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

Update prepared by
Climate Prediction Center / NCEP
September 5, 2006

Outline

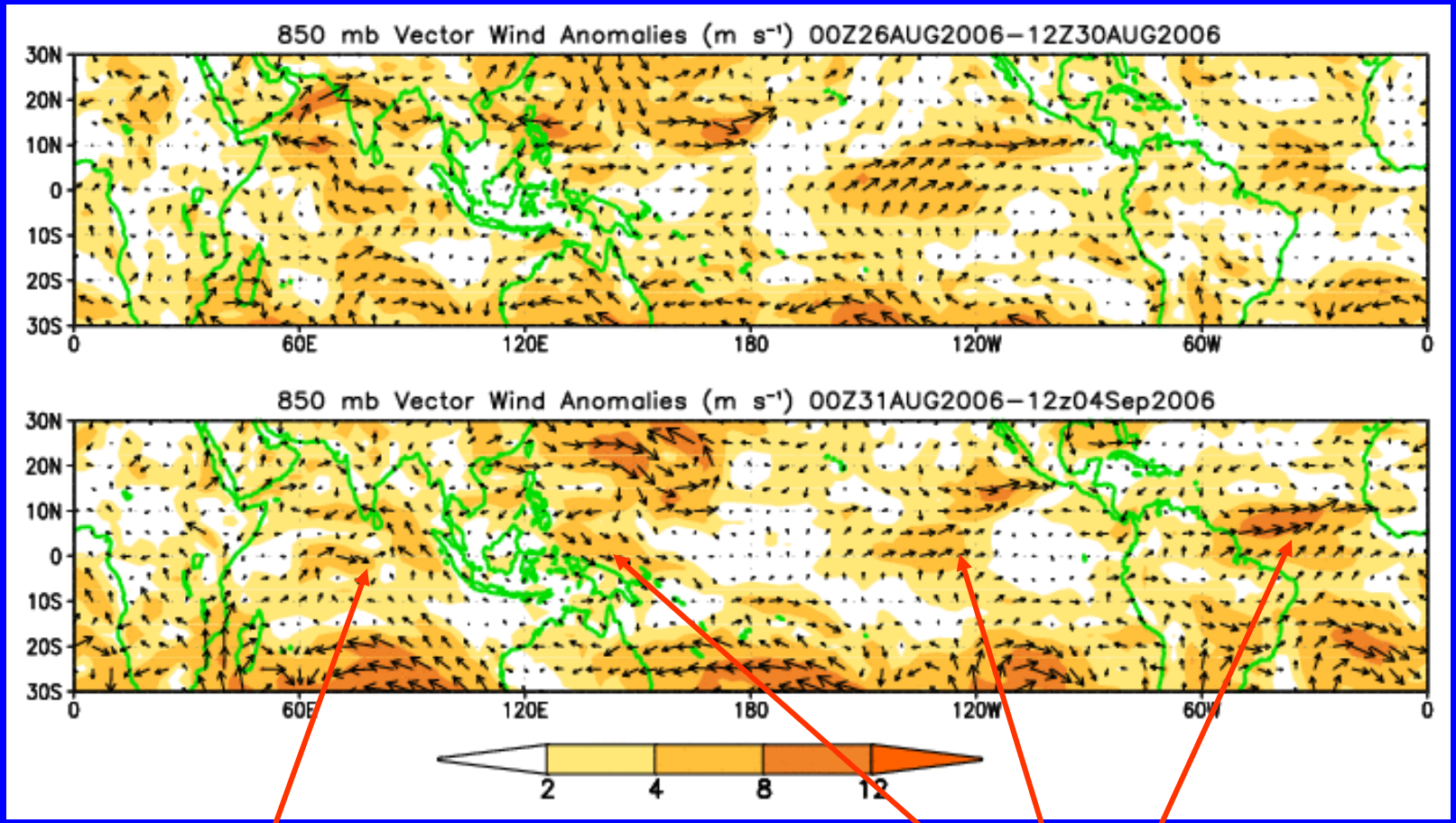
- Overview
- Recent Evolution and Current Conditions
- Madden Julian Oscillation Forecast
- Summary

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 the central Indian Ocean and in the Pacific Ocean near the date line with an increased chance for below normal rainfall for the Maritime continent.
- Also during week 1, there are favorable conditions for tropical cyclogenesis in the Atlantic Ocean. Tropical Cyclone Florence will impact the subtropical Atlantic Ocean and Typhoon Ioke will influence the northwestern Pacific Ocean.
- During week 2, the potential hazards/benefits are unclear.

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

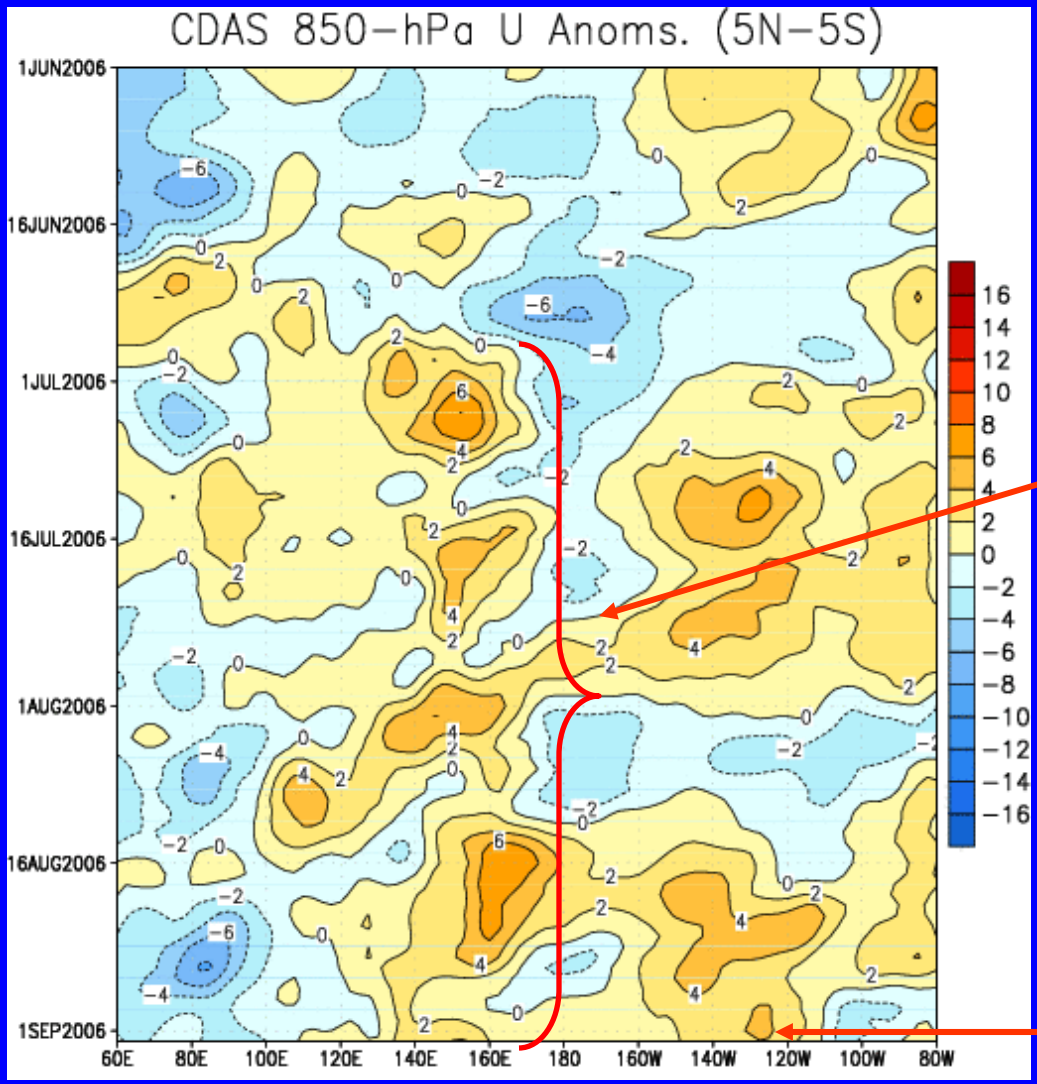
Note that shading denotes the magnitude of the anomalous wind vectors



Easterly anomalies have weakened in the Indian Ocean.

Westerly anomalies remain persistent along the equator in the western Pacific, eastern Pacific, and Atlantic Oceans.

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



Time

Longitude

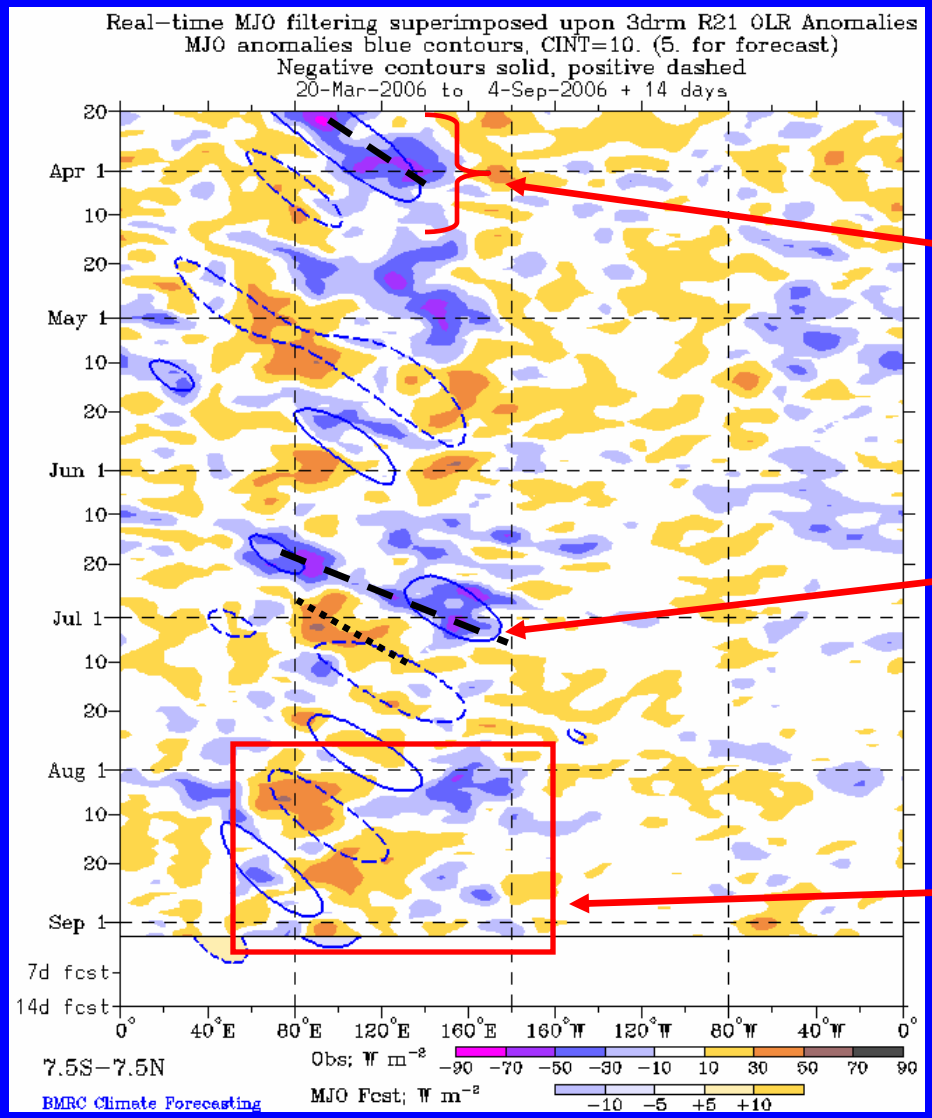
Weaker-than-average easterlies or westerlies (orange/red shading)

Stronger-than-average easterlies (blue shading)

Since early July, anomalous westerly wind "bursts" have been observed just west of the Date line.

Recently, westerly anomalies have been observed across much of the Pacific.

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



Time

Longitude

Drier-than-average conditions (/red shading)

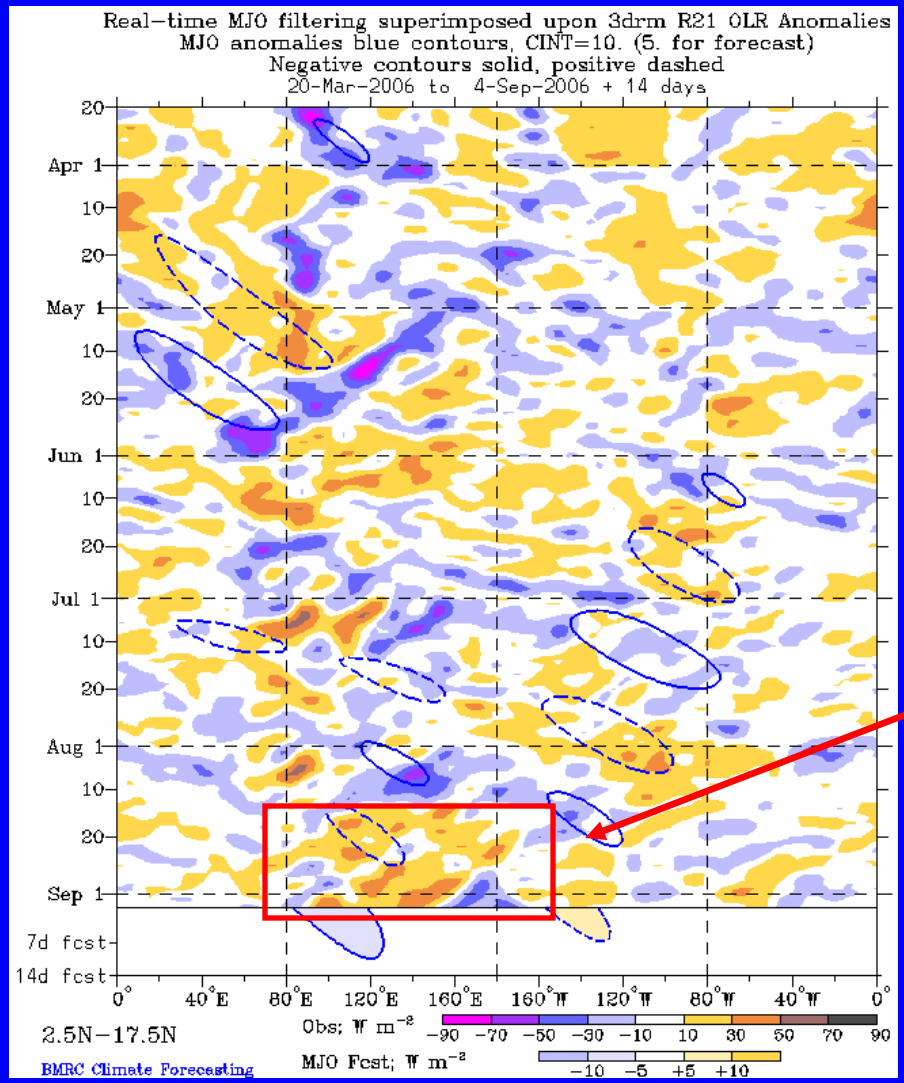
Wetter-than-average conditions (blue shading)

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

Coherent OLR anomalies moved across the Eastern Hemisphere in June.

Since early August, mostly dry conditions have been observed near the eastern Indian Ocean and the Maritime Continent. Spotty areas of enhanced convection have been evident in the central Indian Ocean and western Pacific.

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



Time

Longitude

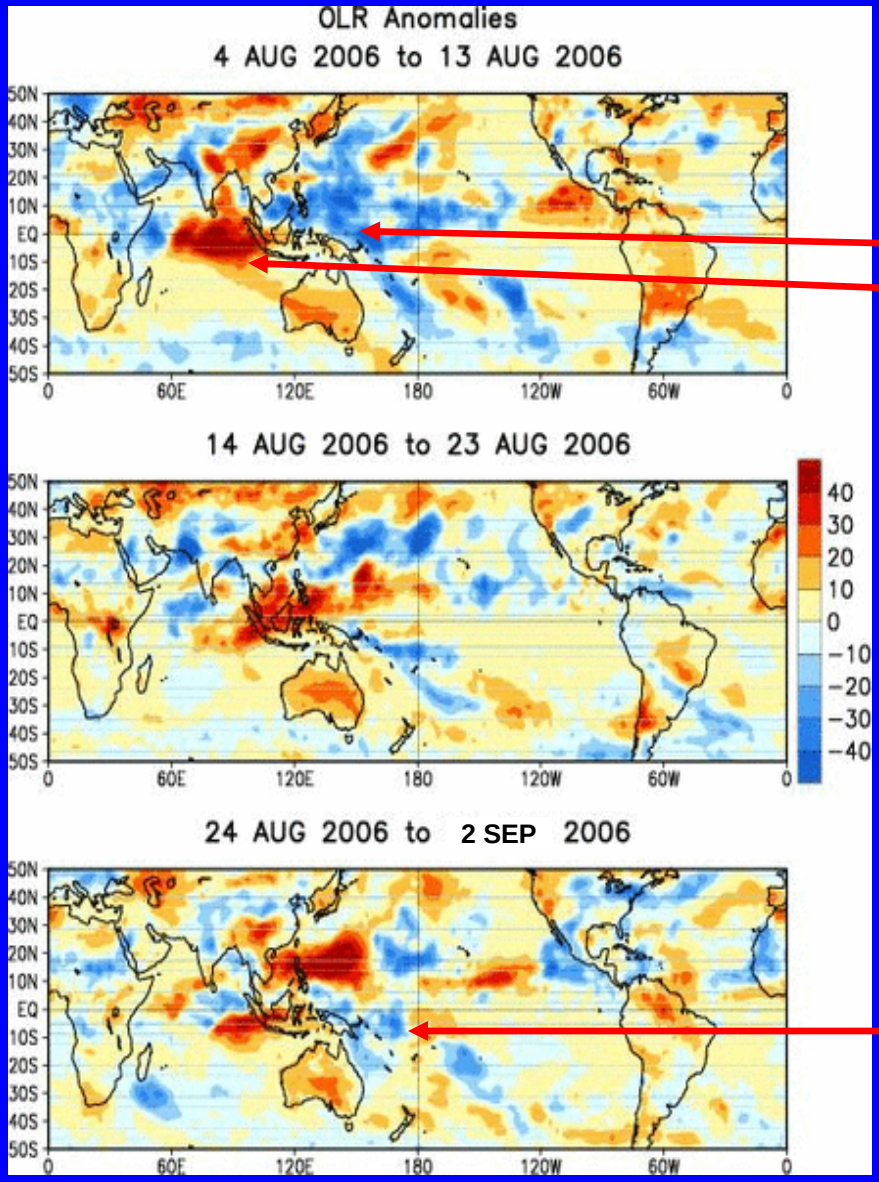
Drier-than-average conditions (/red shading)

Wetter-than-average conditions (blue shading)

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

Recently, wetter than average conditions have been observed near the date line.

Anomalous OLR: Last 30 days



Drier-than-average conditions (/red shading)

Wetter-than-average conditions (blue shading)

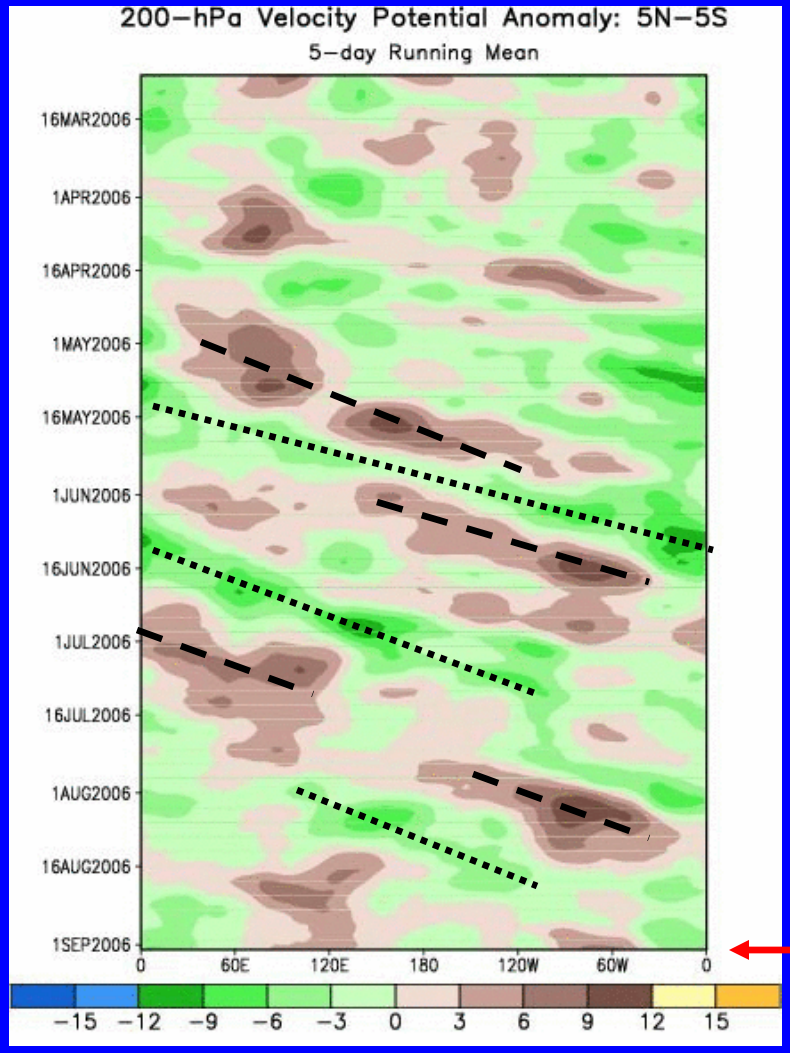
During early August, dry (wet) conditions impacted areas in the Indian Ocean (western Pacific).

Over the last 30 days, dry conditions have shifted eastward from the Indian Ocean to the Maritime Continent.

During the most recent ten days, dry conditions are evident across much of the western Maritime Continent. Convection has persisted to the east of Papua New Guinea.

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

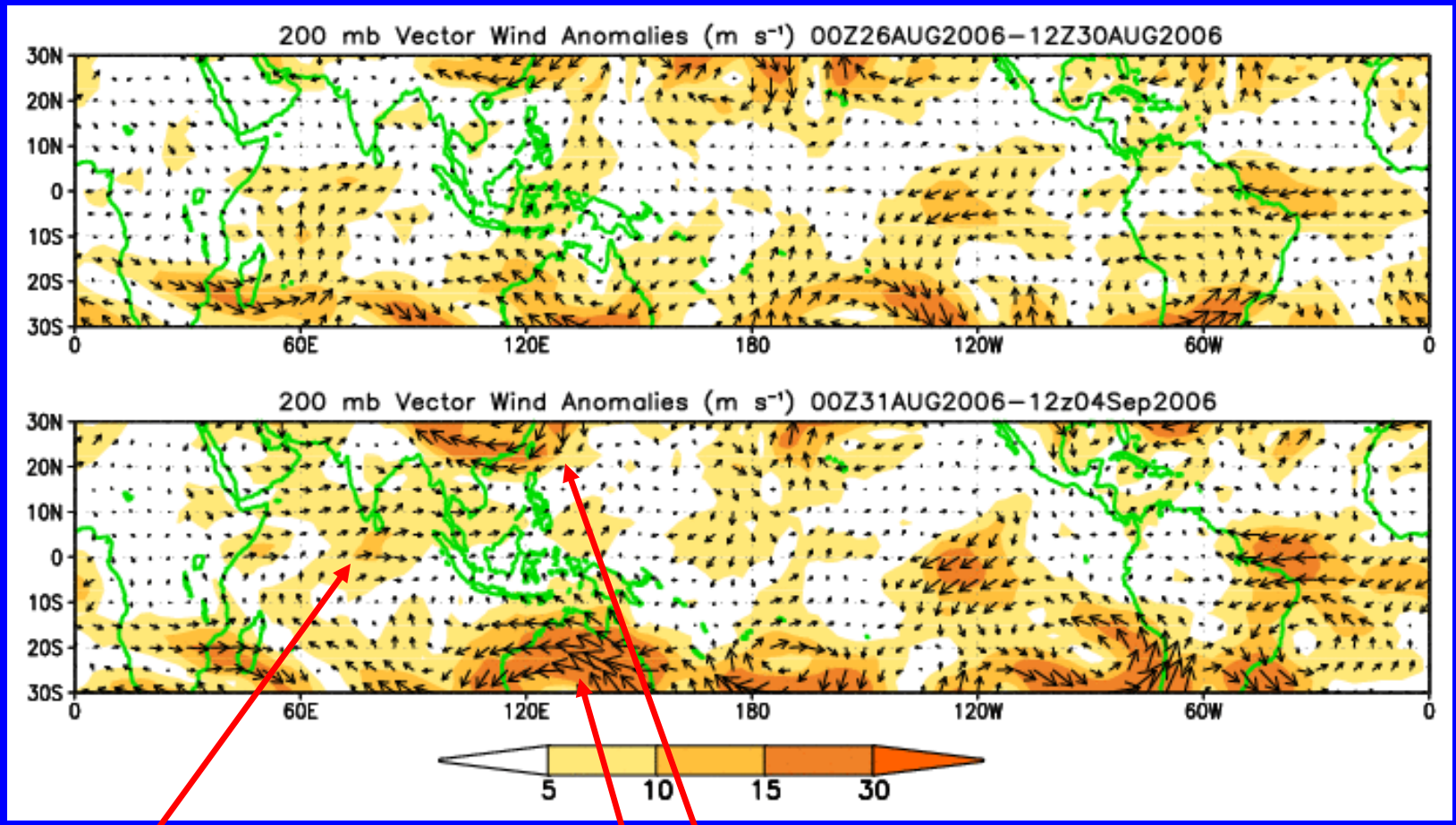
The MJO was incoherent during much of March and April.

MJO activity strengthened some during May through June and early August, but remained weak.

Most recently, the anomalies remain weak. An area of enhanced divergence is observed in the Atlantic and an area of enhanced convergence is located at the Maritime Continent.

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

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

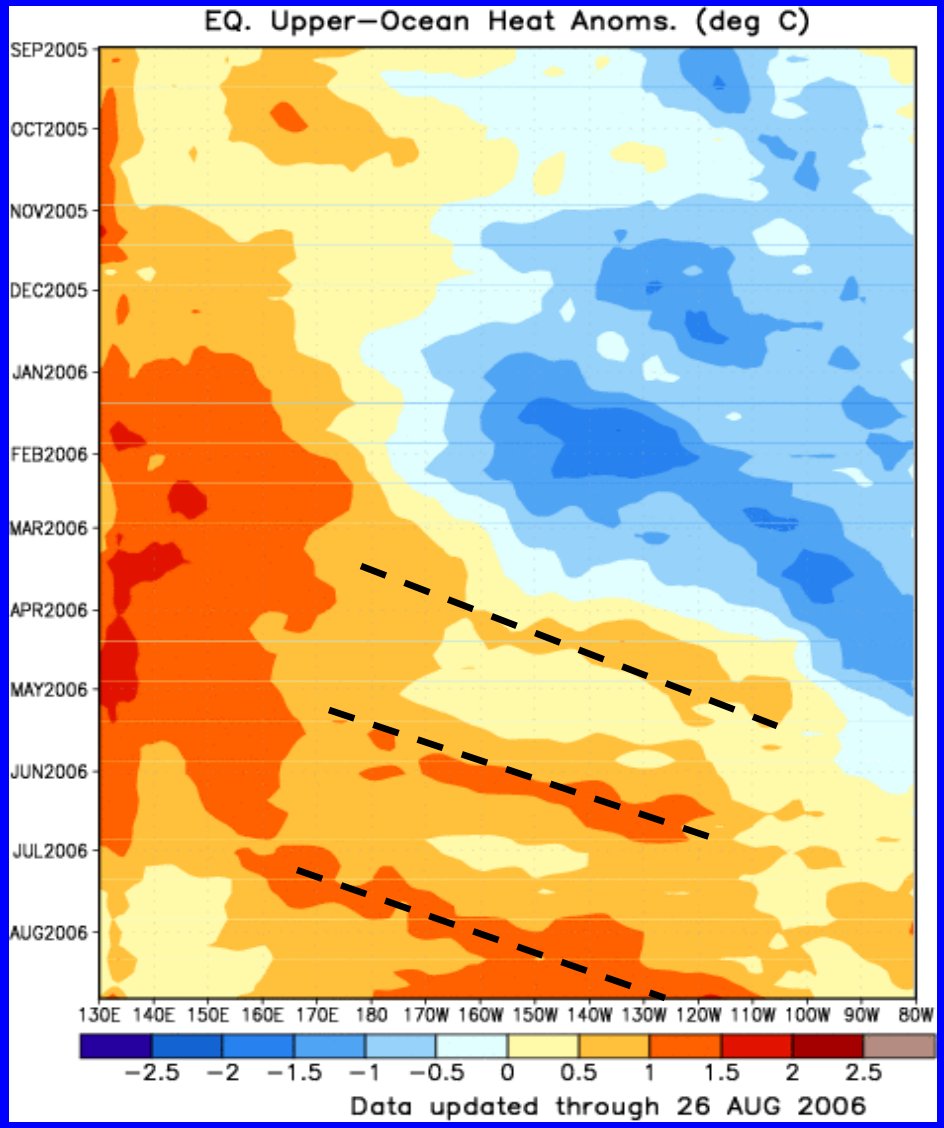


Westerly anomalies have strengthened over the Indian Ocean.

Anticyclonic circulation centers are evident north and south of the equator.

Heat Content Evolution in the Eq. Pacific

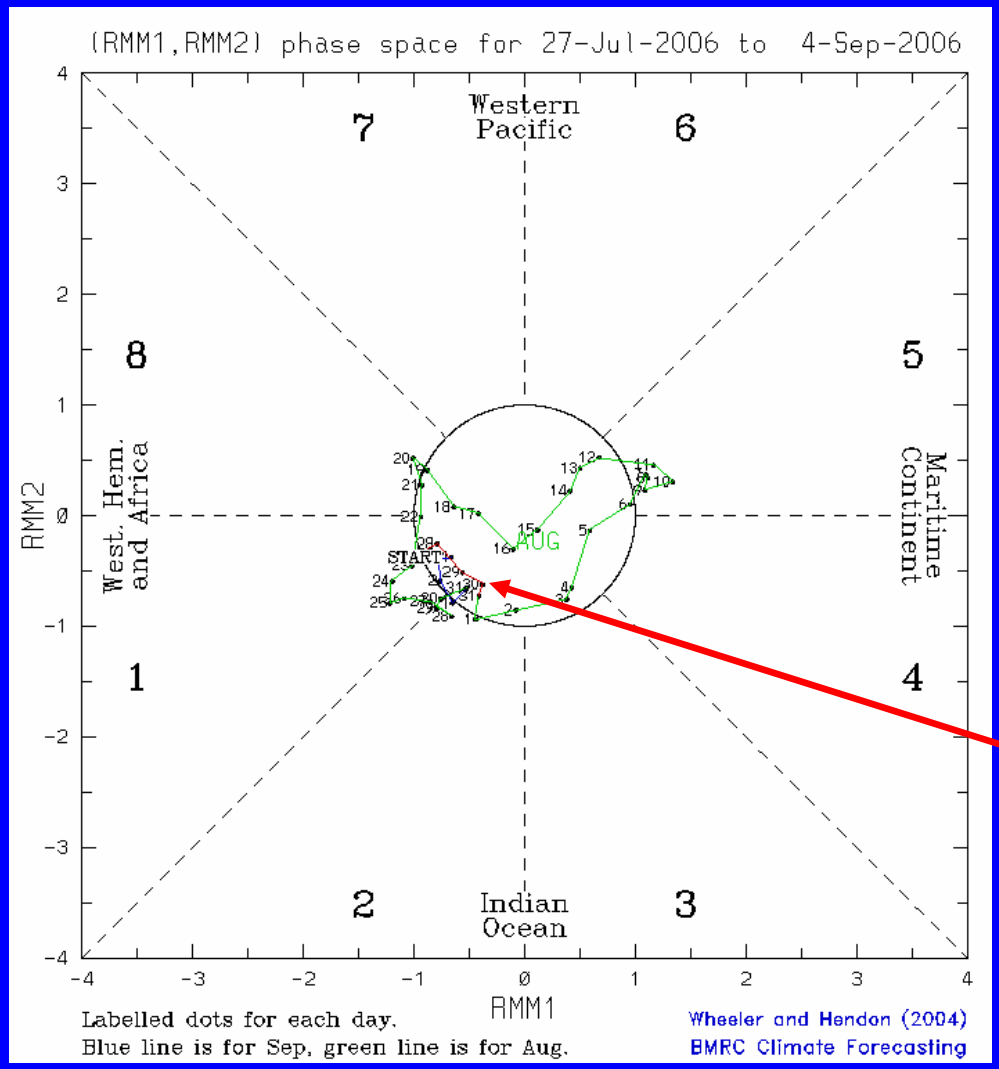
Time



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)

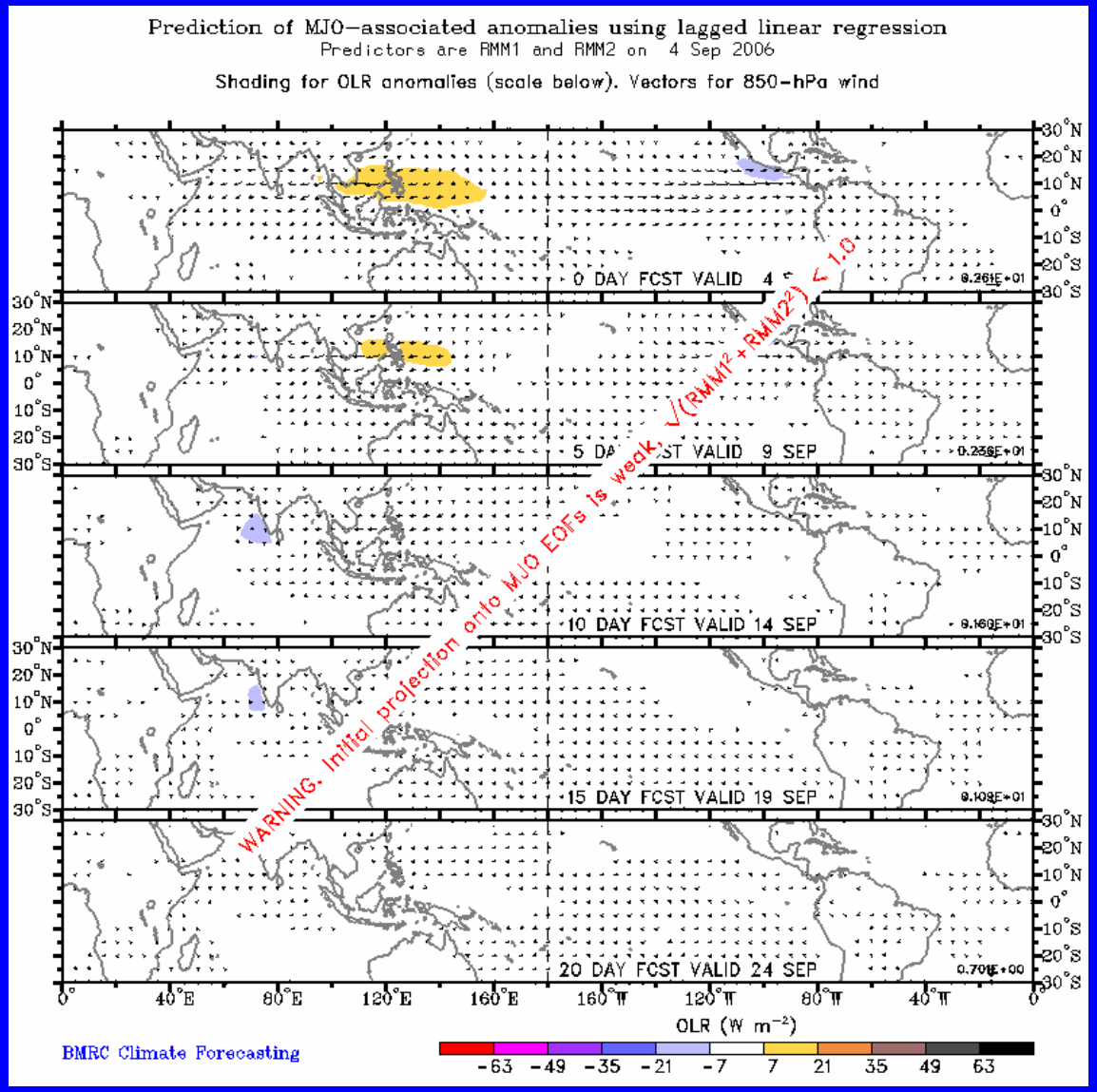


The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850 hPa zonal wind, 200 hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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.

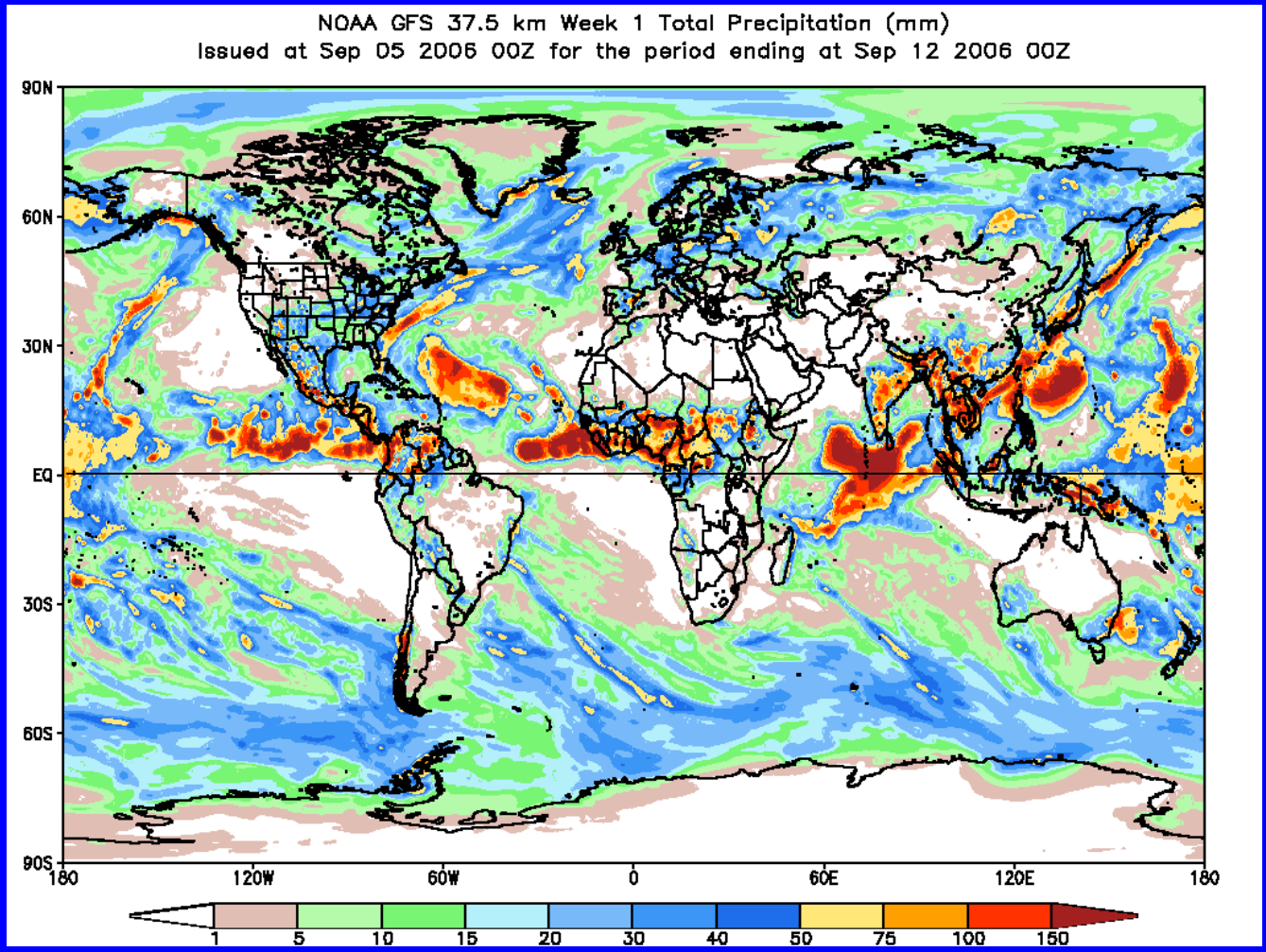
The MJO signal remains weak.

Statistical OLR MJO Forecast

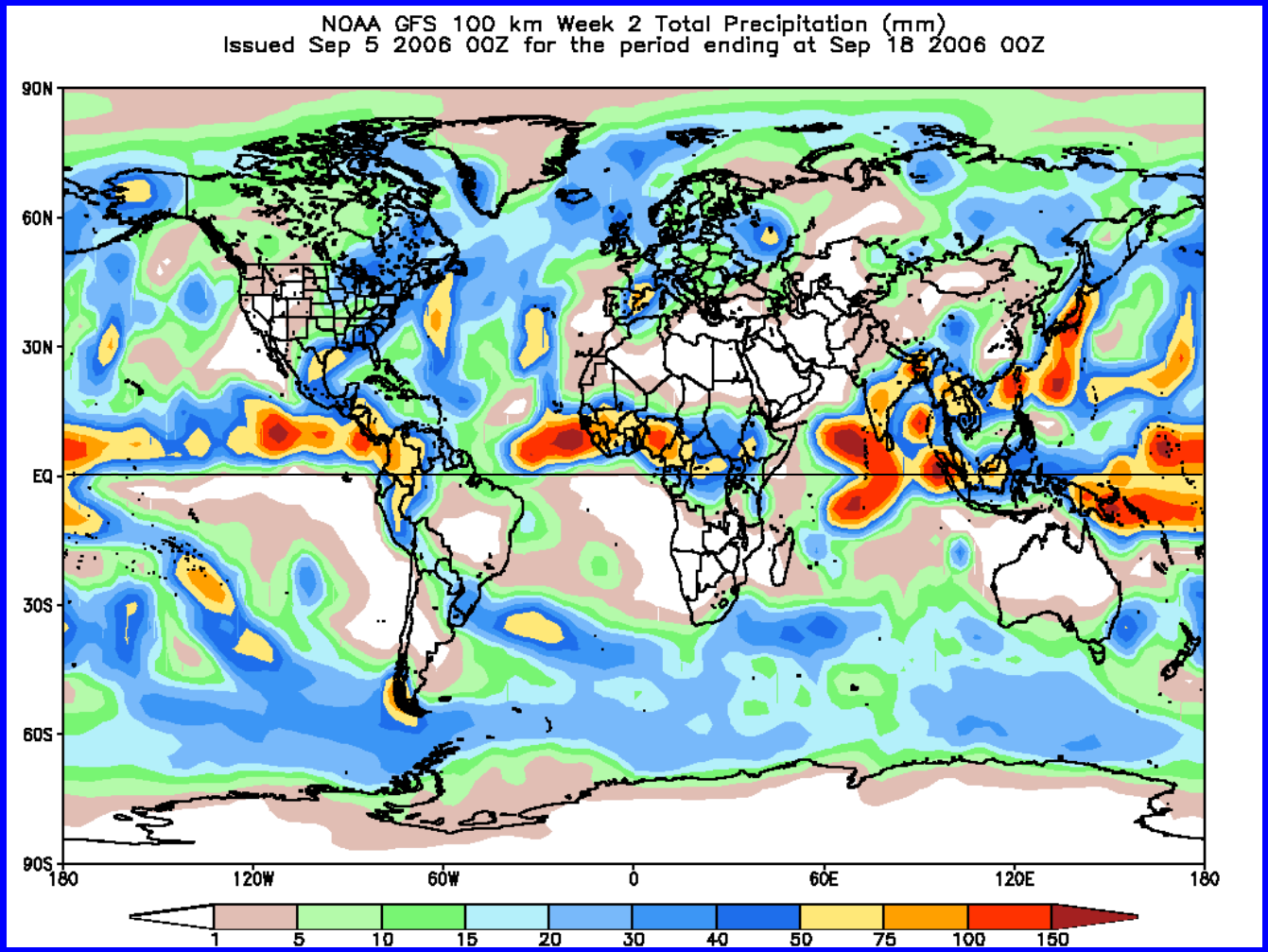


The projection onto the MJO is weak.

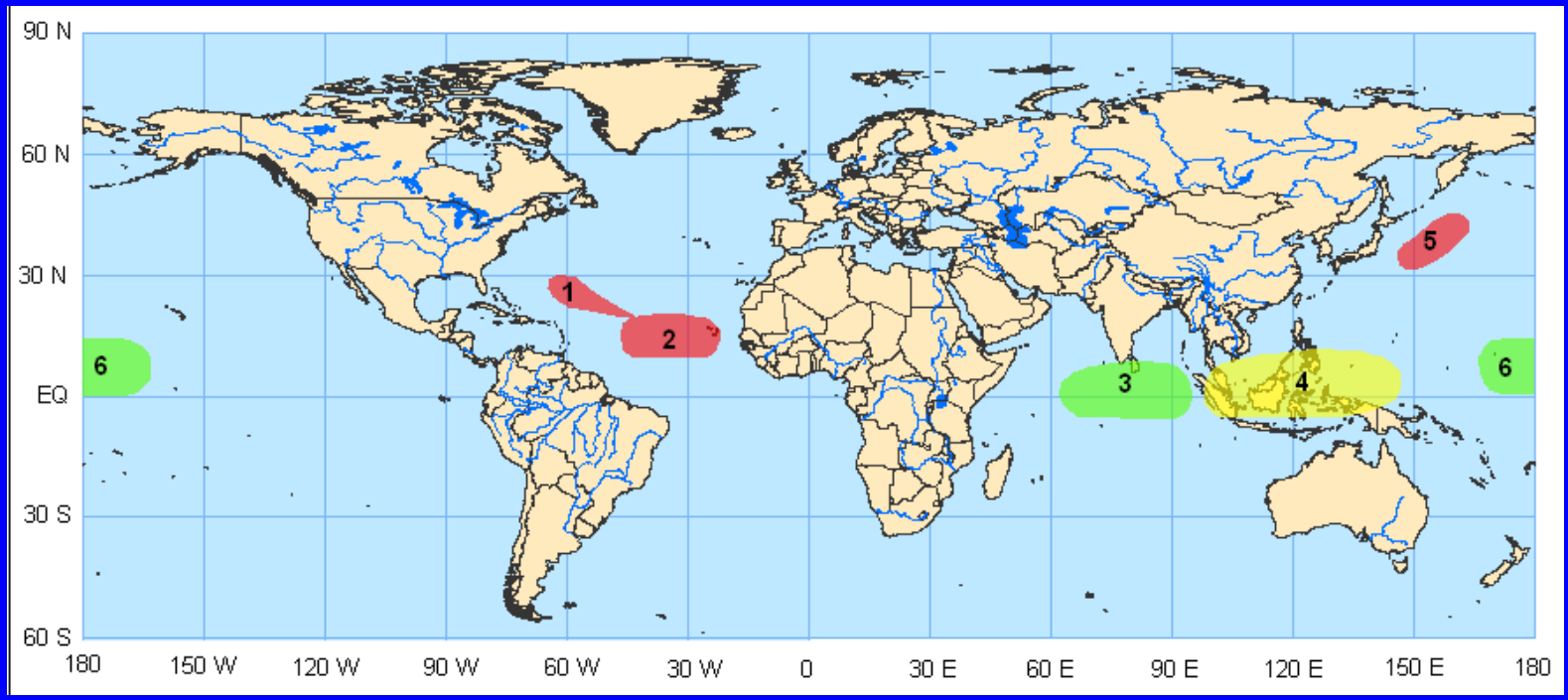
Global Forecast System (GFS) Week 1 Precipitation Forecast



Global Forecast System (GFS) Week 2 Precipitation Forecast

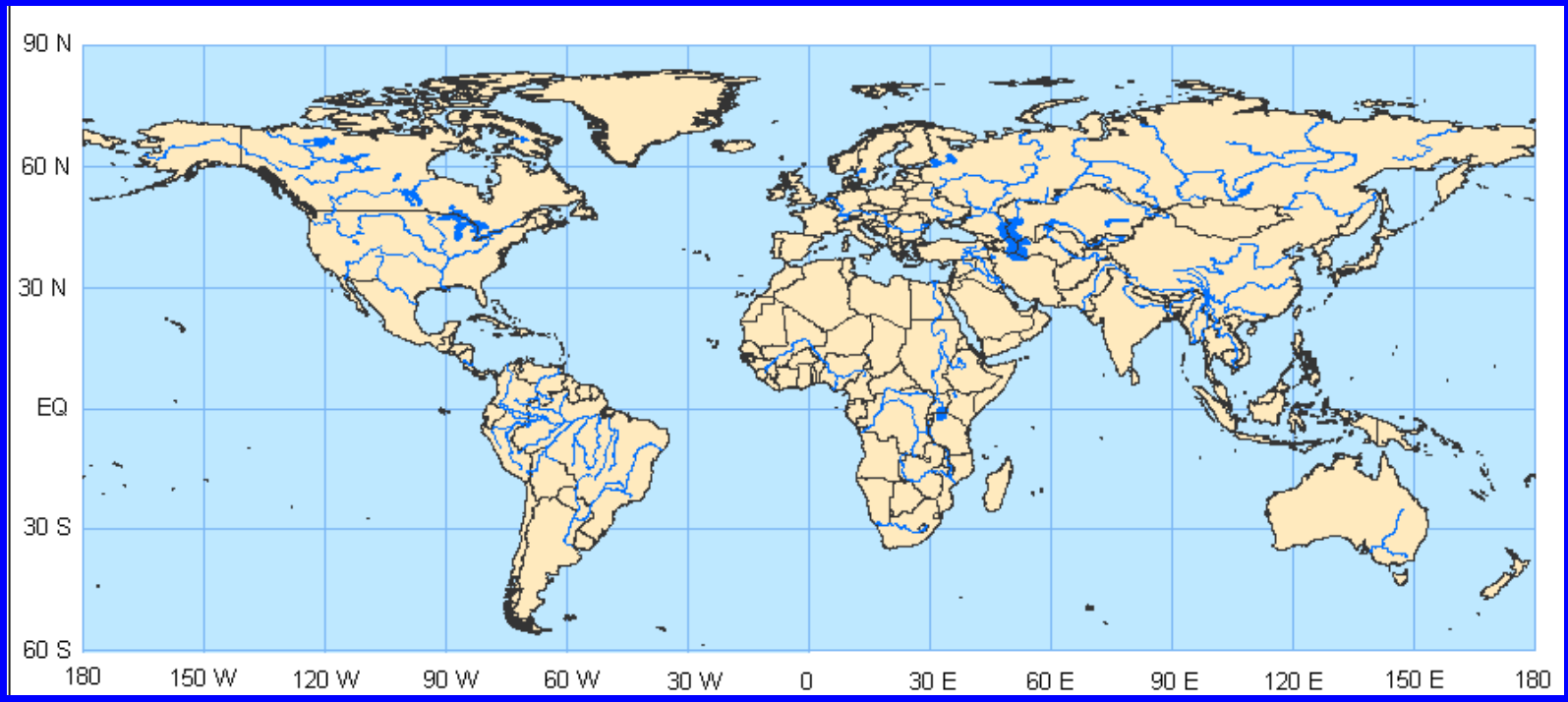


Potential Benefits/Hazards – Week 1
Valid September 5 – September 11, 2006



1. Tropical Cyclone Florence will impact the subtropical Atlantic Ocean.
2. Favorable conditions for tropical cyclogenesis are expected for the Atlantic Ocean.
3. An increased chance of above normal rainfall in the central Indian Ocean.
4. An increased chance of below normal rainfall for the Maritime Continent.
5. Typhoon Ioke will influence the northwestern Pacific Ocean.
6. An increased chance of above normal rainfall near the date line.

Potential Benefits/Hazards – Week 2
Valid September 12 – 18, 2006



Potential benefits/hazards are unclear for Week 2

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 the central Indian Ocean and in the Pacific Ocean near the date line with an increased chance for below normal rainfall for the Maritime continent.
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