

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

Update prepared by  
Climate Prediction Center / NCEP  
August 21, 2006

# Outline

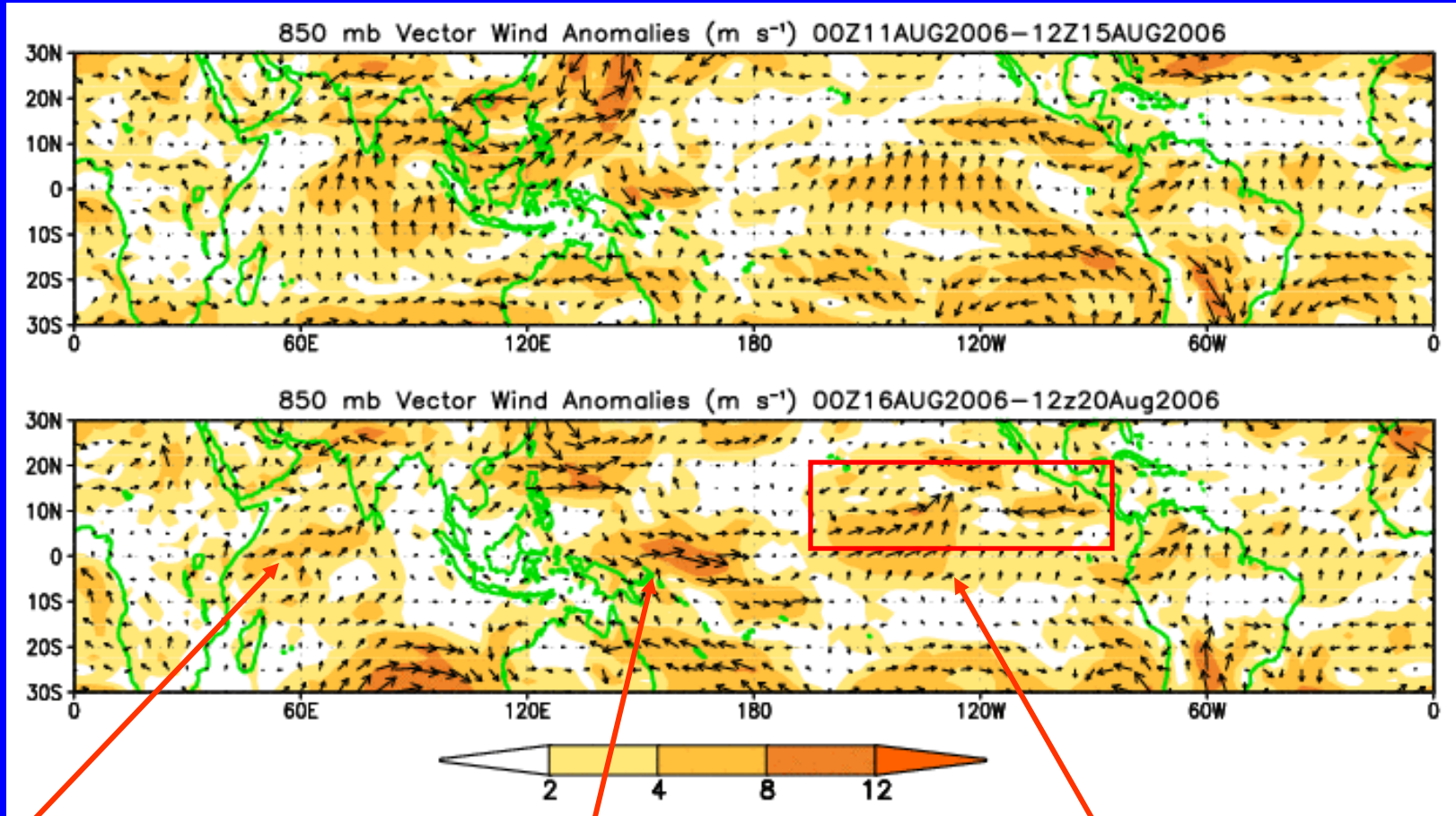
- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**

# Overview

- The MJO remains weak. Based on the latest observations and model forecasts, continued weak MJO activity is expected during the next 1-2 weeks.
- During week 1, there is an increased chance for above normal rainfall for sections of the eastern Indian Ocean, the Bay of Bengal, Southeast Asia, the central and eastern Pacific Ocean, northern South America, Central America, Mexico and the southwest US. Also, favorable conditions for tropical cyclogenesis are expected in the eastern Pacific.
- Hurricane Ioke will impact shipping in the north-central Pacific Ocean and tropical depression 10E is expected to strengthen to hurricane status during week 1.
- Also, there is evidence that conditions are becoming more favorable for tropical cyclone development for areas in the Atlantic Basin. These include the Gulf of Mexico and the eastern Atlantic especially at lower latitudes.
- No definitive statements can be made regarding potential hazards/benefits during week 2.

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

Note that shading denotes the magnitude of the anomalous wind vectors

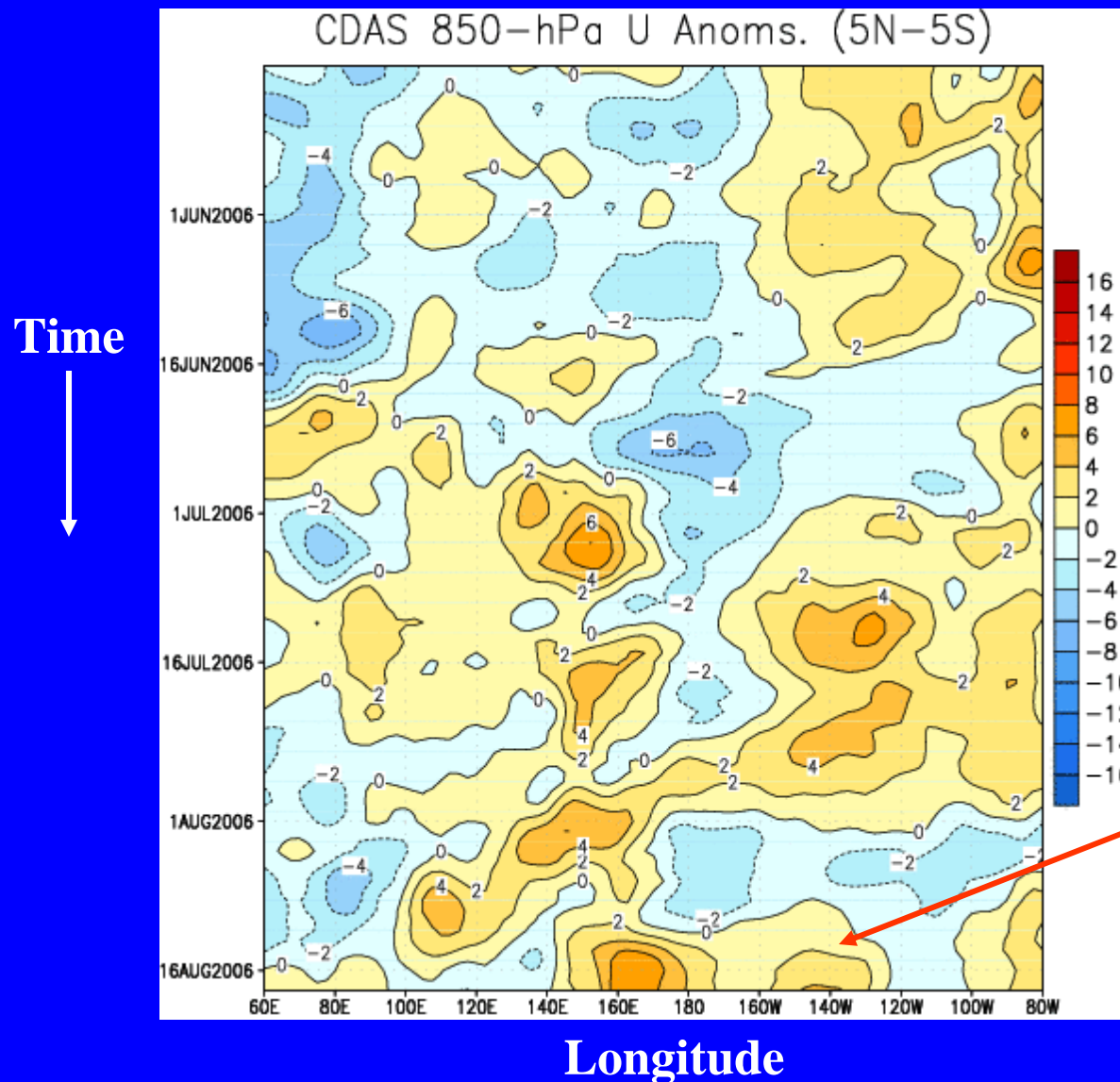


Slightly enhanced southwesterly flow into South Asia.

Westerly anomalies have strengthened and shifted eastward during the past five days.

Couplet of westerly / easterly anomalies across the eastern Pacific.

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

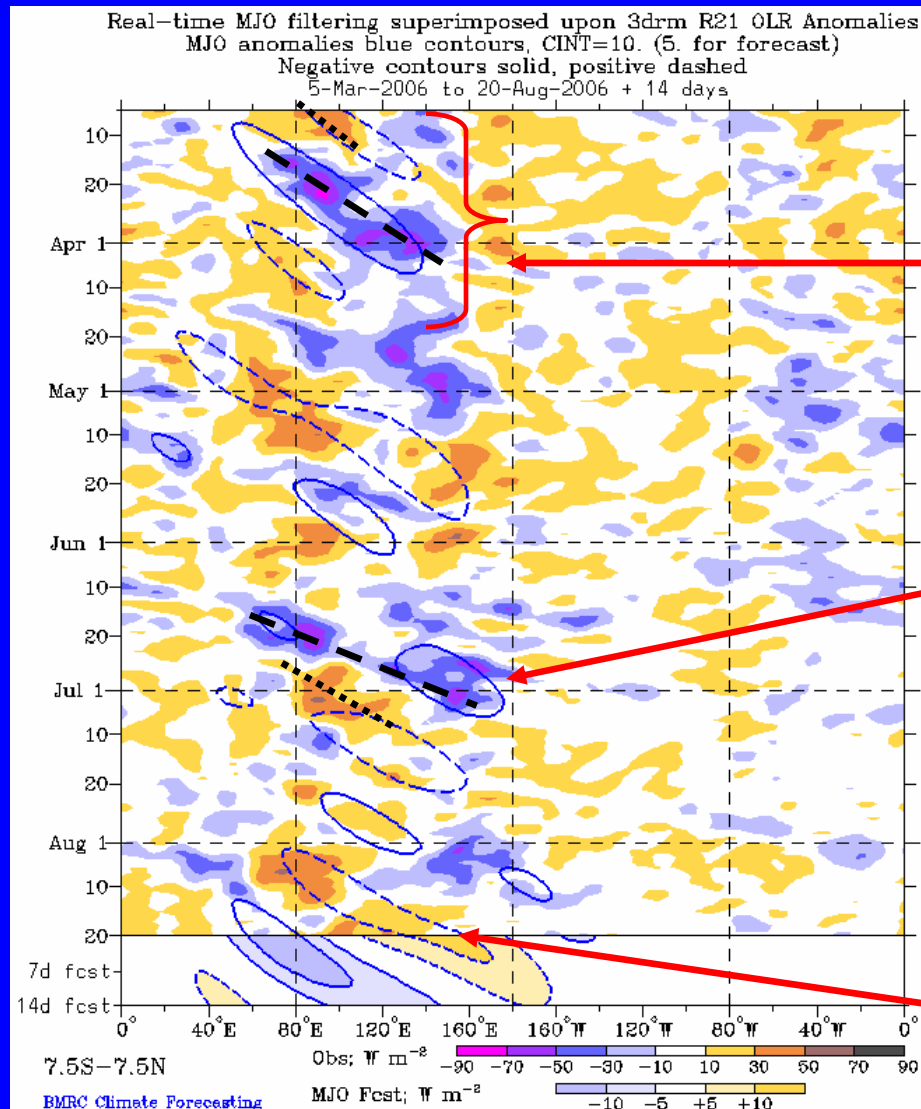


Weaker-than-average easterlies or westerlies (orange/red shading)

Stronger-than-average easterlies (blue shading)

Westerly anomalies are evident across a large area in the western and central Pacific.

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



Drier-than-average conditions (/red shading)

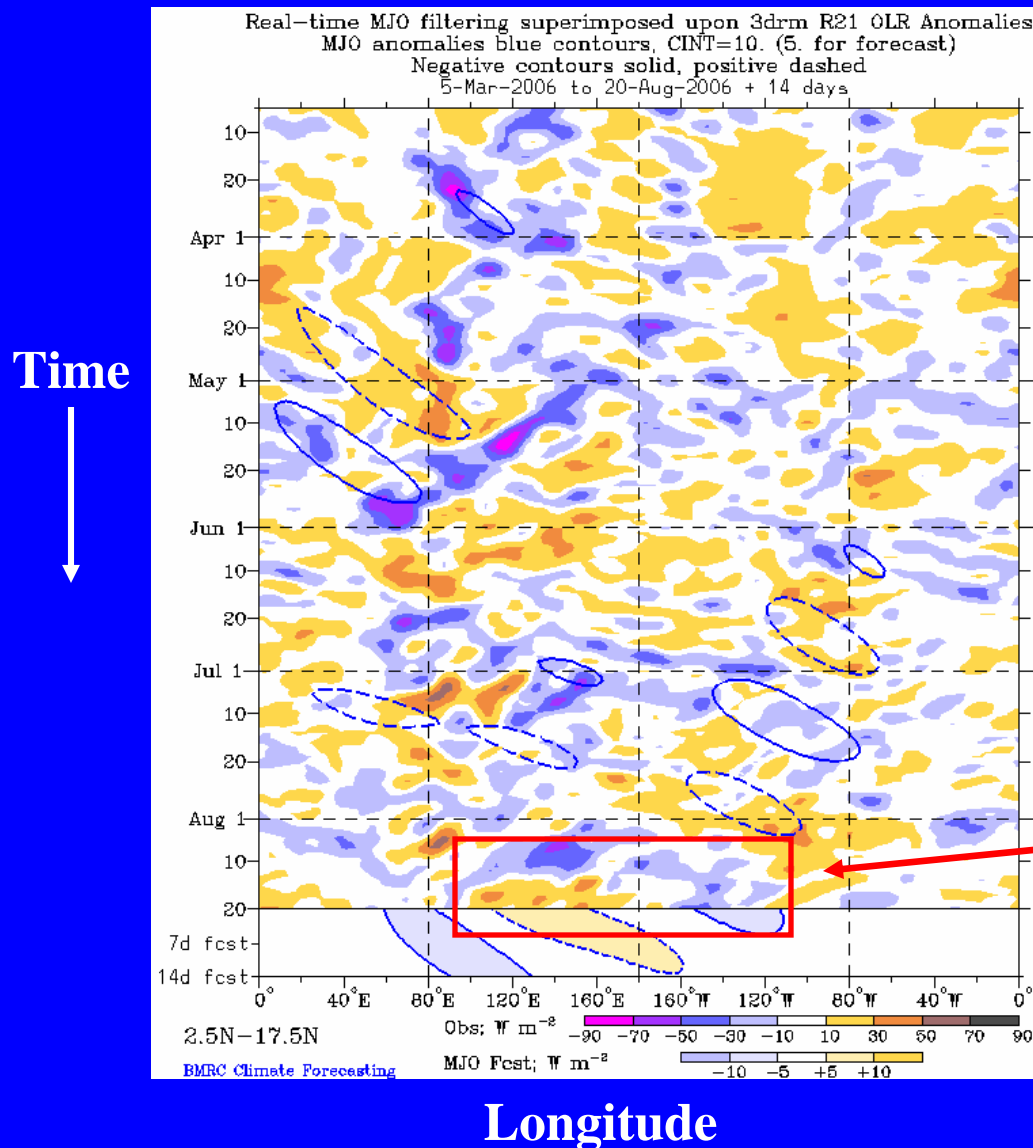
Wetter-than-average conditions (blue shading)

Eastward propagation of OLR anomalies associated with the MJO was evident during March.

Coherent OLR anomalies moved across the Eastern Hemisphere in June.

Dry conditions have shifted eastward across Indonesia during the past ten days.

# Outgoing Longwave Radiation (OLR) Anomalies (2.5°N-17.5°N)



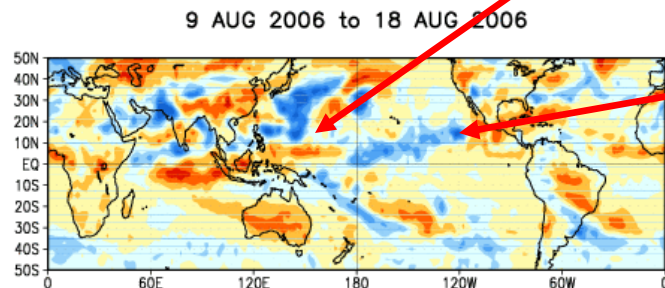
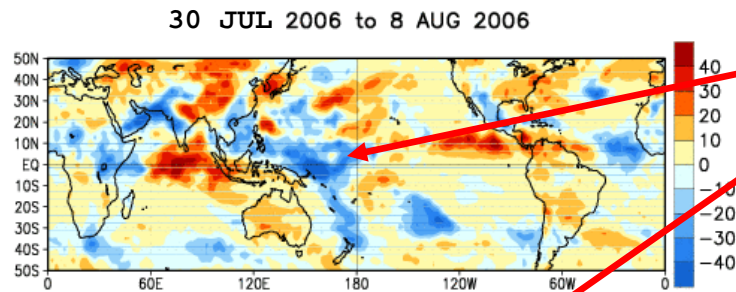
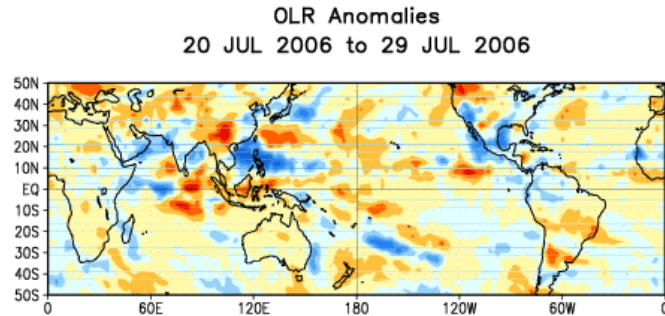
Drier-than-average conditions (/red shading)

Wetter-than-average conditions (blue shading)

Wet (dry) conditions have been evident during the past week for the Central Pacific (western Pacific and Indonesia).

# Anomalous OLR: Last 30 days

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



A shift from wet to dry conditions has occurred in the Western Pacific along the equator during August.

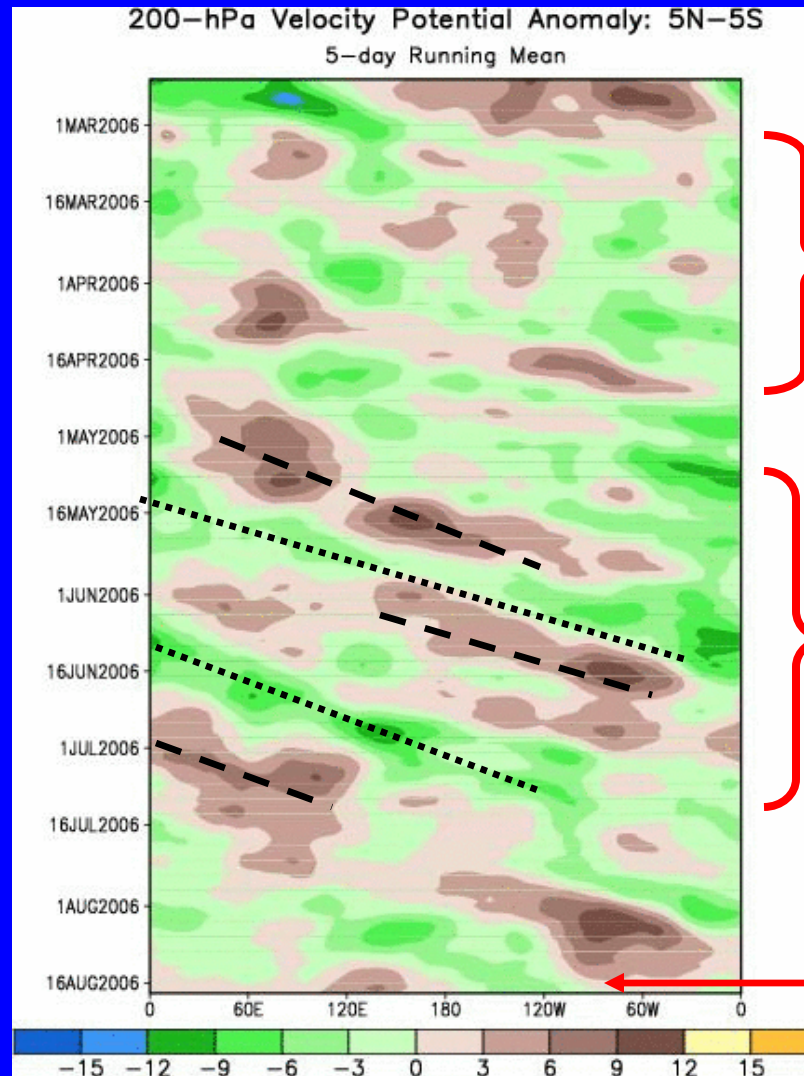
During the last ten days, wet conditions are evident across the central Pacific north of the equator.



# 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

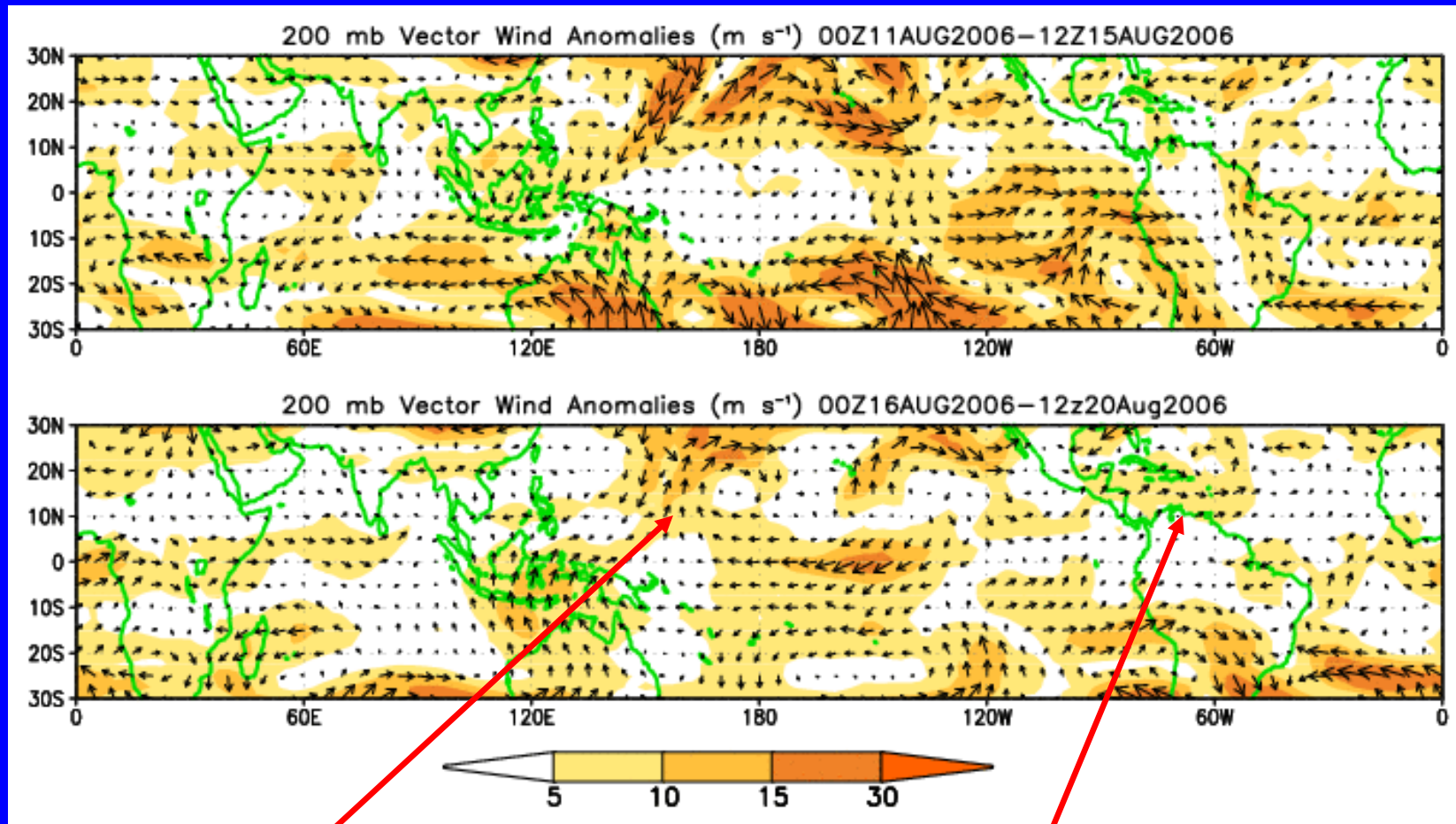
The MJO was incoherent during much of March and April.

MJO activity strengthened some during May and June but remained weak.

Upper-level divergence (convergence) across the central/eastern Pacific (western Pacific) during the middle of August.

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

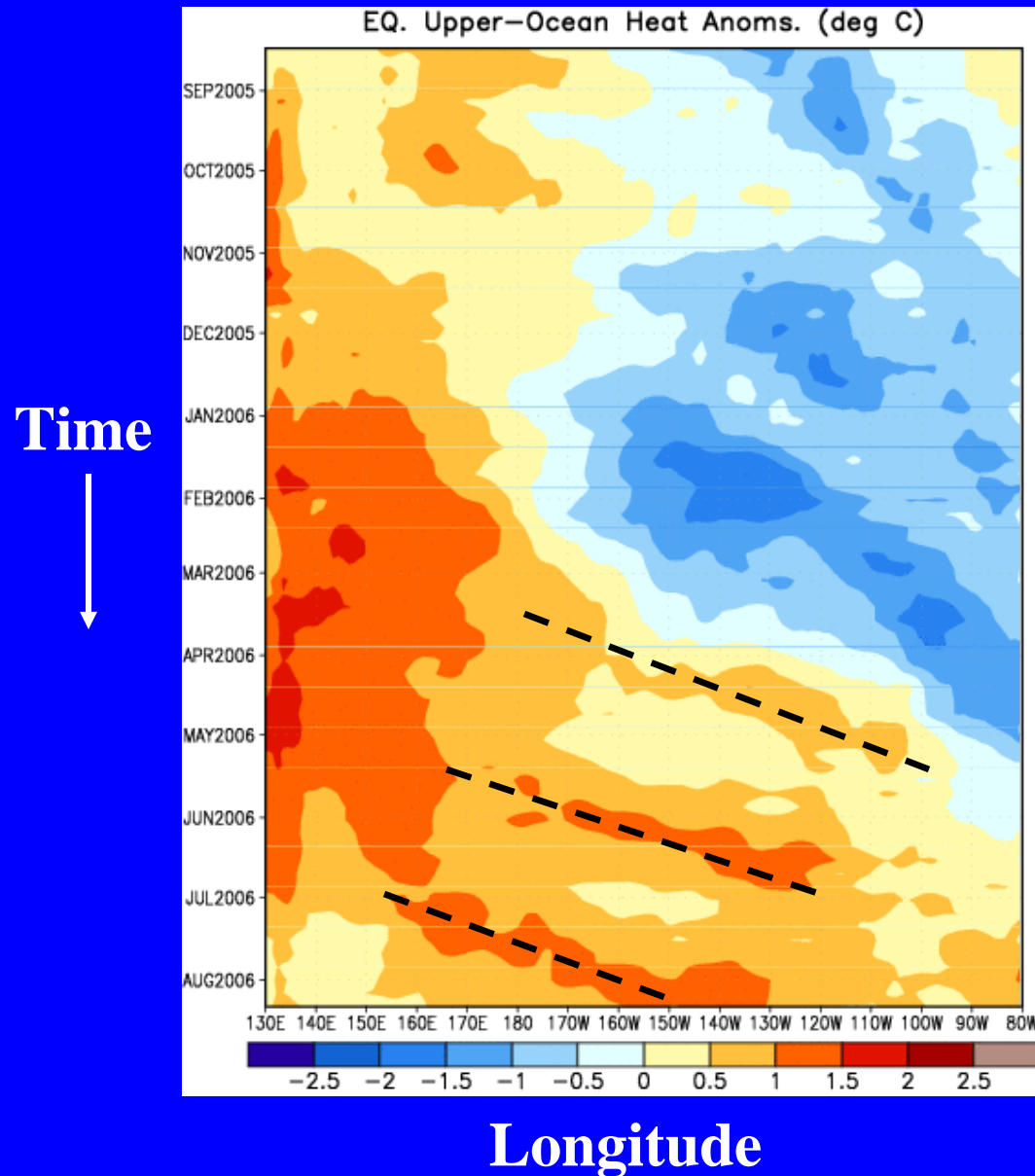
Note that shading denotes the magnitude of the anomalous wind vectors.



Anti-cyclonic circulation in the western Pacific north of the equator.

Westerly anomalies in the Caribbean and western Atlantic.

# Heat Content Evolution in the Eq. Pacific

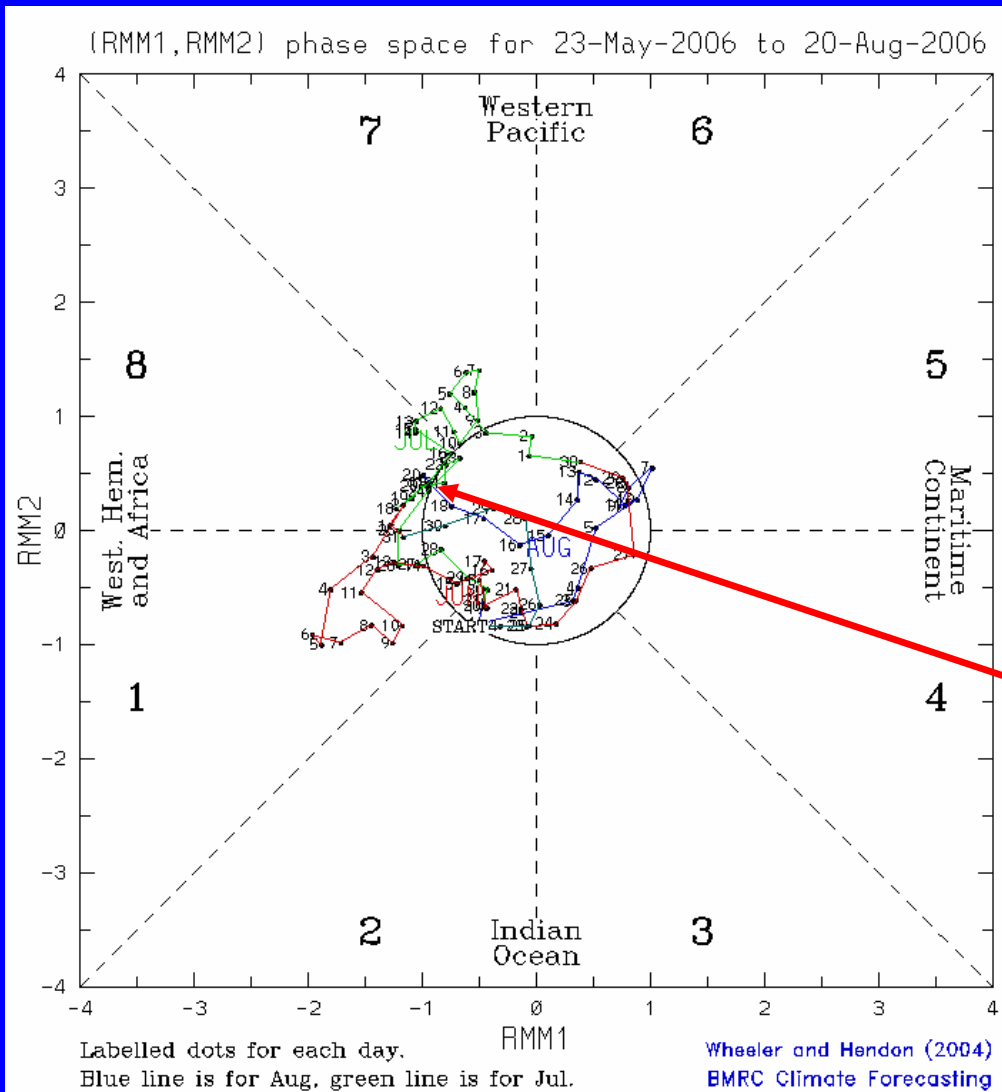


Starting in April, above normal upper oceanic water temperatures expanded from the western Pacific into the eastern Pacific in part due to Kelvin wave activity.

# MJO Index (Magnitude and Phase)

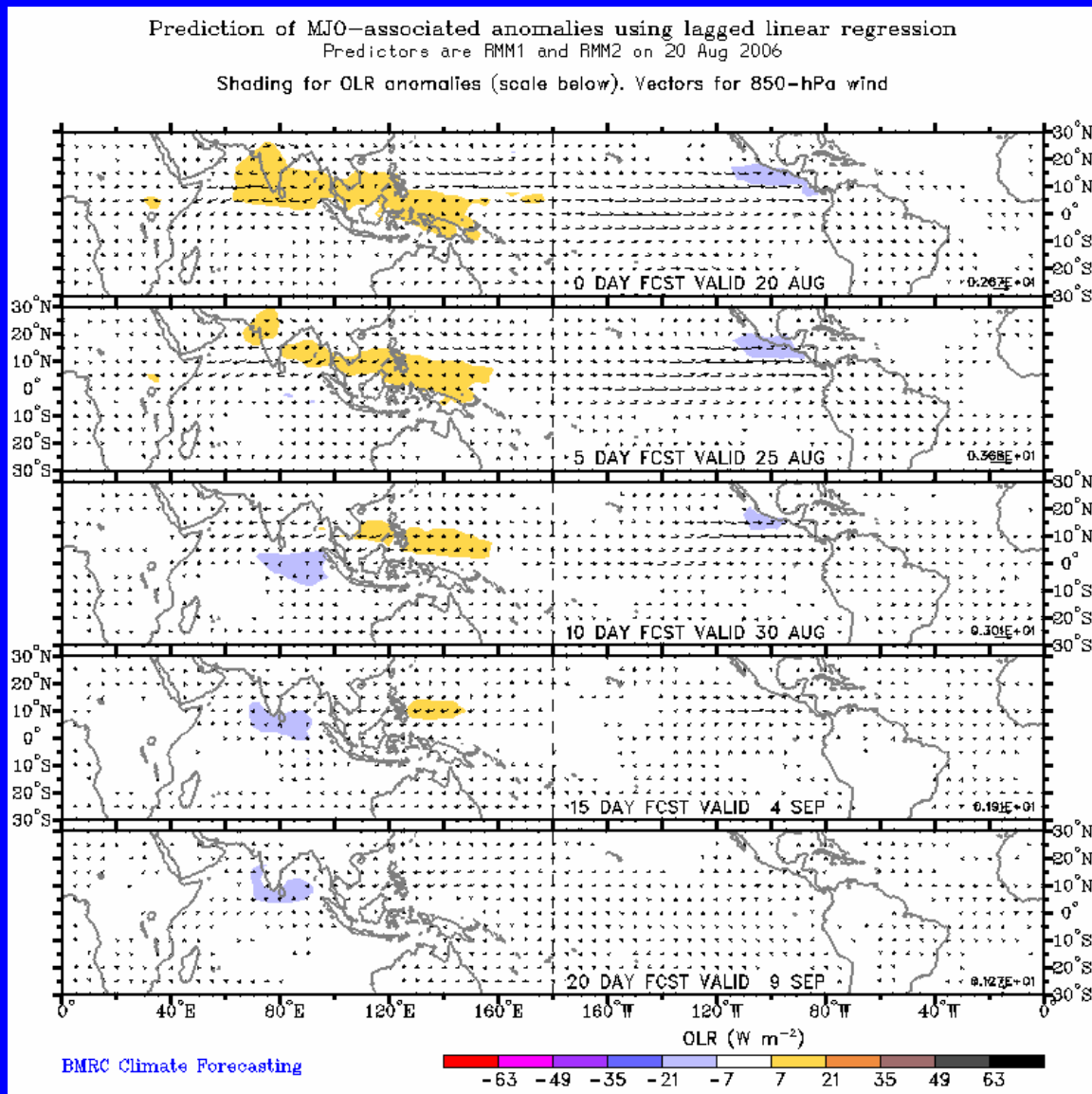
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850 hPa zonal wind, 200 hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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.



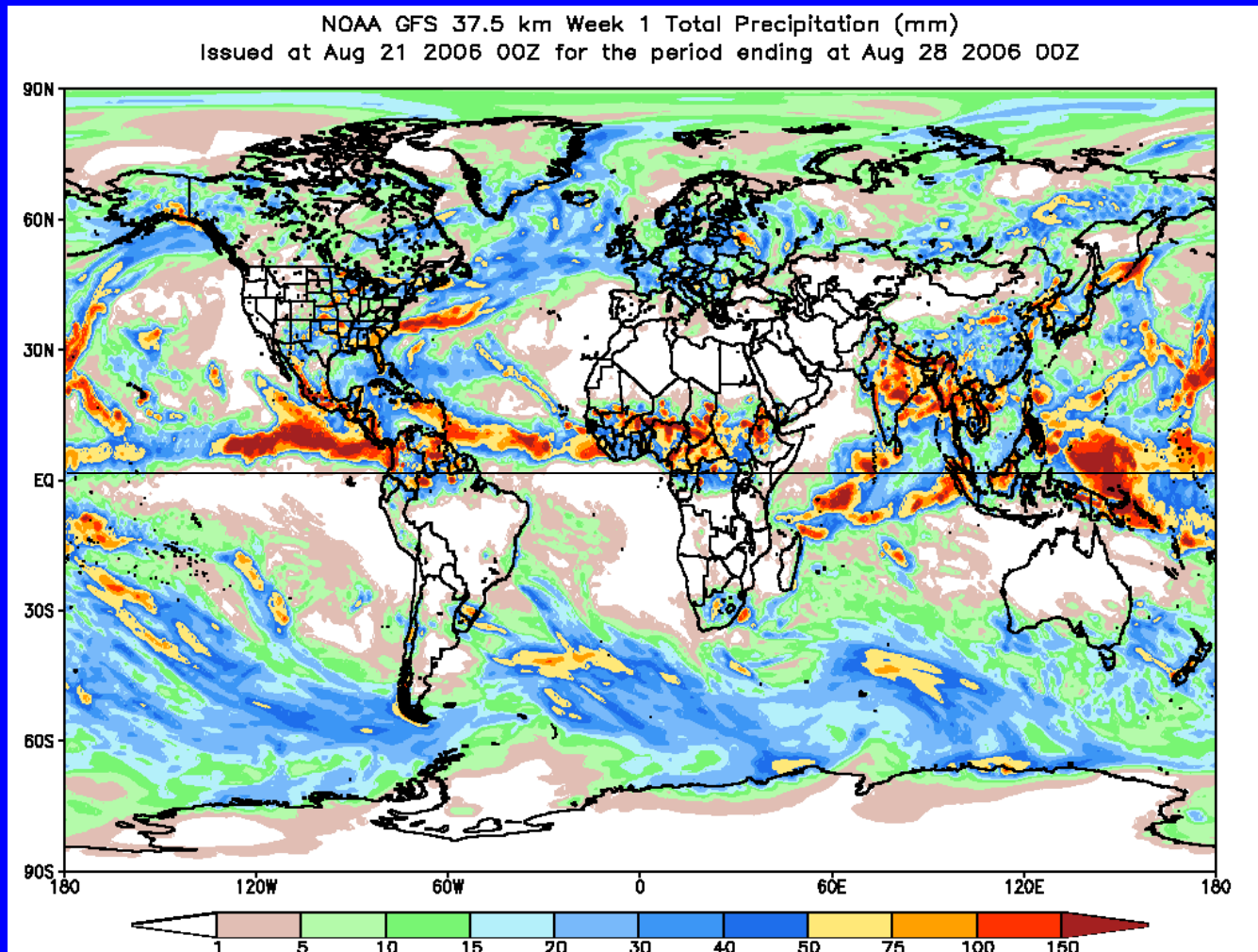
The MJO signal has strengthened and is centered in the western Hemisphere.

# Statistical OLR MJO Forecast



Dry conditions are forecast across sections of Indonesia and the western Pacific.

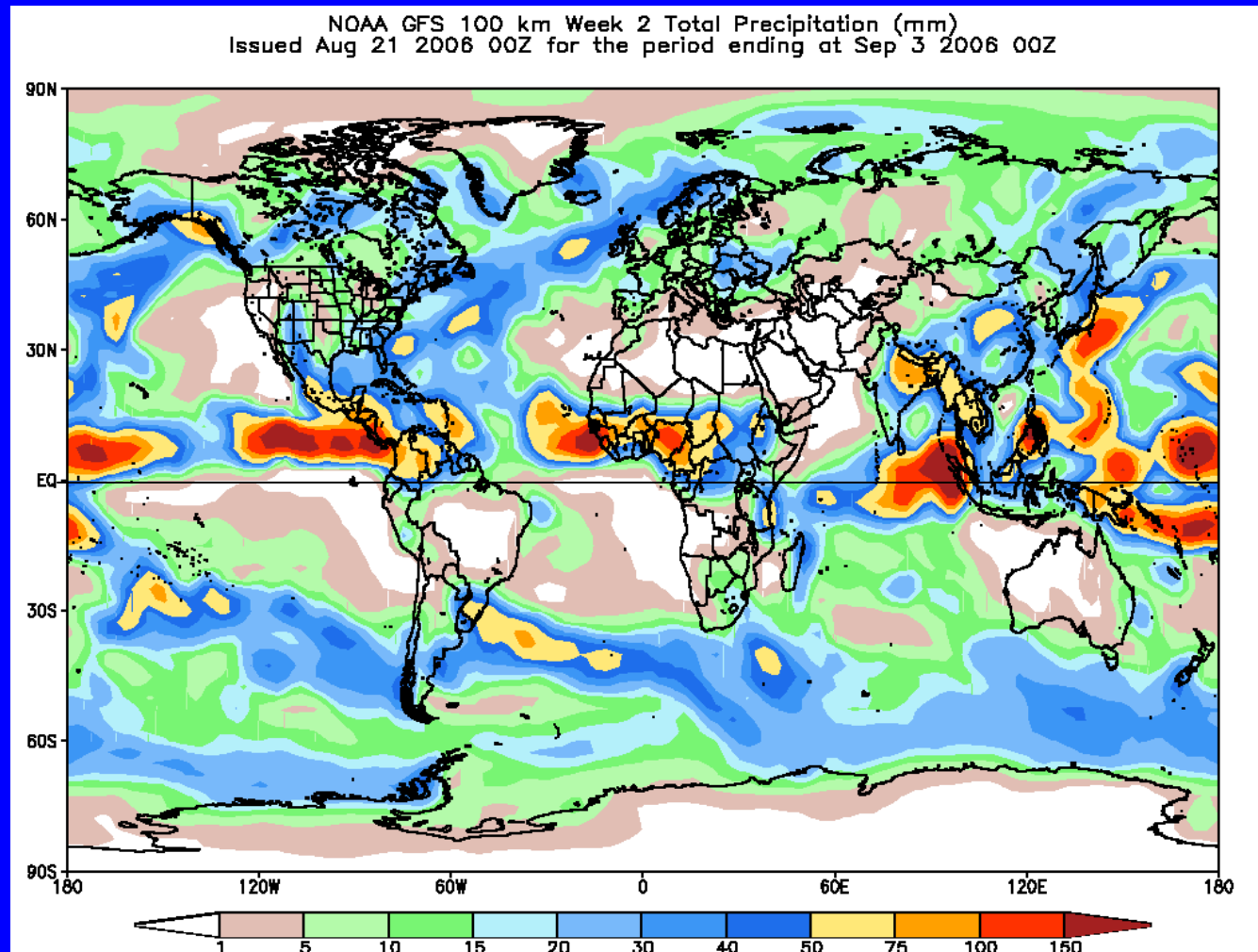
# Global Forecast System (GFS) Week 1 Precipitation Forecast



Abundant rainfall is expected across much of the eastern Pacific.

# Global Forecast System (GFS) Week 2

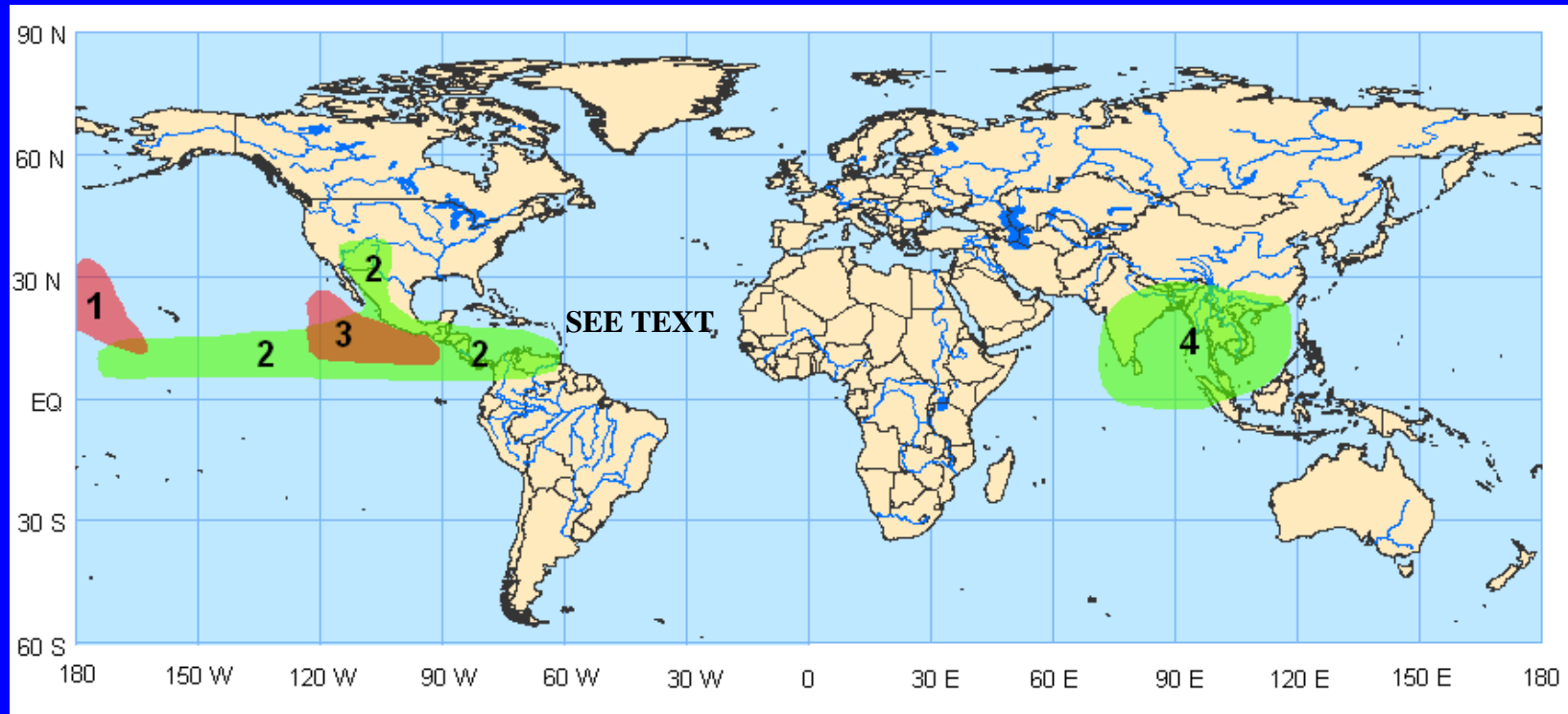
## Precipitation Forecast



Rainfall across the eastern Pacific is expected to remain with precipitation redeveloping across sections of the Indian Ocean.

# Potential Benefits/Hazards – Week 1

## Valid August 22 - 28, 2006

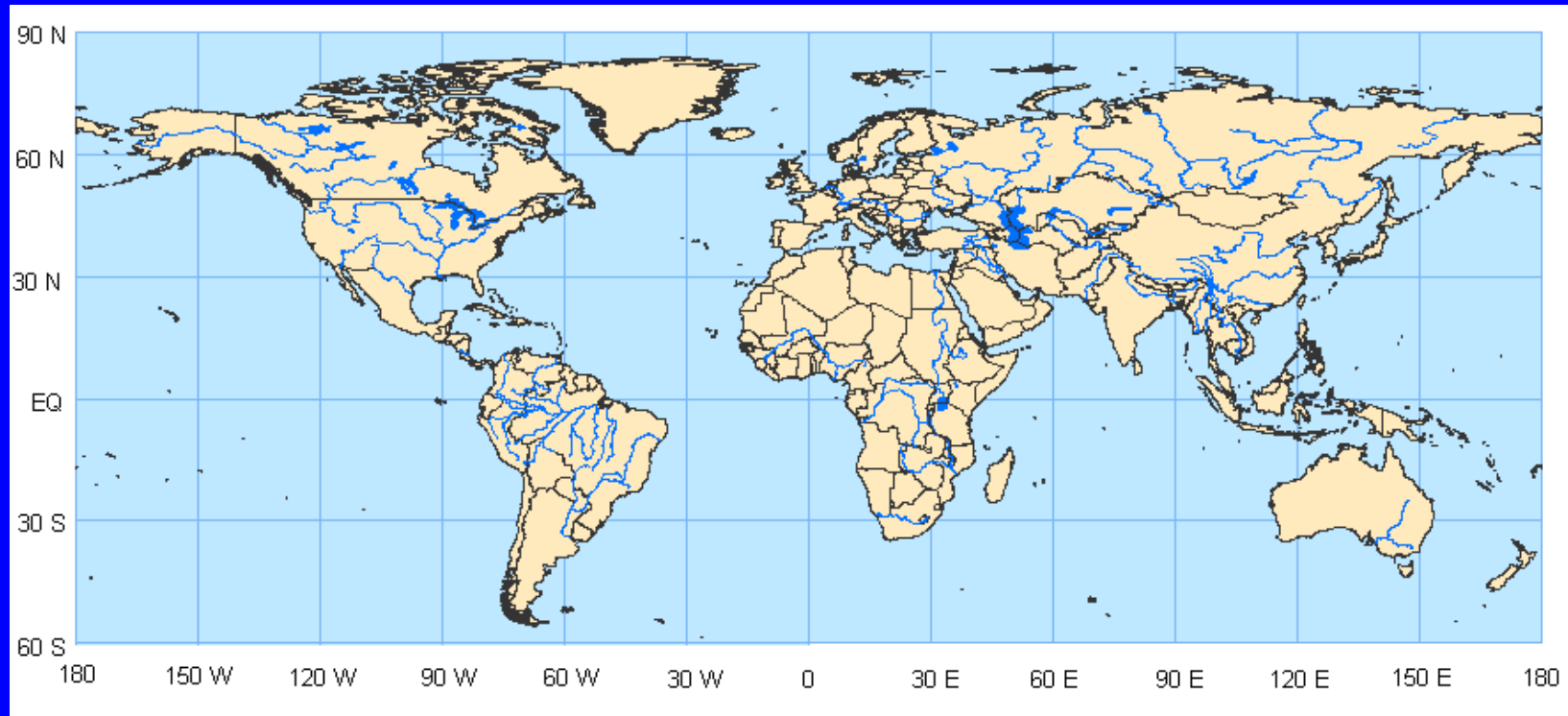


1. Hurricane Ioke will impact shipping in the north-central Pacific west of Hawaii.
2. An increased chance for above normal rainfall for the central and eastern Pacific Ocean, northern South America, Central America, sections of Mexico and the southwest US.
3. Favorable conditions are expected for tropical cyclogenesis in the eastern Pacific and tropical depression 10E is expected strengthen to hurricane status during the period and impact the area southwest of Baja California.
4. An increased chance for above normal rainfall for the eastern Indian Ocean, Bay of Bengal, and Southeast Asia.



# Potential Benefits/Hazards – Week 2

## Valid August 29 – September 4, 2006



No definitive statements can be made regarding potential hazards/benefits during this time period.

# Summary

- The MJO remains weak. Based on the latest observations and model forecasts, continued weak MJO activity is expected during the next 1-2 weeks.
- During week 1, there is an increased chance for above normal rainfall for sections of the eastern Indian Ocean, the Bay of Bengal, Southeast Asia, the central and eastern Pacific Ocean, northern South America, Central America, Mexico and the southwest US. Also, favorable conditions for tropical cyclogenesis are expected in the eastern Pacific.
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