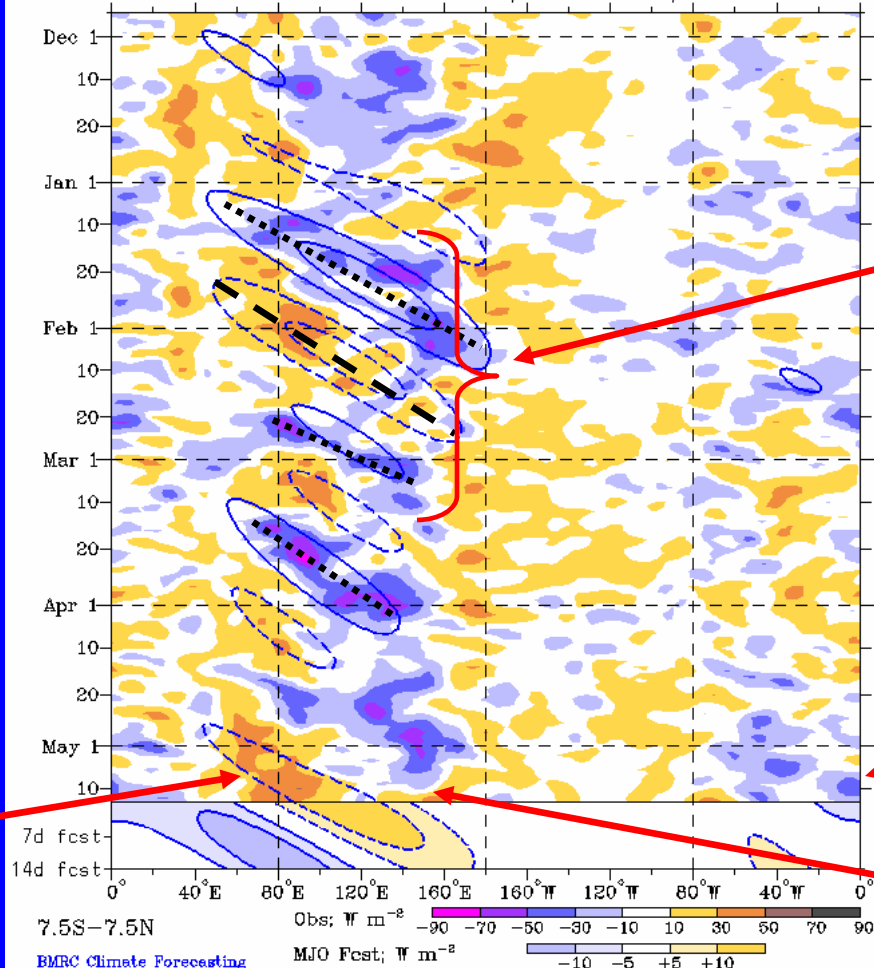
Westerly anomalies over the maritime continent (western-central Pacific) weakened (enhanced).

Easterly anomalies remained in the Indian Ocean.



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

Real-time MJO filtering superimposed upon 3drmm R21 OLR Anomalies  
 MJO anomalies blue contours, CINT=10. (5. for forecast)  
 Negative contours solid, positive dashed  
 26-Nov-2005 to 13-May-2006 + 14 days



Drier-than-average conditions (/red shading)  
 Wetter-than-average conditions (blue shading)

Eastward propagation of OLR anomalies associated with the MJO was evident from mid-January through late February

Enhanced convection over Africa during the last week.

Convection in the western Pacific weakened during the last week.

Time  
 ↓

Dry conditions in the Indian Ocean enhanced during the past two weeks.

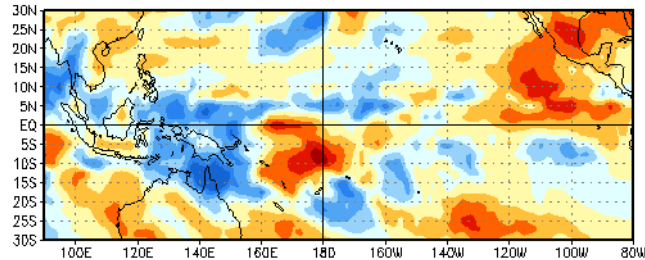
Longitude



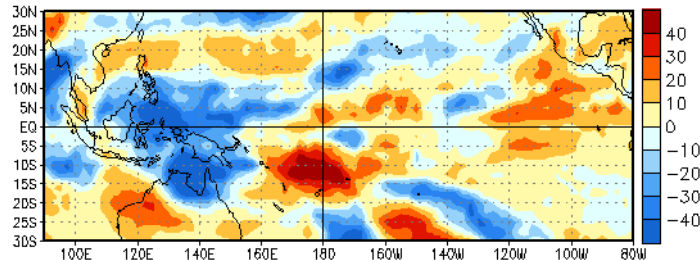
# Anomalous OLR and 850-hPa Wind

## Wind: Last 30 days

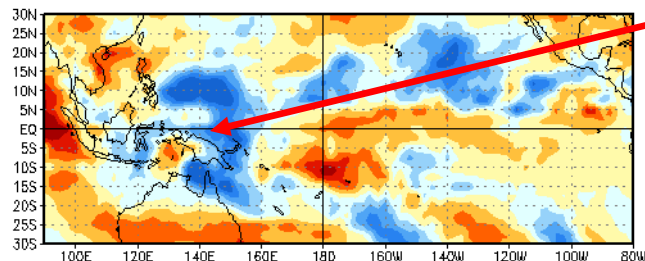
OLR Anomalies  
11 APR 2006 to 20 APR 2006



21 APR 2006 to 30 APR 2006

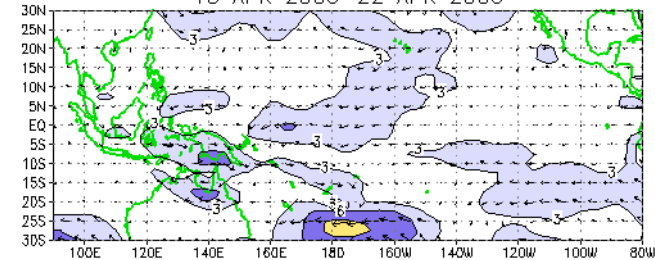


1 MAY 2006 to 10 MAY 2006

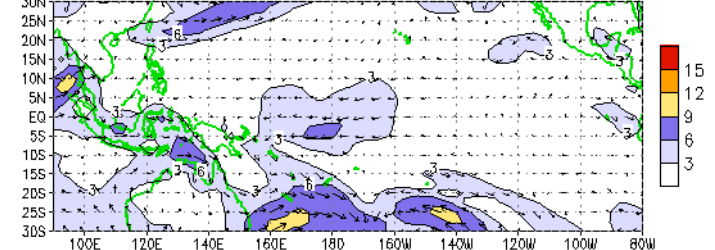


Convection and associated wind anomalies over maritime continent and the western Pacific have weakened.

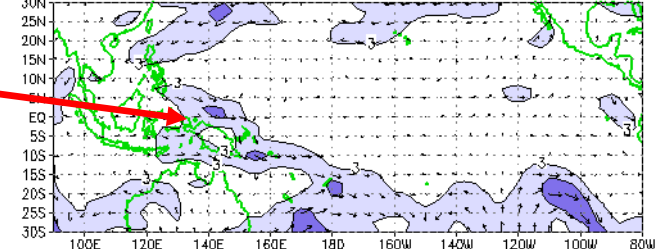
CDAS 850-hPa Wind Anoms  
13 APR 2006-22 APR 2006



23 APR 2006-02 MAY 2006



03 MAY 2006-12 MAY 2006



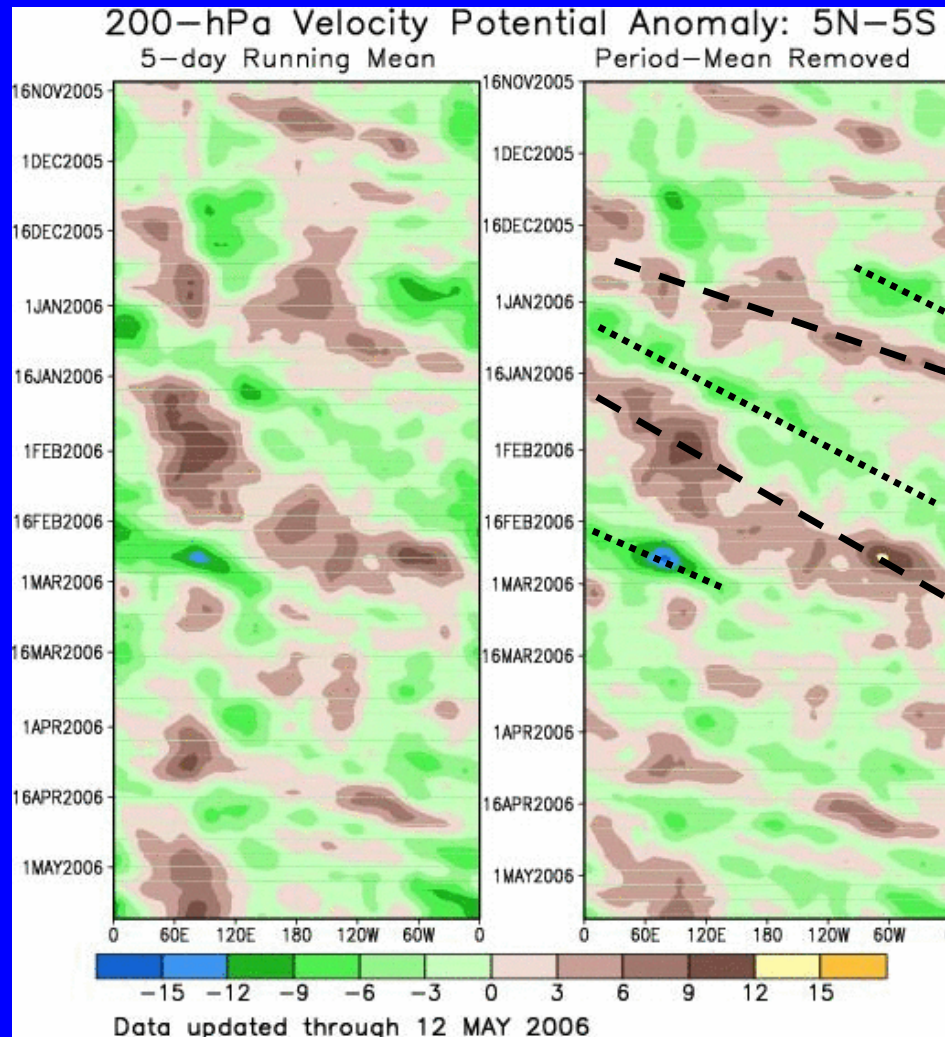


# 200-hPa Velocity Potential Anomalies (5°S-5°N)

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

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

Time



Weak to moderate MJO activity was observed during January-February time periods.

The MJO has generally been weak since early March.

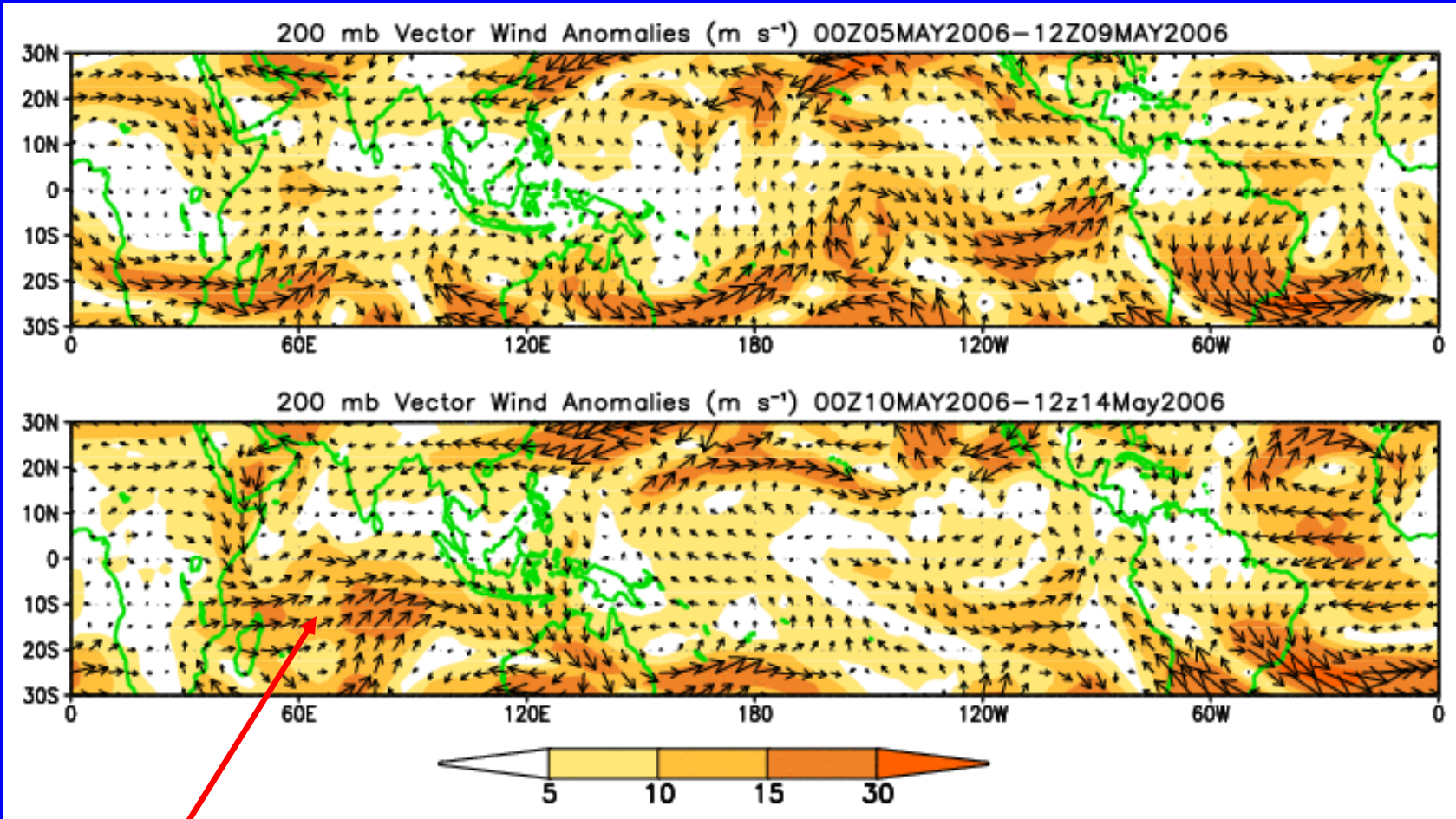
Longitude





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

Note that shading denotes the magnitude of the anomalous wind vectors.

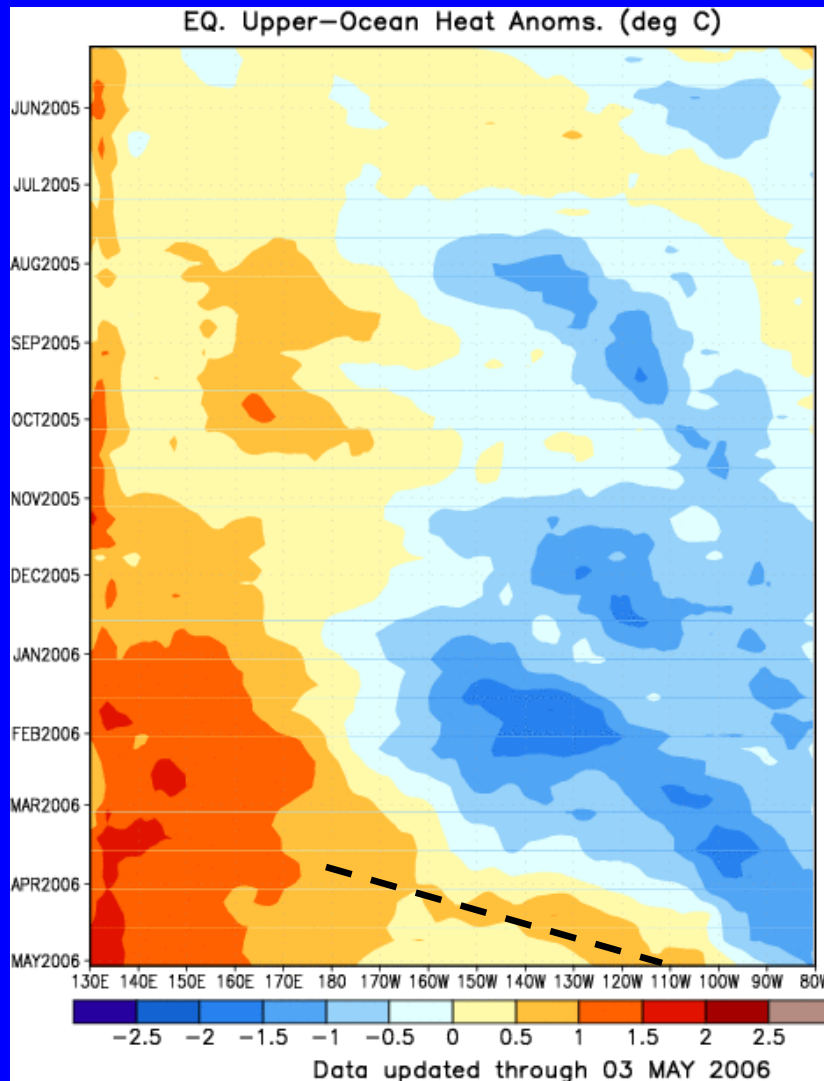


Westerly anomalies in the Indian Ocean are consistent with below normal convection.



# Heat Content Evolution in the Eq. Pacific

Time



Longitude

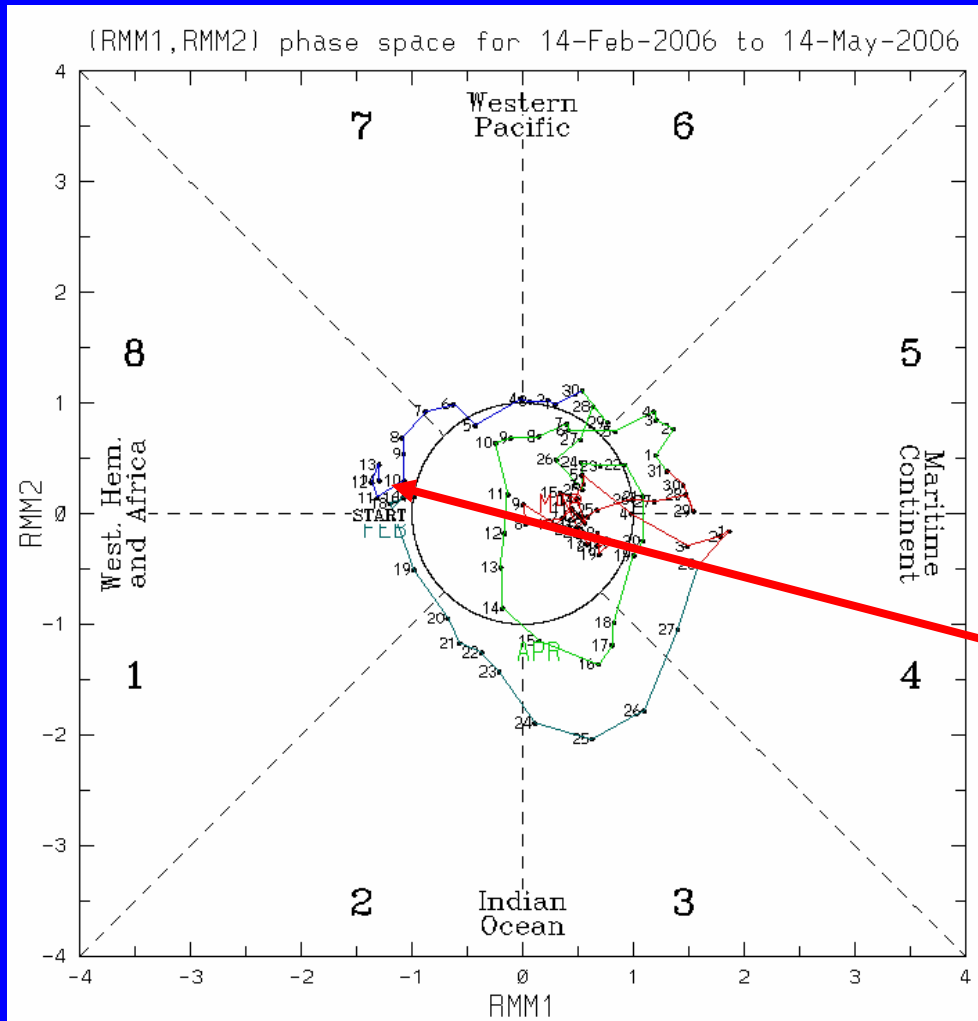
**Above normal heat content expanded into the central eastern Pacific during April 2006 associated with the latest Kelvin wave.**



# MJO Index (Magnitude and Phase)

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 zonal wind, 200 hPa zonal wind, and satellite-observed 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.

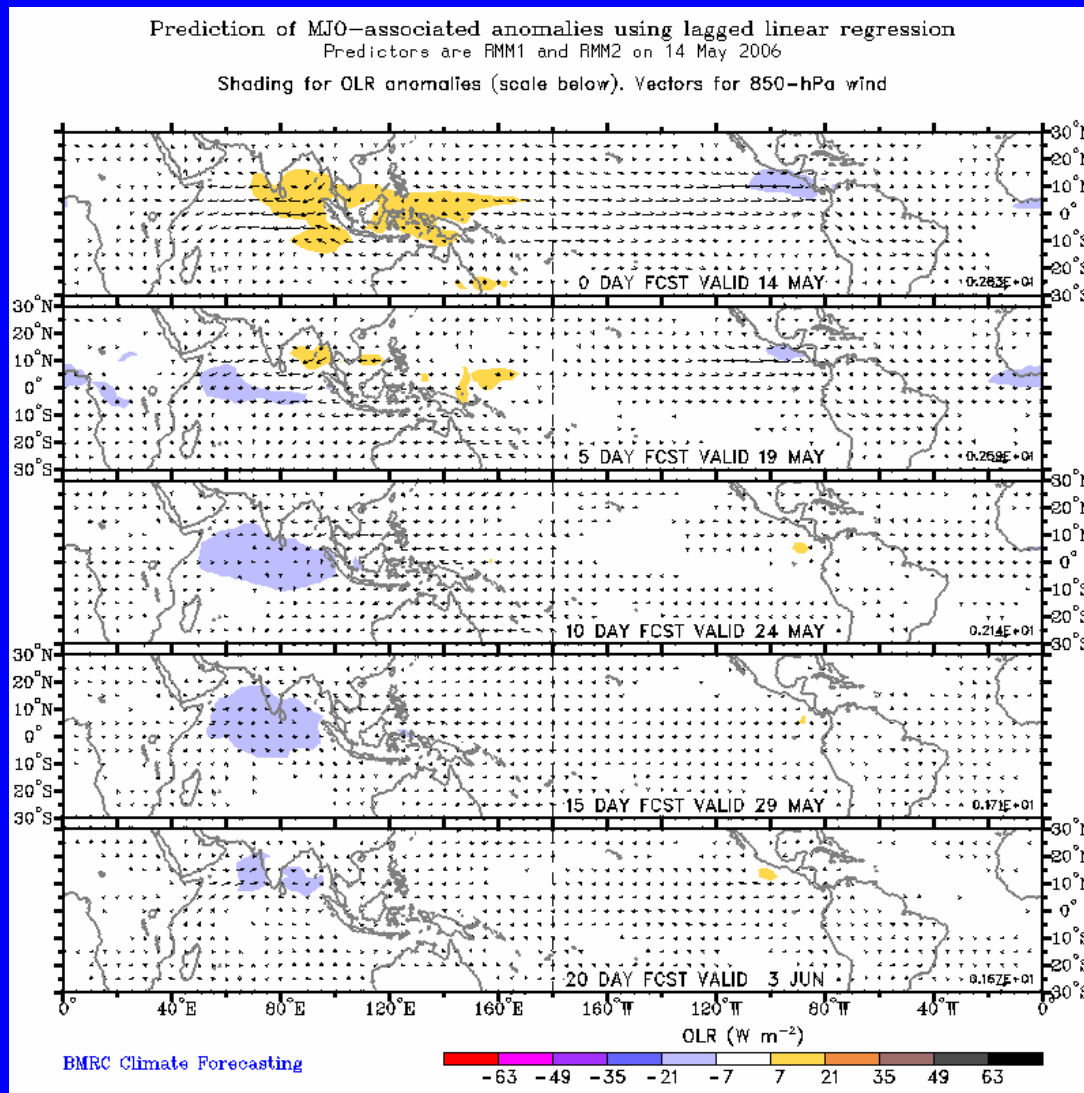


Blue line is for May, green line is for Apr. Labelled dots for each day.

The MJO signal has been weak during late April and early May, however, the MJO signal has strengthened during the last several days.



# Statistical OLR MJO Forecast

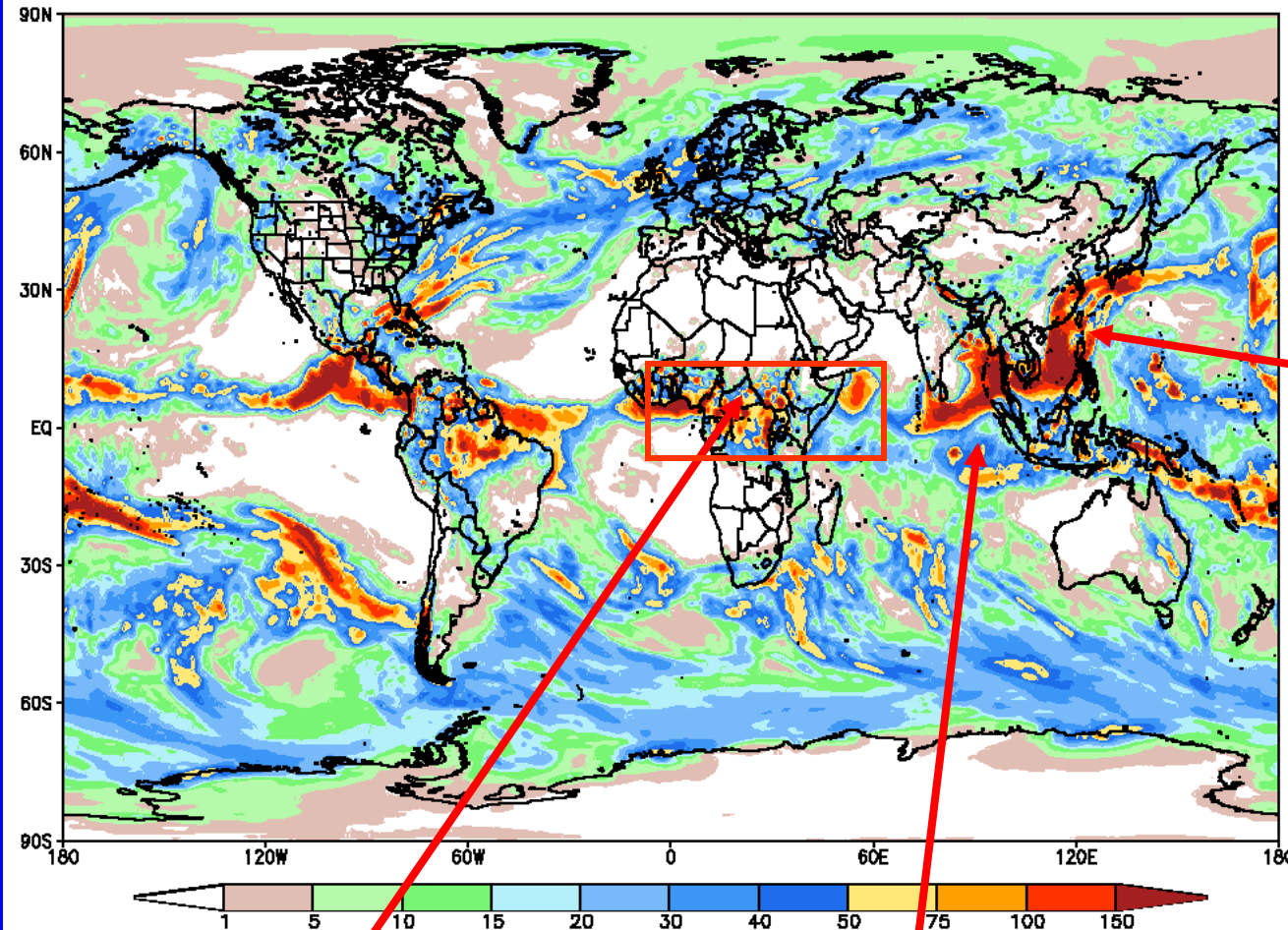


A statistical MJO forecast indicates dry conditions across sections of Indonesia early in the period with wet conditions across the Indian Ocean during late week 1 and early week 2.



# Global Forecast System (GFS) Week 1 Precipitation Forecast

GFS 37.5 km Week 1 Total Precipitation (mm)  
Issued at May 15 2006 00Z for the period ending at May 22 2006 00Z



Heavy rainfall  
in South China  
Sea, the  
northern  
Philippines,  
and east China.

Abundant rainfall in equatorial  
Africa and western Indian Ocean

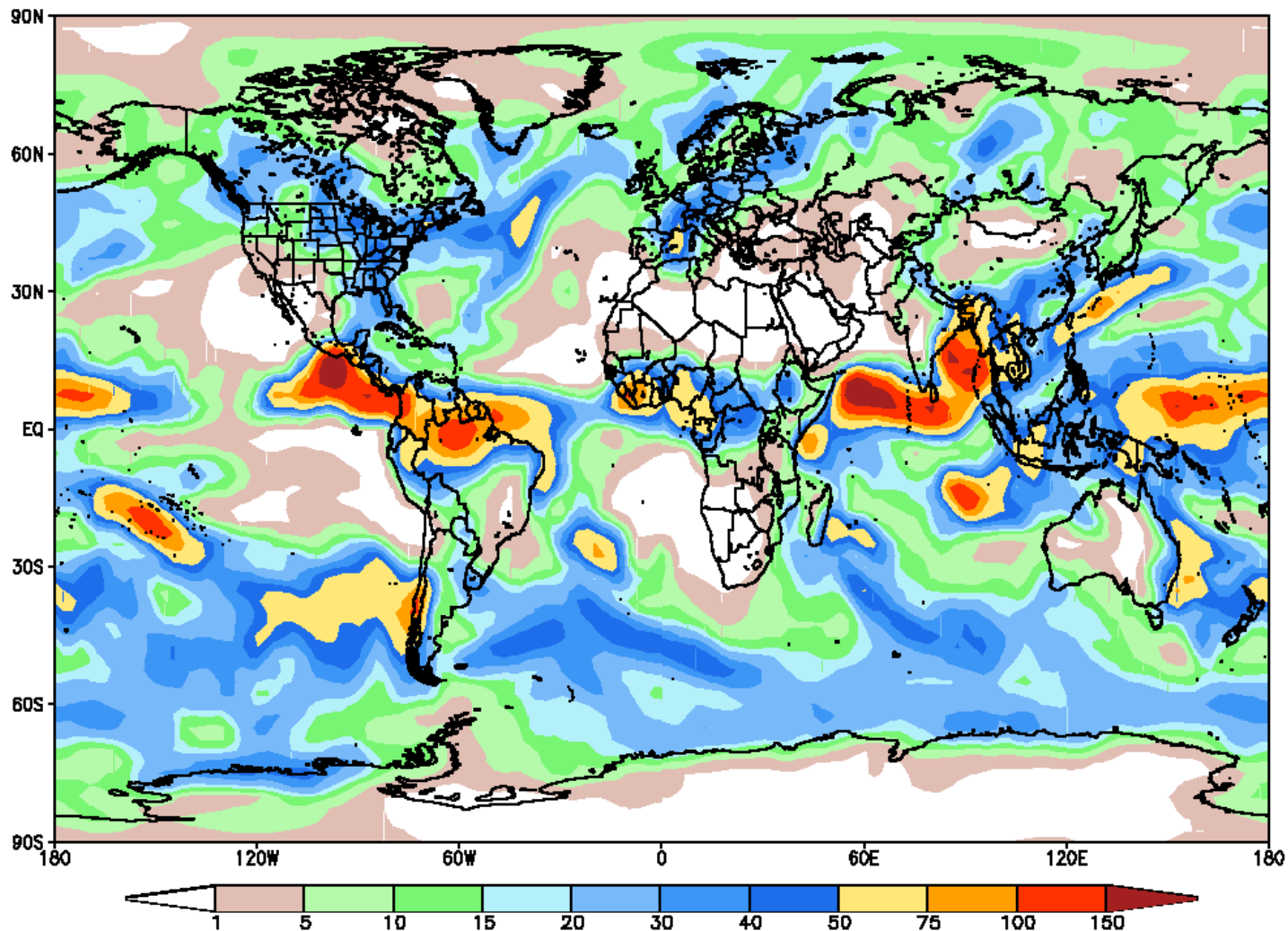
Rainfall is forecast to reappear in  
the eastern Indian Ocean



# Global Forecast System (GFS) Week 2

## Precipitation Forecast

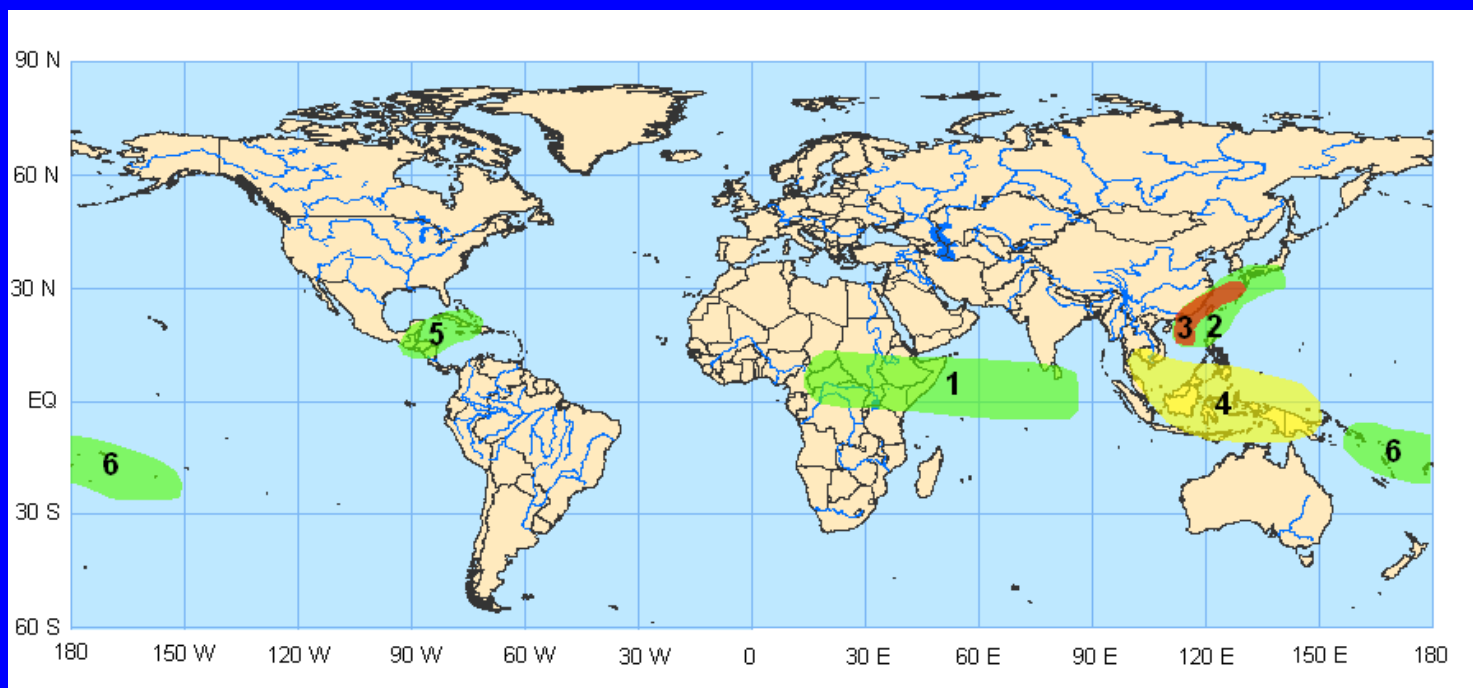
GFS 100 km Week 2 Total Precipitation (mm)  
Issued May 15 2006 00Z for the period ending at May 28 2006 00Z





# Potential Benefits/Hazards – Week 1

## Valid May 16 - 22, 2006

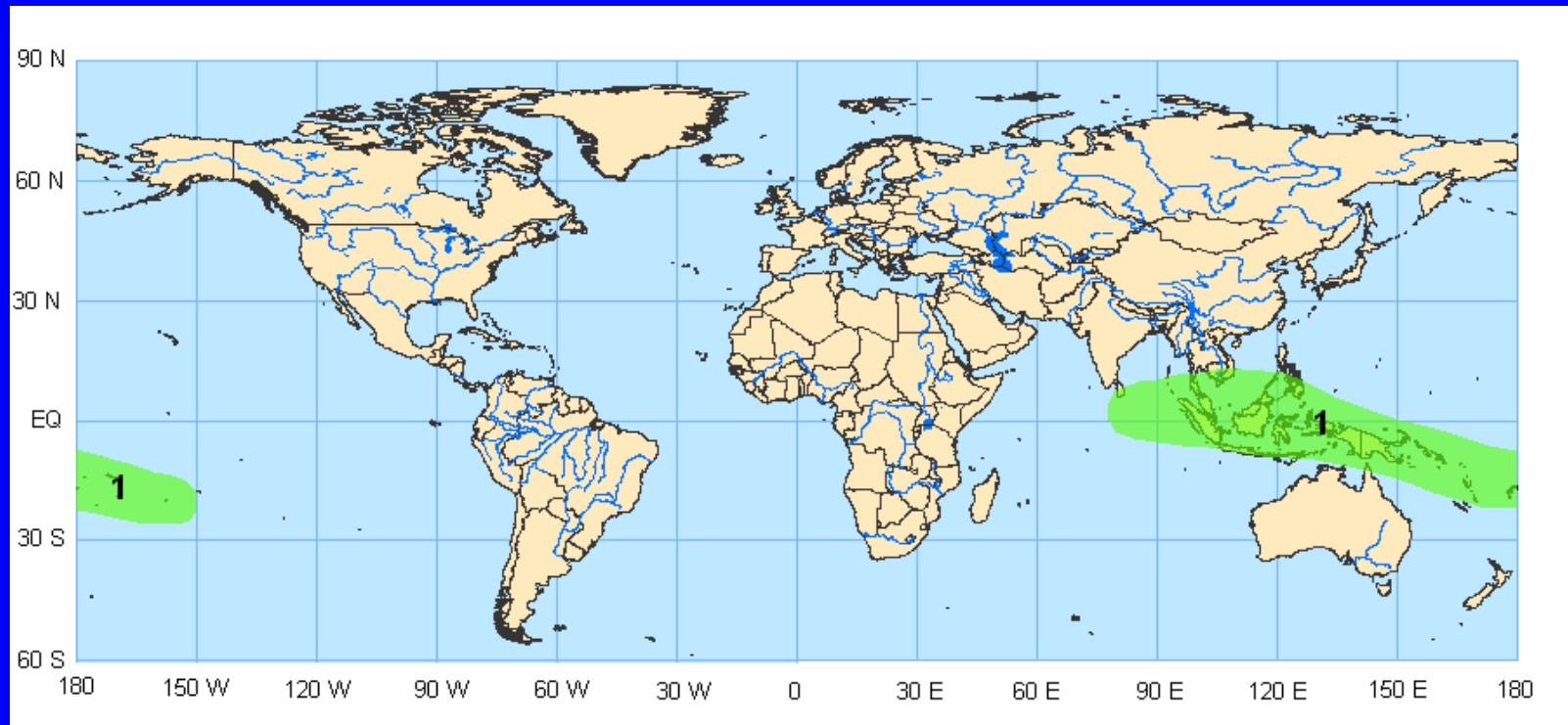


1. Increased chances of above normal rainfall across equatorial Africa into the Indian Ocean associated with the continued evolution of intraseasonal variability and localized above normal SSTs
2. Above average is expected over the South China Sea, northern Philippines, southeast China, and southern Japan due to Typhoon Chanchu
3. Typhoon Chanchu will impact southeast China and possible Taiwan with heavy rainfall, strong winds, and high seas
4. Increased chances of below normal rainfall across sections of Indonesia associated with the continued evolution of intraseasonal variability
5. Increased chances of above normal rainfall over central America and the northwest Caribbean Sea associated with the interaction of tropical moisture and expected low-latitude front
6. Increased chances of above normal rainfall in the tropical south western Pacific Ocean associated with localized positive SST anomalies and interaction with the subtropics.



# Potential Benefits/Hazards – Week 2

## Valid May 23 – May 29, 2006



1. Increased chances of above normal rainfall stretching from the Indian Ocean, across the maritime continent, and into the tropical southwestern Pacific Ocean associated with continued evolution of intraseasonal variability and localized positive SST anomalies.





# Summary

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