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

Update prepared by
Climate Prediction Center / NCEP
August 28, 2006

Outline

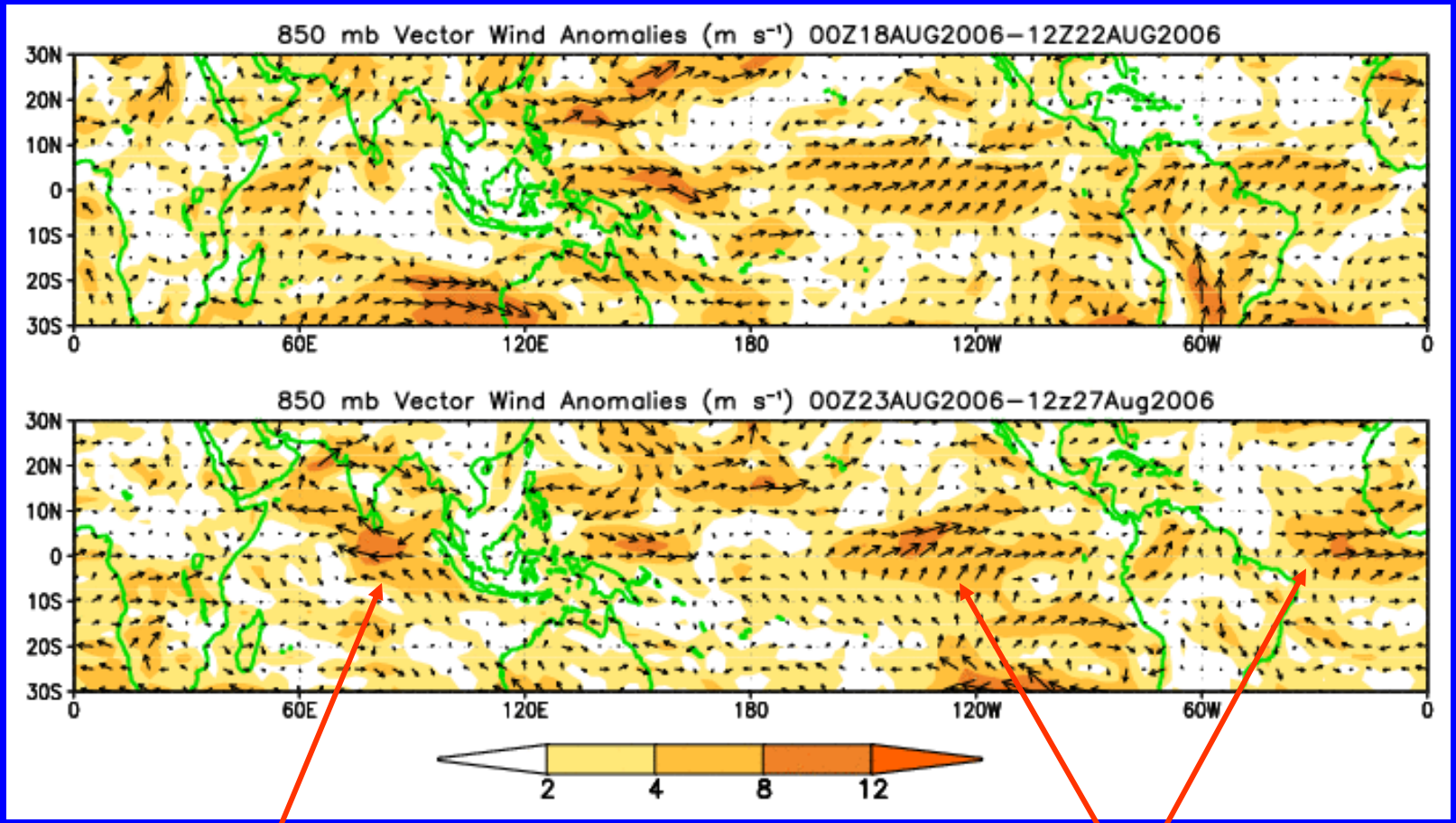
- Overview
- Recent Evolution and Current Conditions
- Madden Julian Oscillation Forecast
- Summary

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, the western Pacific, the eastern Pacific, Central America, and Mexico. Also, favorable conditions for tropical cyclogenesis are expected in the eastern Pacific and tropical Atlantic basins.
- Hurricane Ioke will impact shipping in the northwest Pacific Ocean southeast of Japan while tropical storm Ernesto may strengthen and impact interests in Cuba, Florida, the Bahamas and the eastern seaboard of the US. Also, TD 11E is expected to strengthen and impact the eastern Pacific.
- During week 2, there is an increased chance of above average rainfall for sections of Indonesia and the western Pacific and conditions are expected to become favorable for tropical cyclogenesis in the western Pacific Ocean.

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

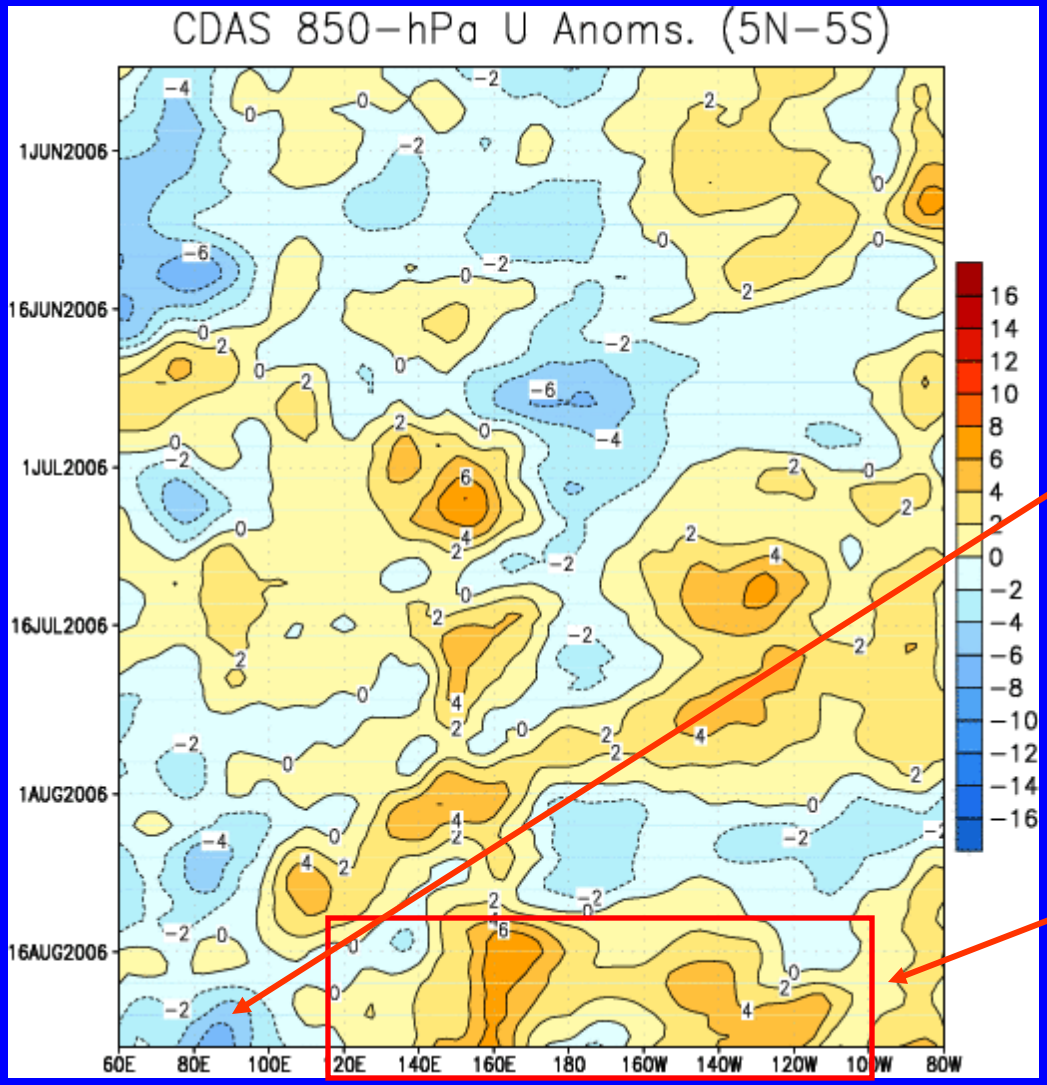
Note that shading denotes the magnitude of the anomalous wind vectors



Easterly anomalies have returned to the eastern Indian Ocean.

Westerly anomalies near the equator in both the eastern Pacific and Atlantic.

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



Time

Longitude

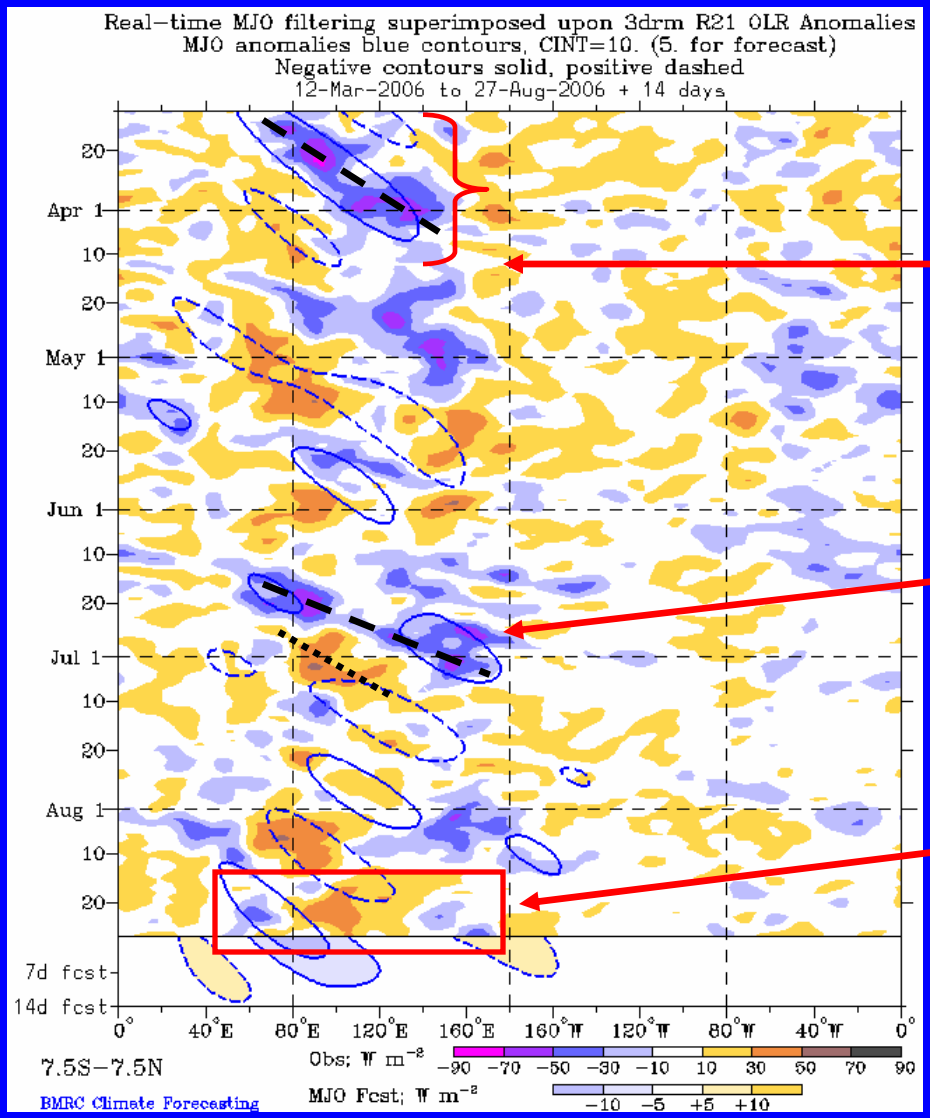
Weaker-than-average easterlies or westerlies (orange/red shading)

Stronger-than-average easterlies (blue shading)

In recent days, easterly anomalies have strengthened in the Indian Ocean.

Strong westerly anomalies have been evident across nearly the entire Pacific Ocean for an extended period of time.

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



Time

Longitude

Drier-than-average conditions (/red shading)

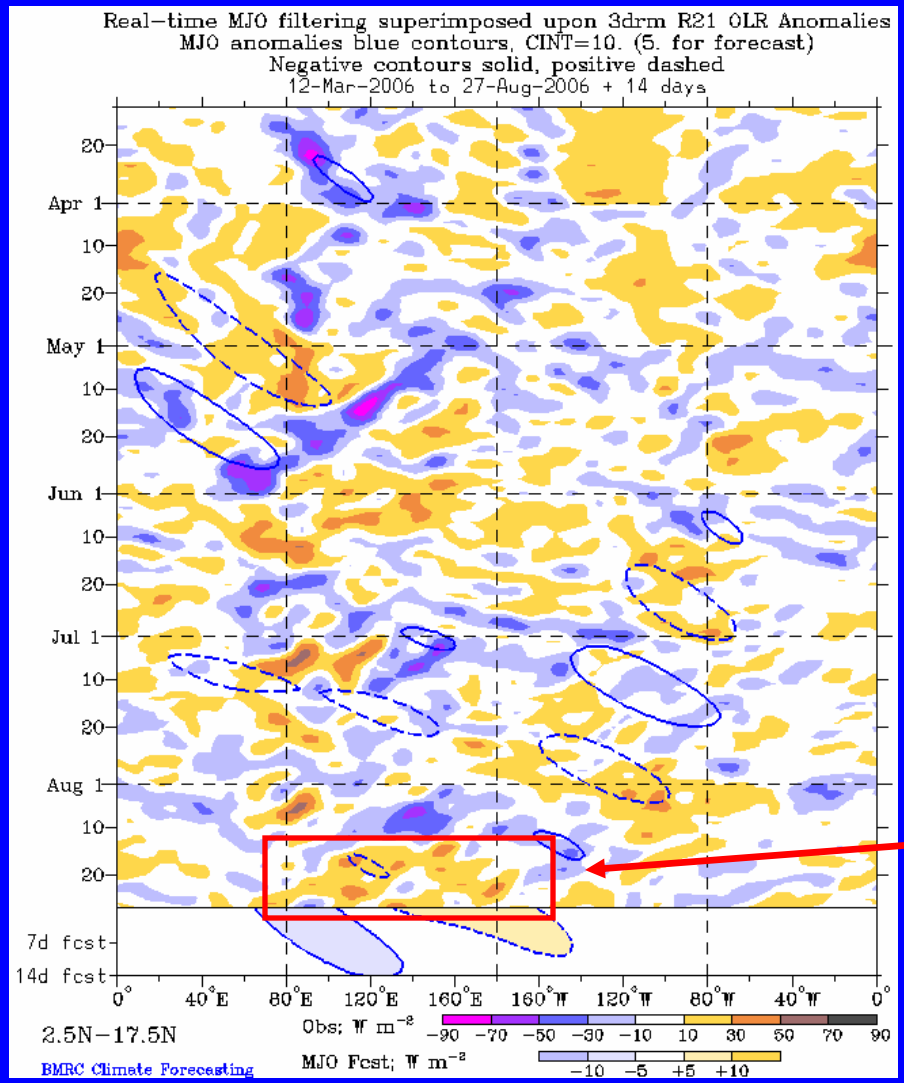
Wetter-than-average conditions (blue shading)

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 remain across Indonesia with recent smaller areas of enhanced convection evident in the central Indian Ocean and western Pacific.

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



Time

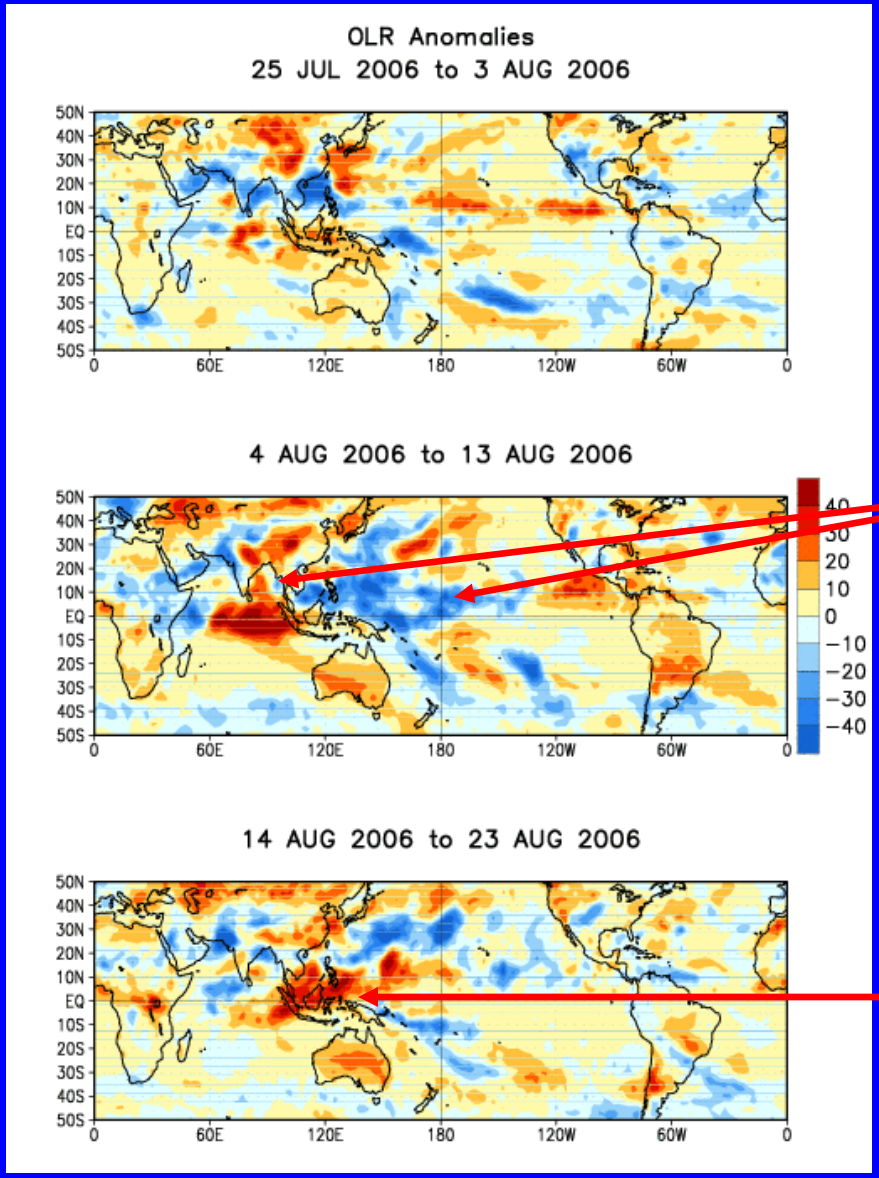
Longitude

Drier-than-average conditions (/red shading)

Wetter-than-average conditions (blue shading)

In general, dry condition have been evident north of the equator across Indonesia and the western Pacific.

Anomalous OLR: Last 30 days



Drier-than-average conditions (/red shading)

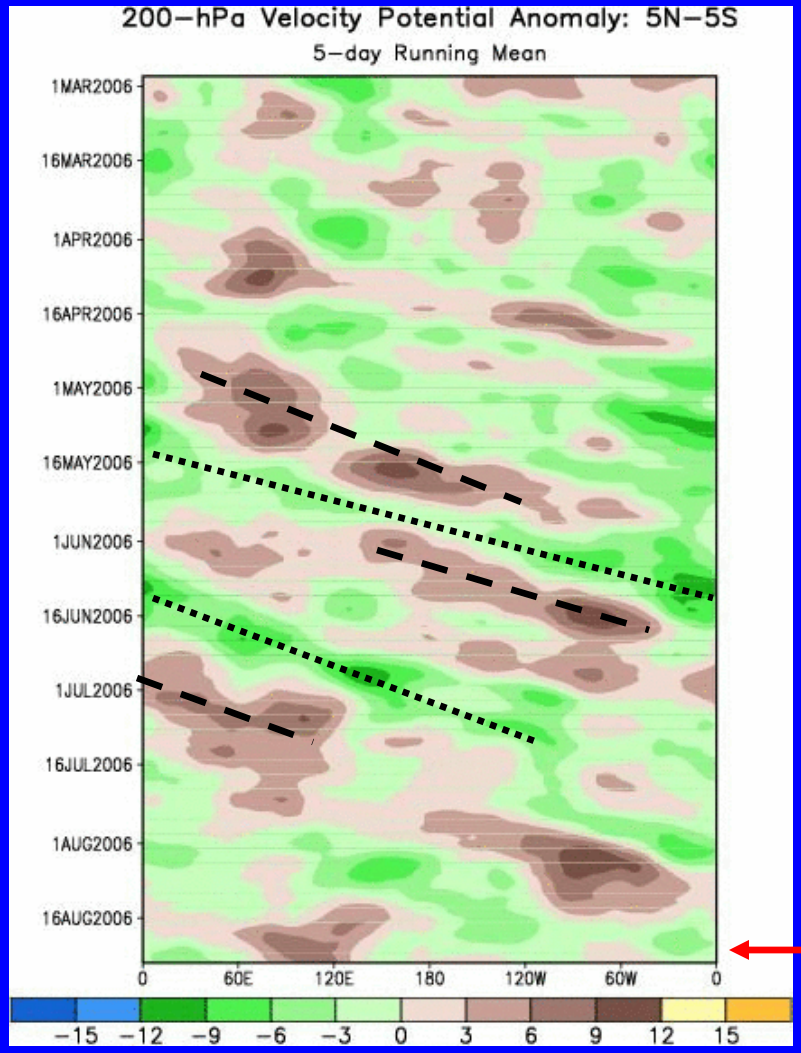
Wetter-than-average conditions (blue shading)

During early August, dry (wet) conditions impacted areas in the Indian Ocean (western Pacific).

During the last ten days, dry conditions are evident across much of the western Maritime Continent.

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

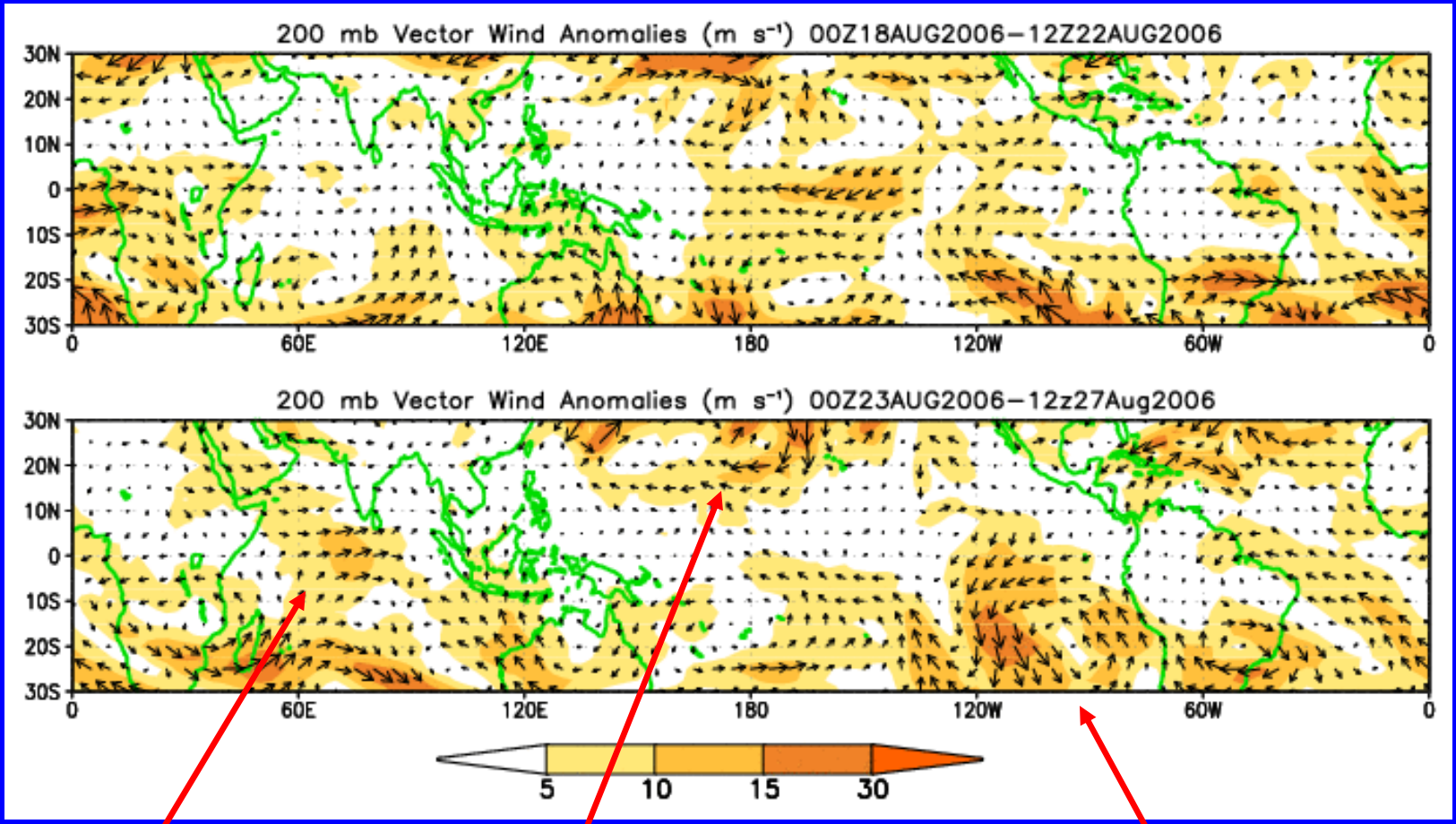
The MJO was incoherent during much of March and April.

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

Most recently, upper-level divergence (convergence) across the western Hemisphere (Indian Ocean).

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

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

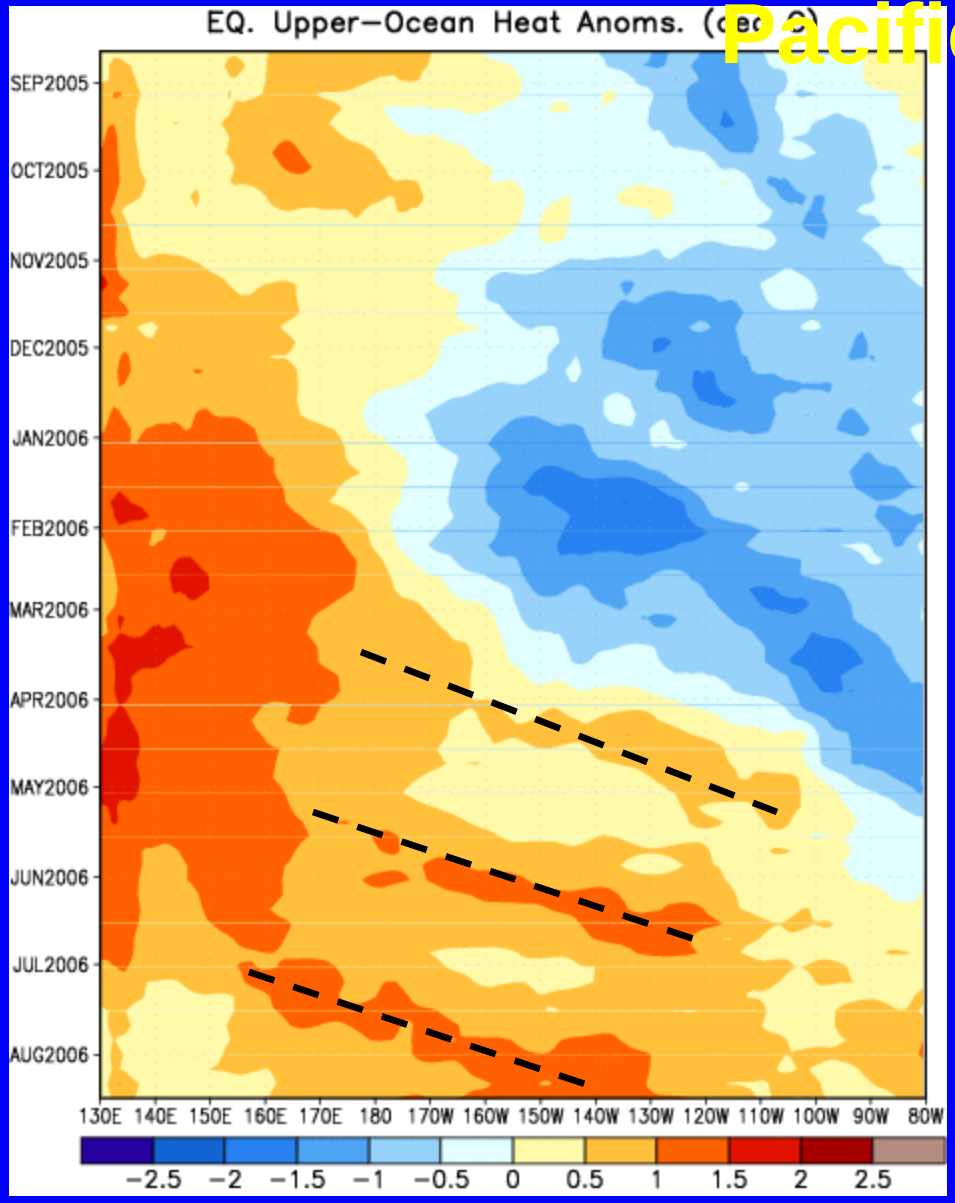


Westerly anomalies are now evident in the Indian Ocean.

There remains a highly variable pattern in the northern hemisphere sub-tropics.

Anti-cyclonic circulation in the eastern Pacific south of the equator.

Heat Content Evolution in the Eq. Pacific

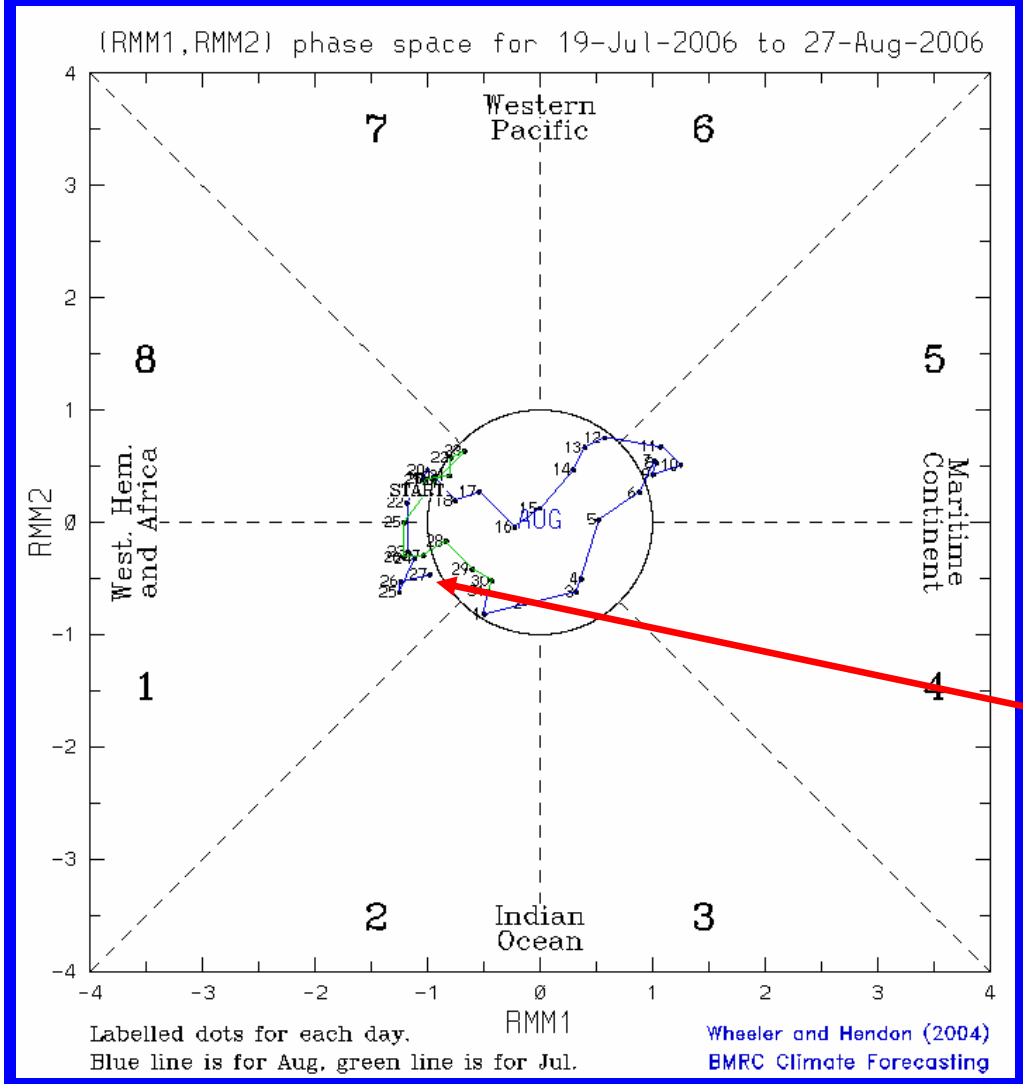


Time

Longitude

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)

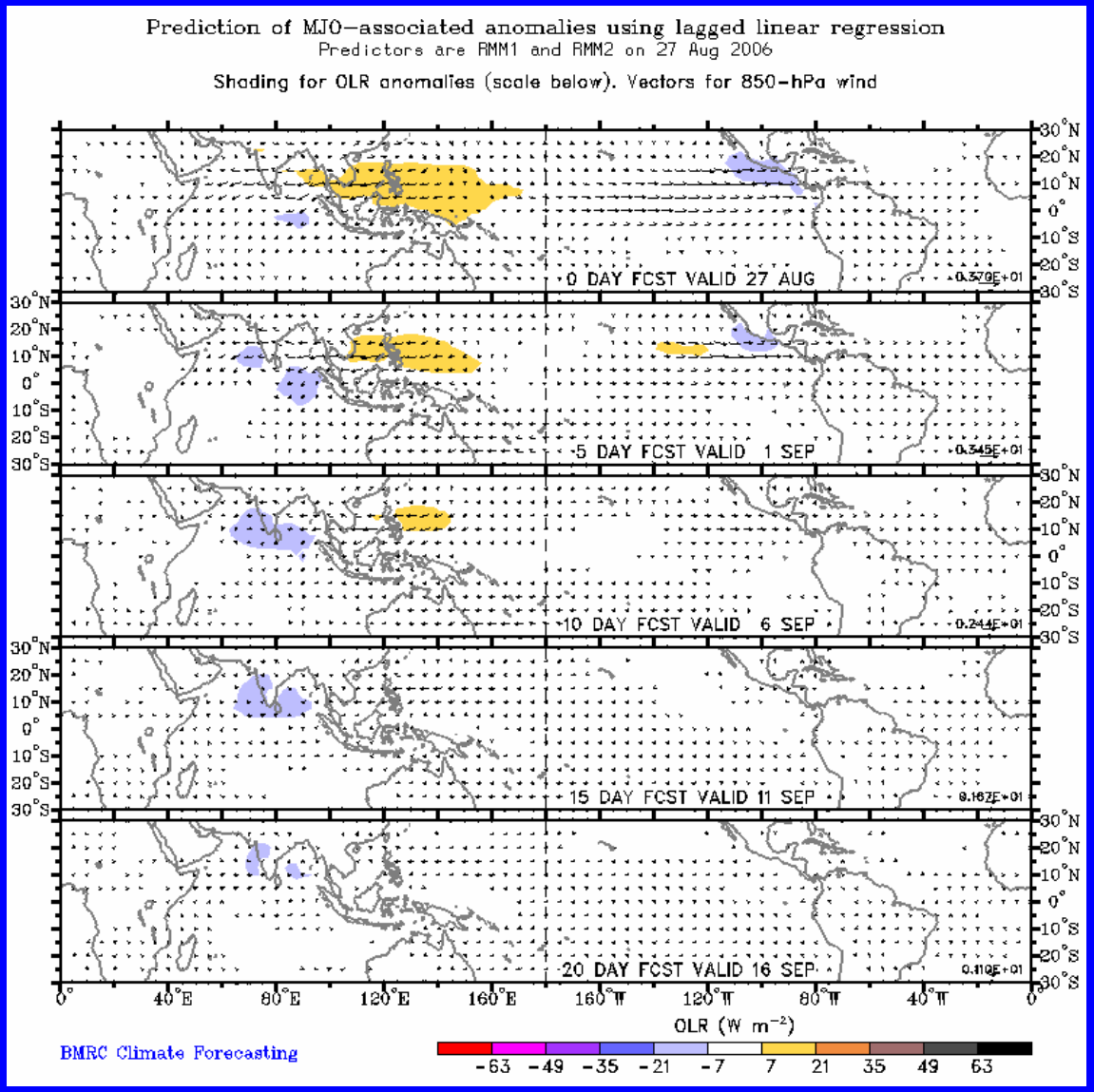


The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850 hPa zonal wind, 200 hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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.

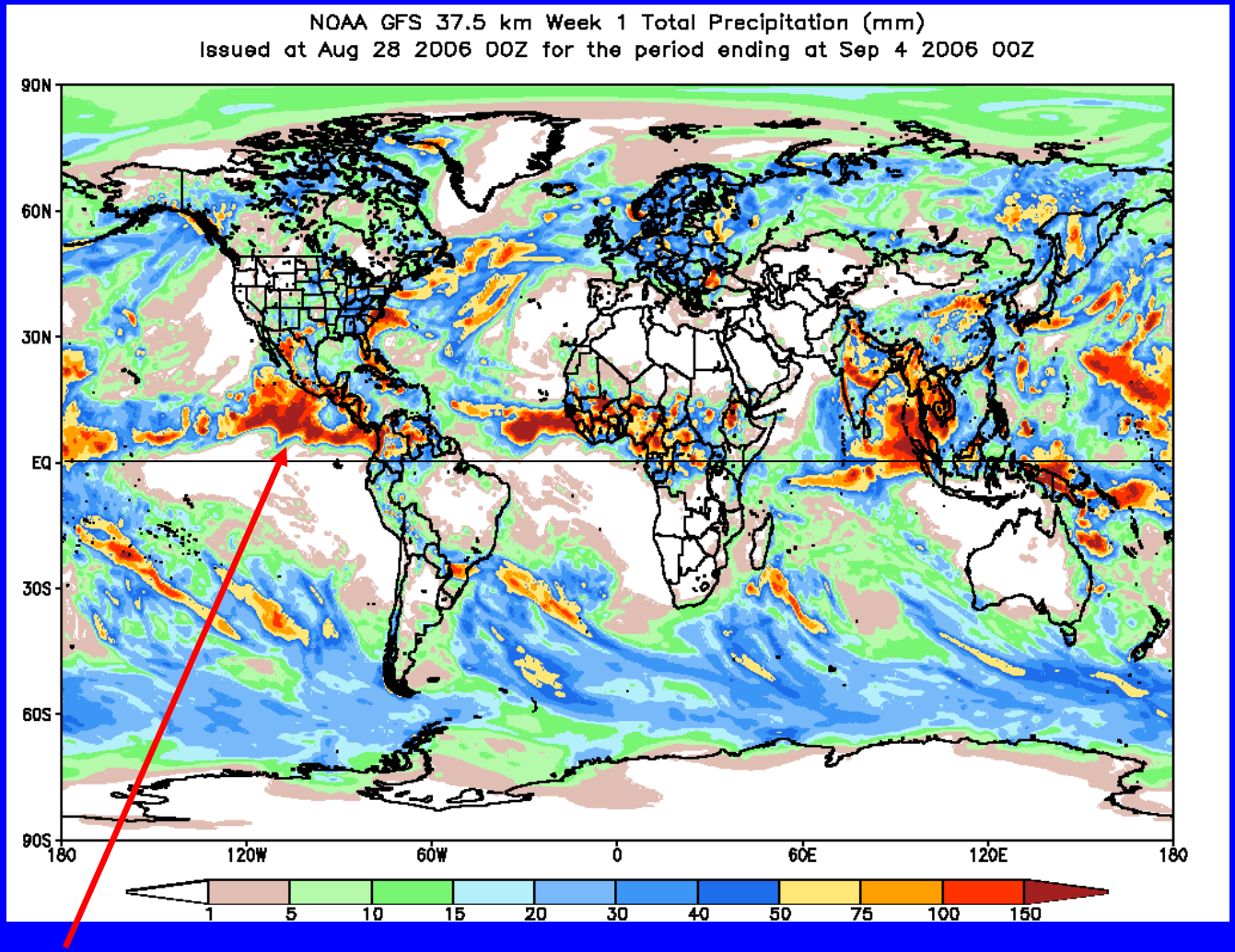
The MJO signal remains weak but is centered in Africa.

Statistical OLR MJO Forecast



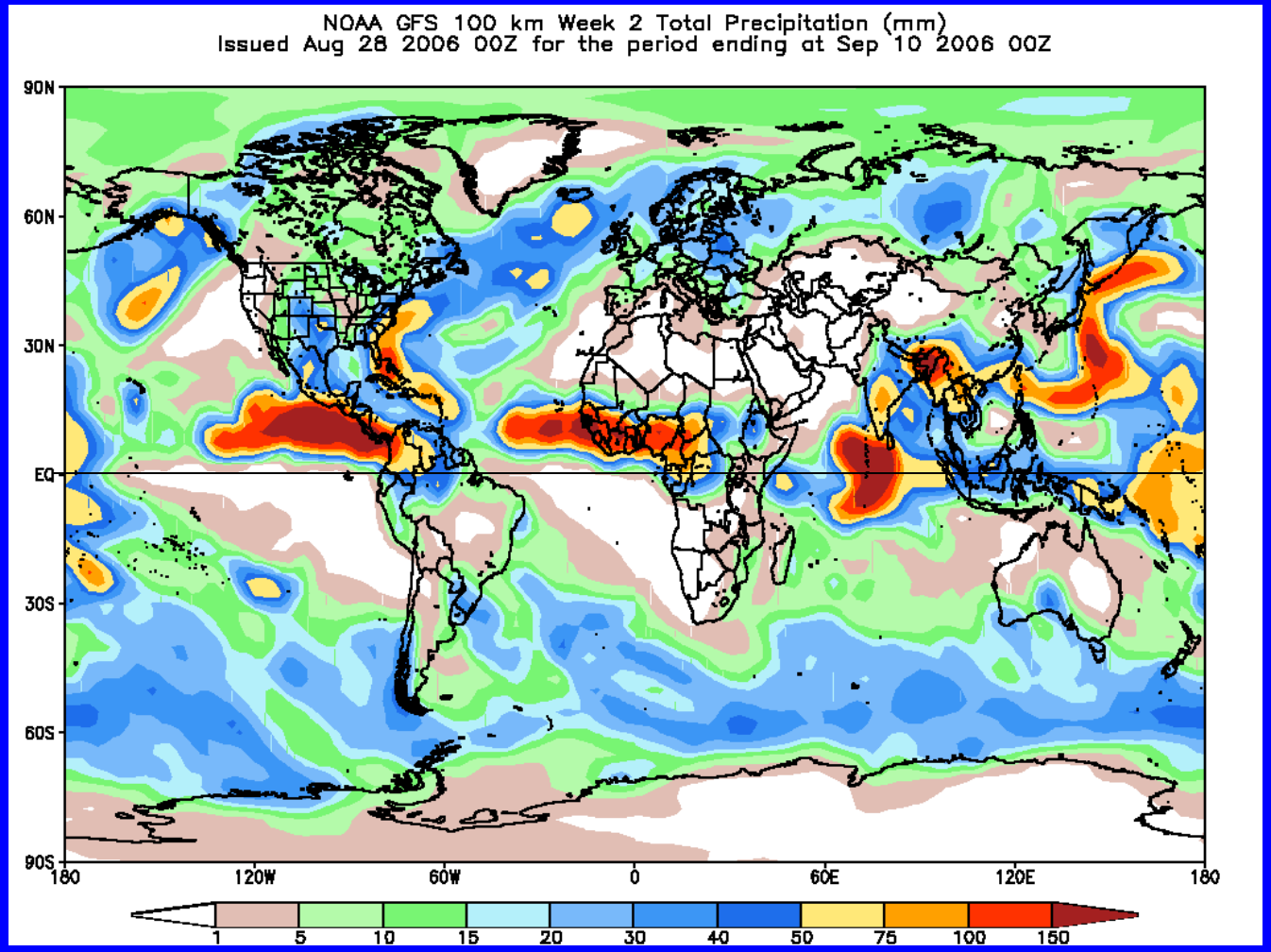
Dry conditions are forecast across sections of Indonesia and the western Pacific with wet conditions developing in the Indian Ocean.

Global Forecast System (GFS) Week 1 Precipitation Forecast

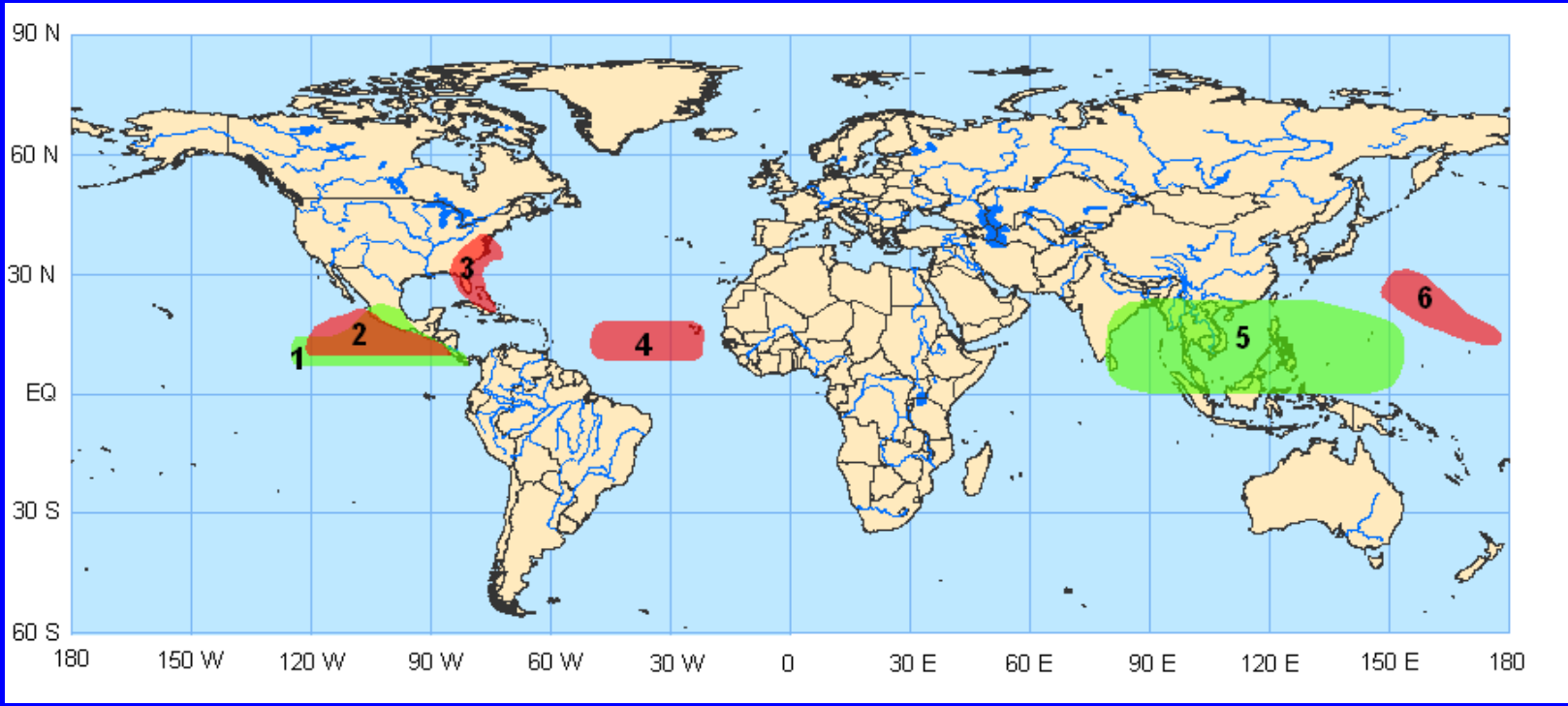


The eastern Pacific is expected to remain active.

Global Forecast System (GFS) Week 2 Precipitation Forecast

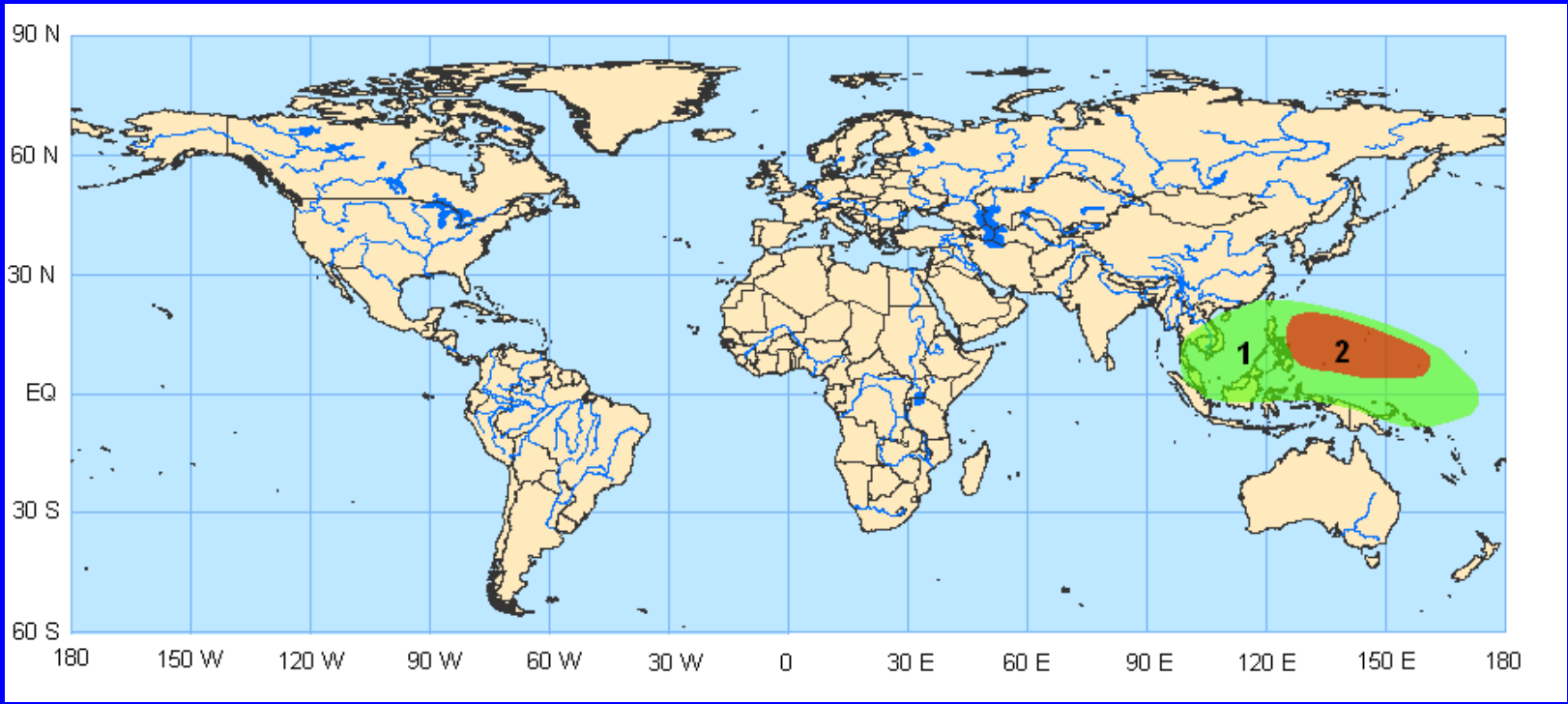


Potential Benefits/Hazards – Week 1
Valid August 29 – September 4, 2006



1. An increased chance for above normal rainfall for the eastern Pacific Ocean and sections of Central America and Mexico.
2. Favorable conditions are expected for tropical cyclogenesis in the eastern Pacific and TD 11E is expected to strengthen and impact the region west of Mexico.
3. Tropical Storm Ernesto may strengthen and impact Cuba, Florida, the Bahamas, and the eastern seaboard of the US.
4. Favorable conditions are expected for tropical cyclogenesis in the tropical Atlantic.
5. An increased chance for above average rainfall for the eastern Indian Ocean, the Bay of Bengal, southeast Asia, and the western Pacific Ocean.
6. Hurricane Ioke will impact shipping in the northwest Pacific southeast of Japan.

Potential Benefits/Hazards – Week 2
Valid September 5 – 11, 2006



1. An increased chance for above normal rainfall for sections of Indonesia and the western Pacific Ocean.
2. Favorable conditions for tropical cyclogenesis in the western Pacific Ocean.

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, the western Pacific, the eastern Pacific, Central America, and Mexico. Also, favorable conditions for tropical cyclogenesis are expected in the eastern Pacific and tropical Atlantic basins.
- Hurricane Ioke will impact shipping in the northwest Pacific Ocean southeast of Japan while tropical storm Ernesto may strengthen and impact interests in Cuba, Florida, the Bahamas and the eastern seaboard of the US. Also, TD 11E is expected to strengthen and impact the eastern Pacific.
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