

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

Update prepared by
Climate Prediction Center / NCEP
September 25, 2006

Outline

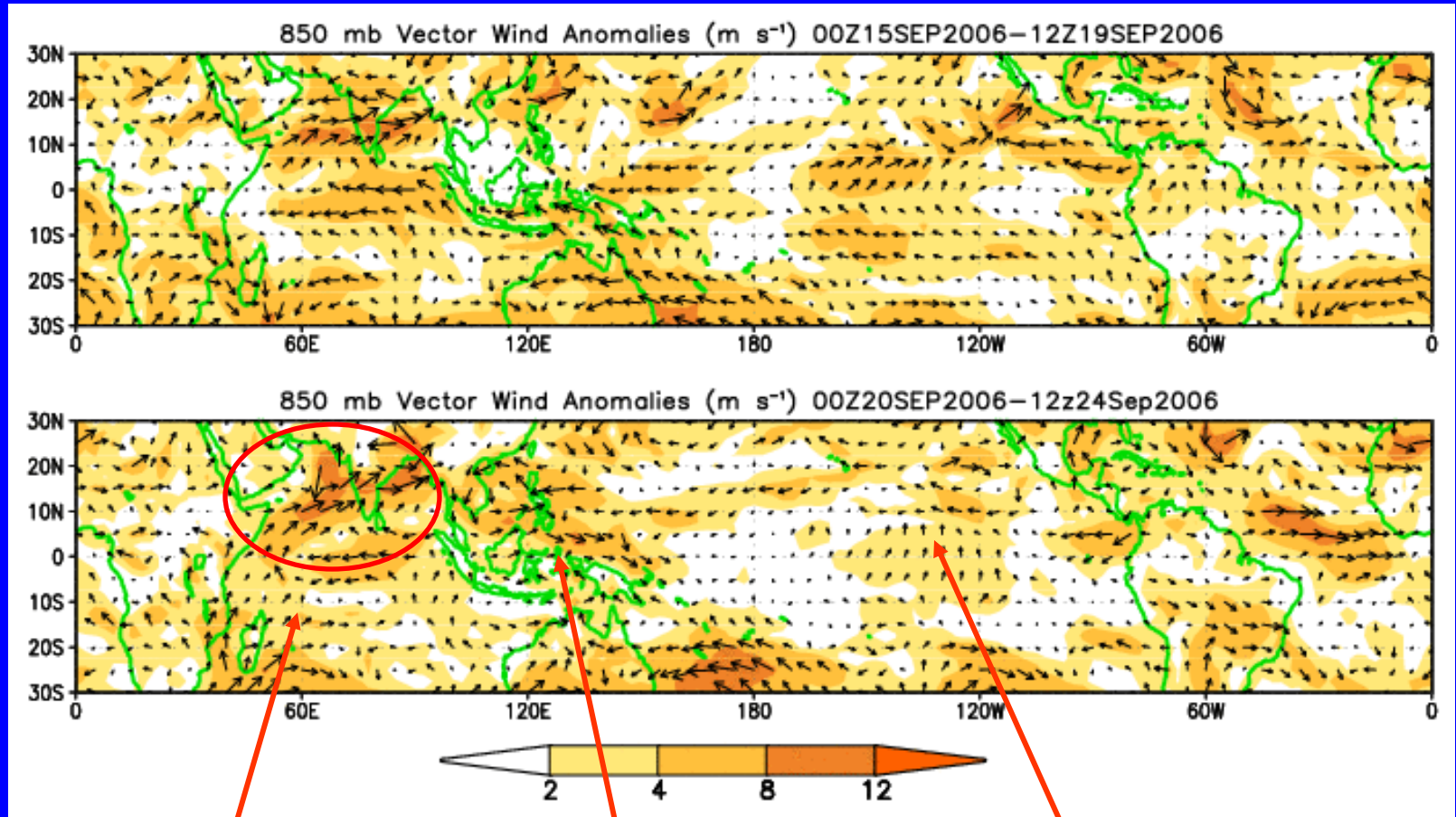
- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**

Overview

- The MJO signal, along with other subseasonal variability, has strengthened during the last week and will be closely monitored.
- Potential benefits/hazards during week 1 include an increased chance for above (below) normal rainfall for sections of the Maritime Continent and the western Pacific Ocean (east-central equatorial Indian Ocean and southwestern Maritime Continent). In addition, increased chances of above average rainfall also exist for the western Indian Ocean and parts of northeast Africa with drier than average conditions expected for the Caribbean Sea and western tropical Atlantic Ocean. Favorable conditions for tropical cyclogenesis exist for both the western and eastern Pacific Ocean.
- During week 2, below average rainfall is expected for the Maritime Continent with an increased chance of above average rainfall for both the central Pacific and western Indian Oceans as well as parts of northeast Africa. Favorable conditions for tropical cyclogenesis remain in the eastern Pacific Ocean.

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

Note that shading denotes the magnitude of the anomalous wind vectors

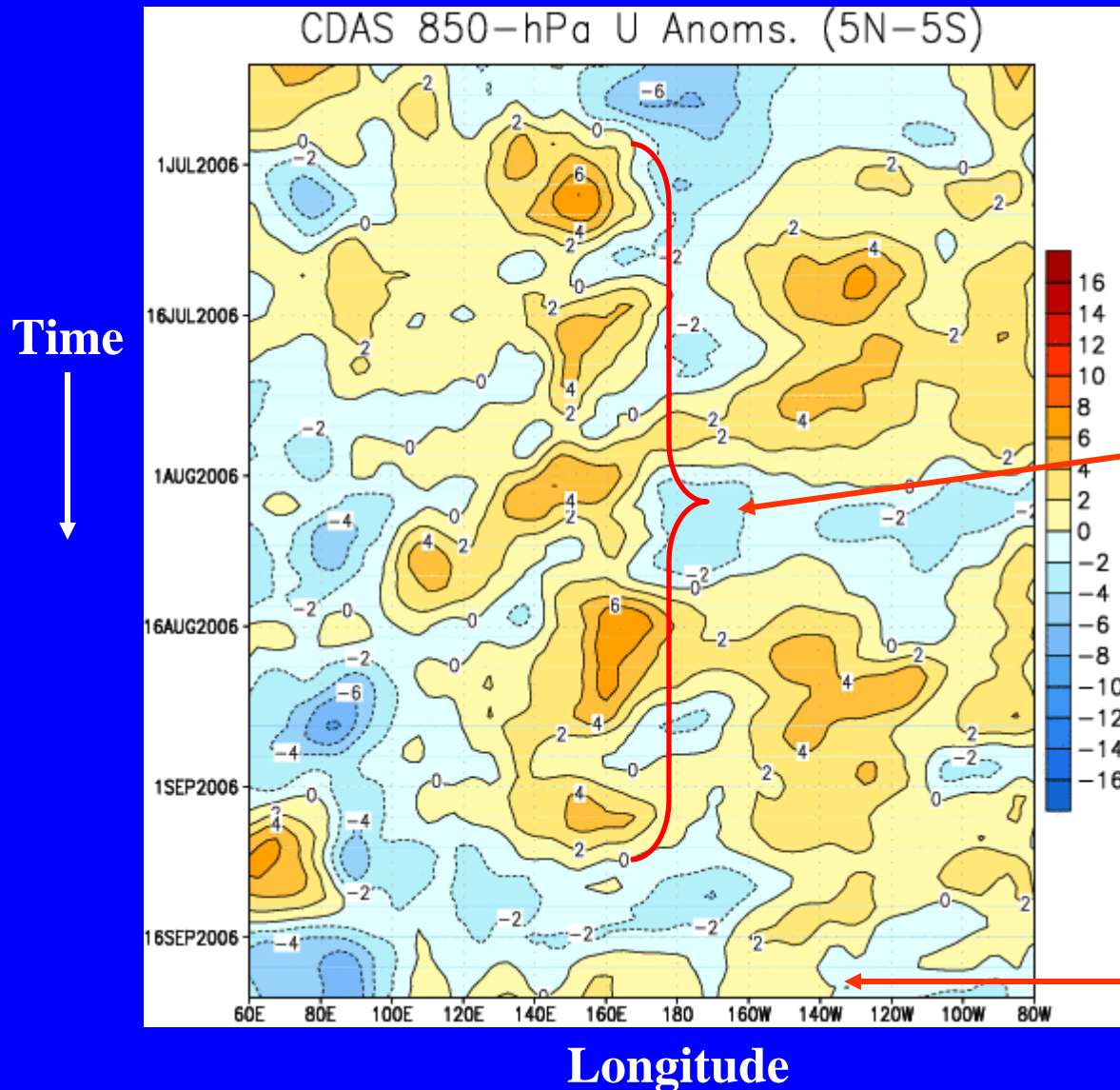


Enhanced monsoonal flow is observed in India.

Westerly anomalies have returned to the Maritime Continent.

Westerly anomalies have diminished in the eastern Pacific.

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



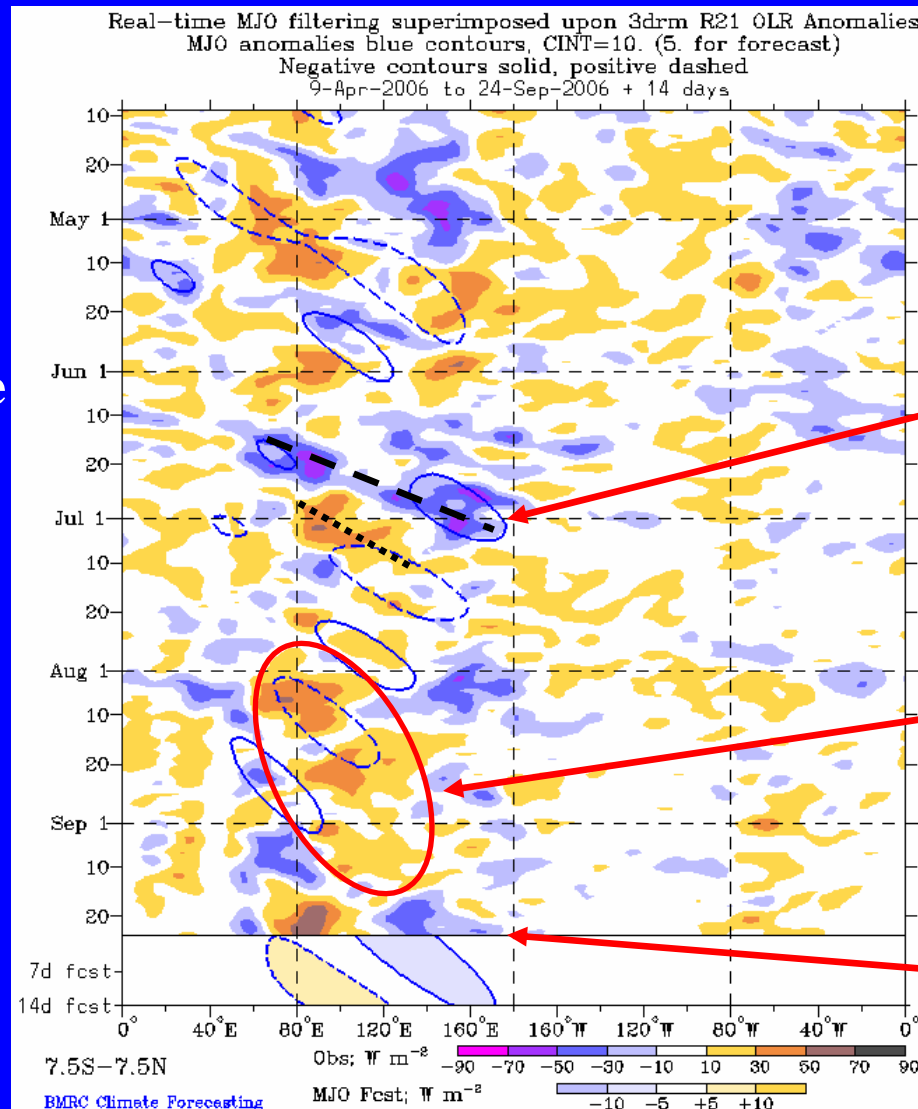
Weaker-than-average easterlies or westerlies (orange/red shading)

Stronger-than-average easterlies (blue shading)

From July until early September, anomalous westerly wind “bursts” were observed just west of the Date line. Also westerly anomalies were persistent in the eastern Pacific ocean.

Recently, weak westerly anomalies have re-emerged over the west, central, and east-central Pacific Ocean.

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



Drier-than-average conditions (/red shading)

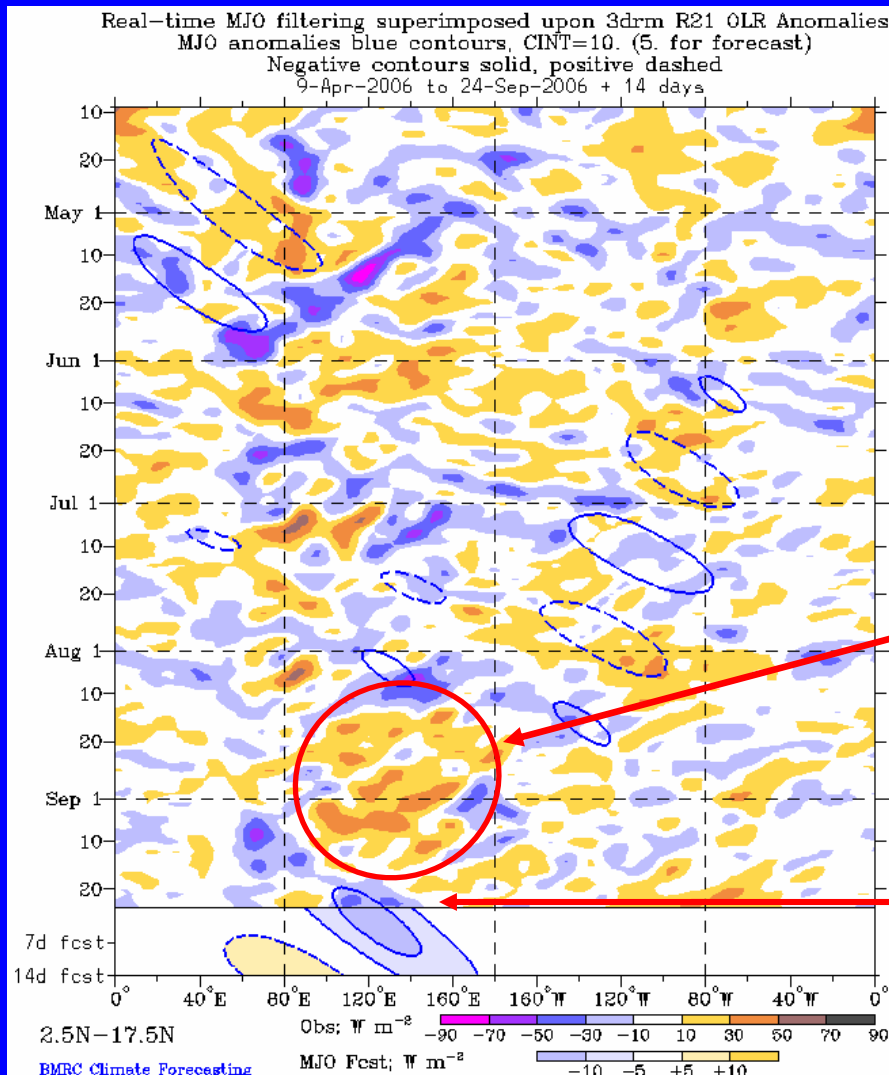
Wetter-than-average conditions (blue shading)

Coherent OLR anomalies moved across the Eastern Hemisphere in June.

Through August and the beginning of September, generally dry conditions were observed for the eastern Indian Ocean and the Maritime Continent.

Recently, wet conditions have emerged in the western Pacific and dry conditions are present in the Indian Ocean.

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



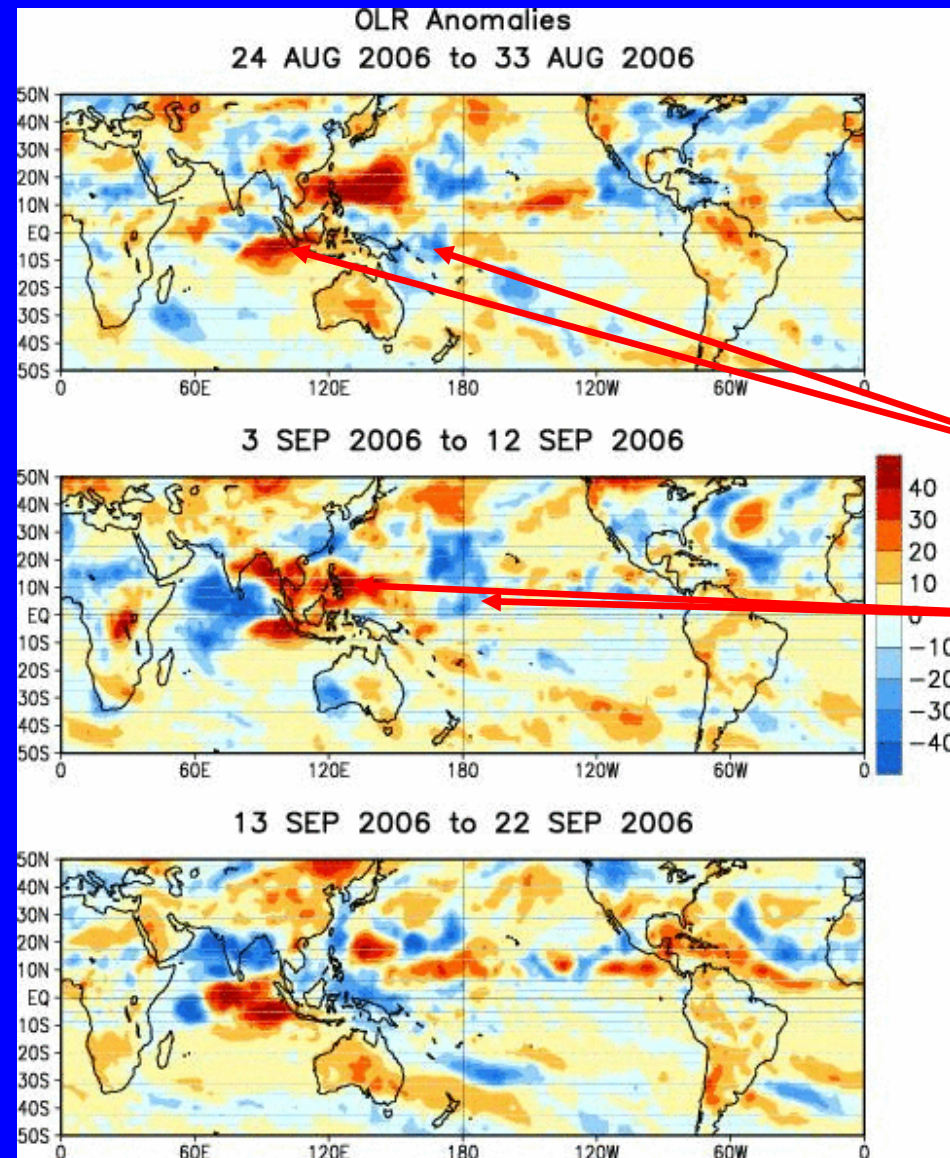
Drier-than-average conditions (/red shading)

Wetter-than-average conditions (blue shading)

Since mid-August through mid-September, generally dry conditions were evident north of the equator across Indonesia and the western Pacific.

Recently, however, wetter than average conditions have been observed near the Maritime continent.

Anomalous OLR: Last 30 days



Drier-than-average conditions (/red shading)

Wetter-than-average conditions (blue shading)

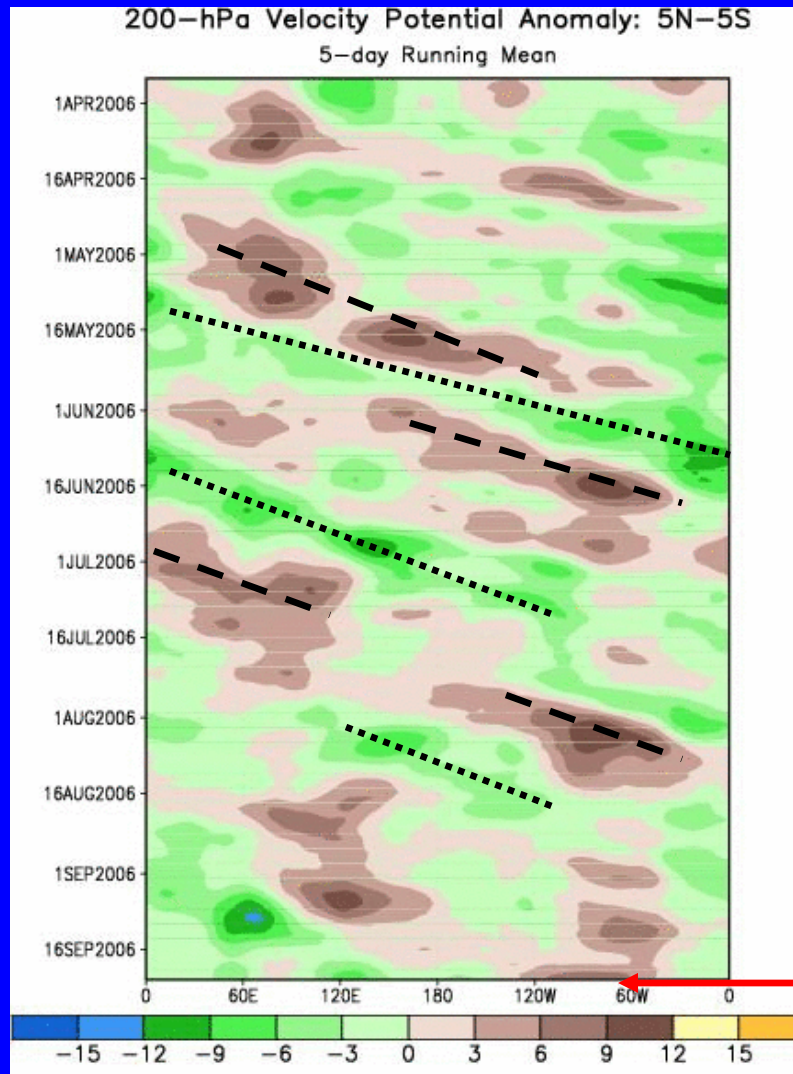
During mid-August to early-September, dry conditions impacted areas in and around the Maritime Continent. Wetter conditions were observed in the Indian ocean and near the date line.

During the most recent ten days, wet conditions have expanded northward across the Indian subcontinent and also eastward across parts of the Maritime Continent. Dry conditions are observed in the central and eastern equatorial Indian Ocean.

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

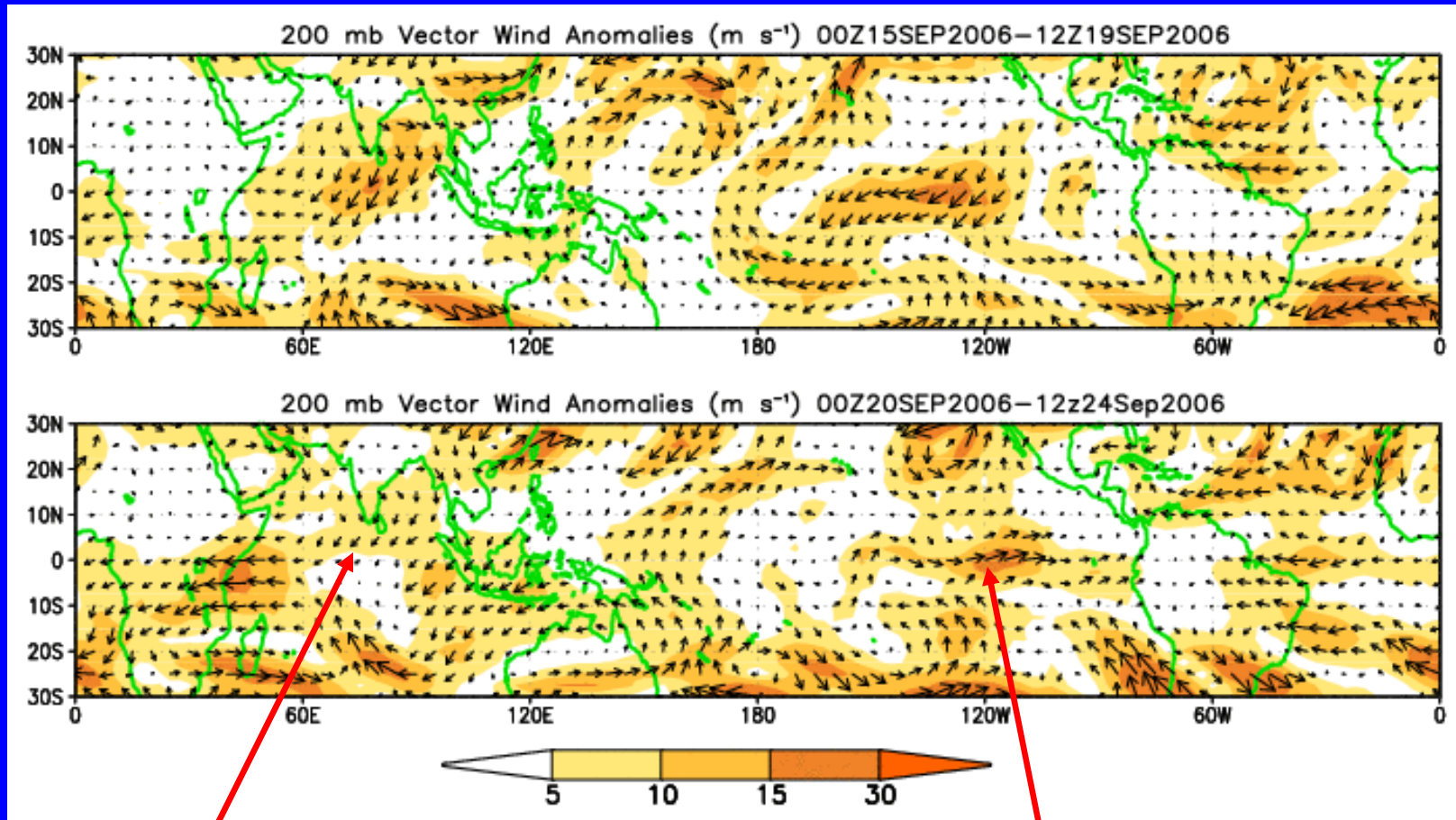
The MJO was incoherent during much of March and April.

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

Most recently, upper-level divergence (convergence) over Africa/Indian ocean (Maritime Continent/western Pacific) has shifted slightly eastward.

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

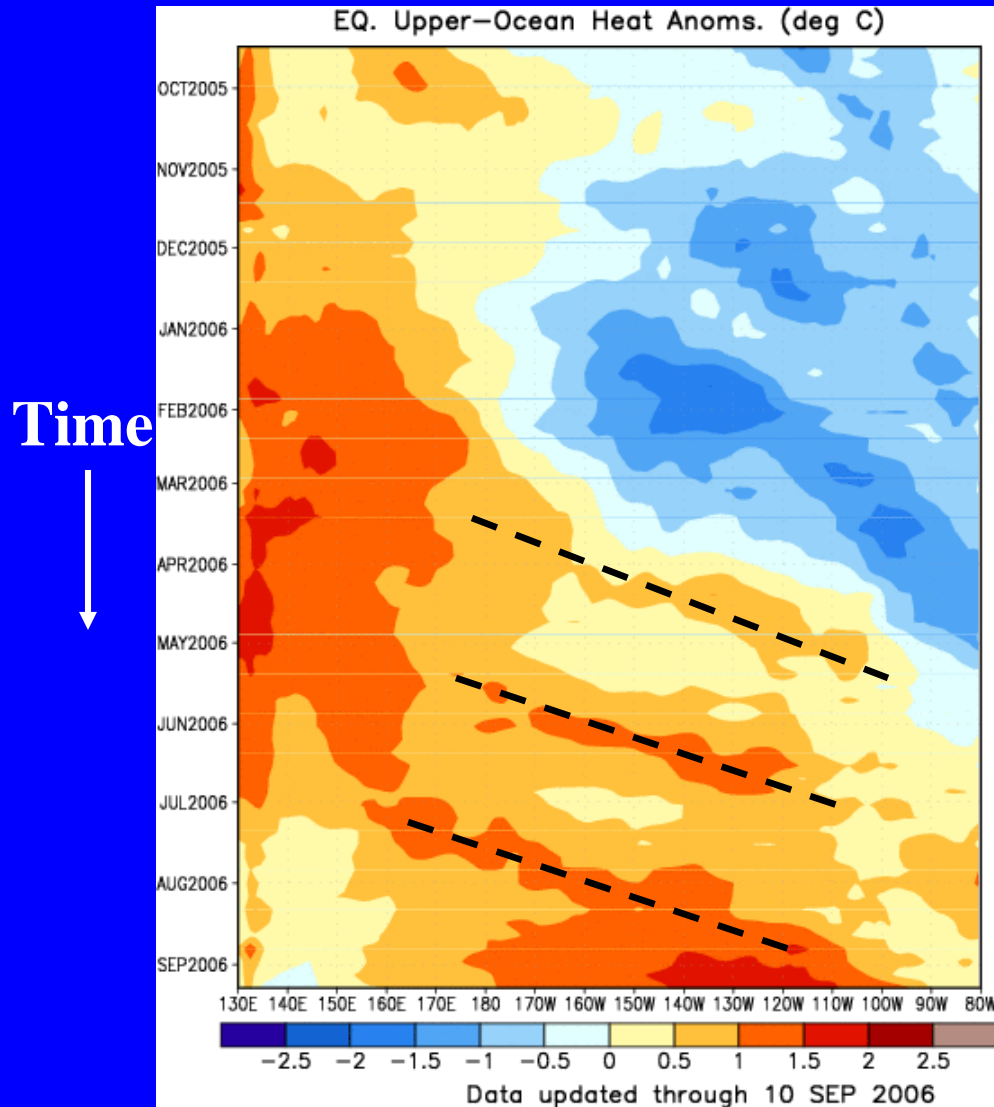
Note that shading denotes the magnitude of the anomalous wind vectors.



Monsoonal upper-level flow anomalies have weakened slightly.

Westerly anomalies are observed in the eastern Pacific Ocean.

Heat Content Evolution in the Eq. Pacific

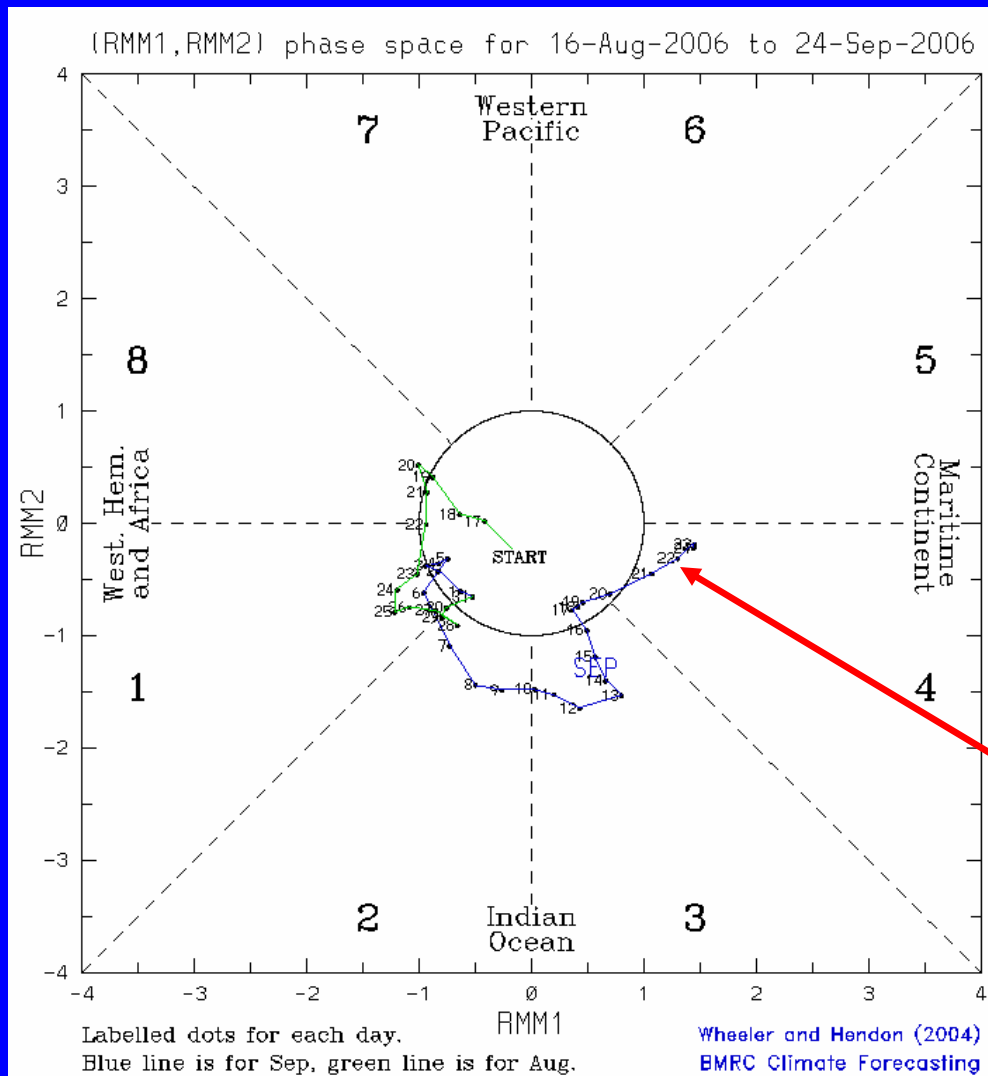


Starting in April, above normal upper oceanic water temperatures expanded from the western Pacific into the eastern Pacific in part due to Kelvin wave activity.

MJO Index (Magnitude and Phase)

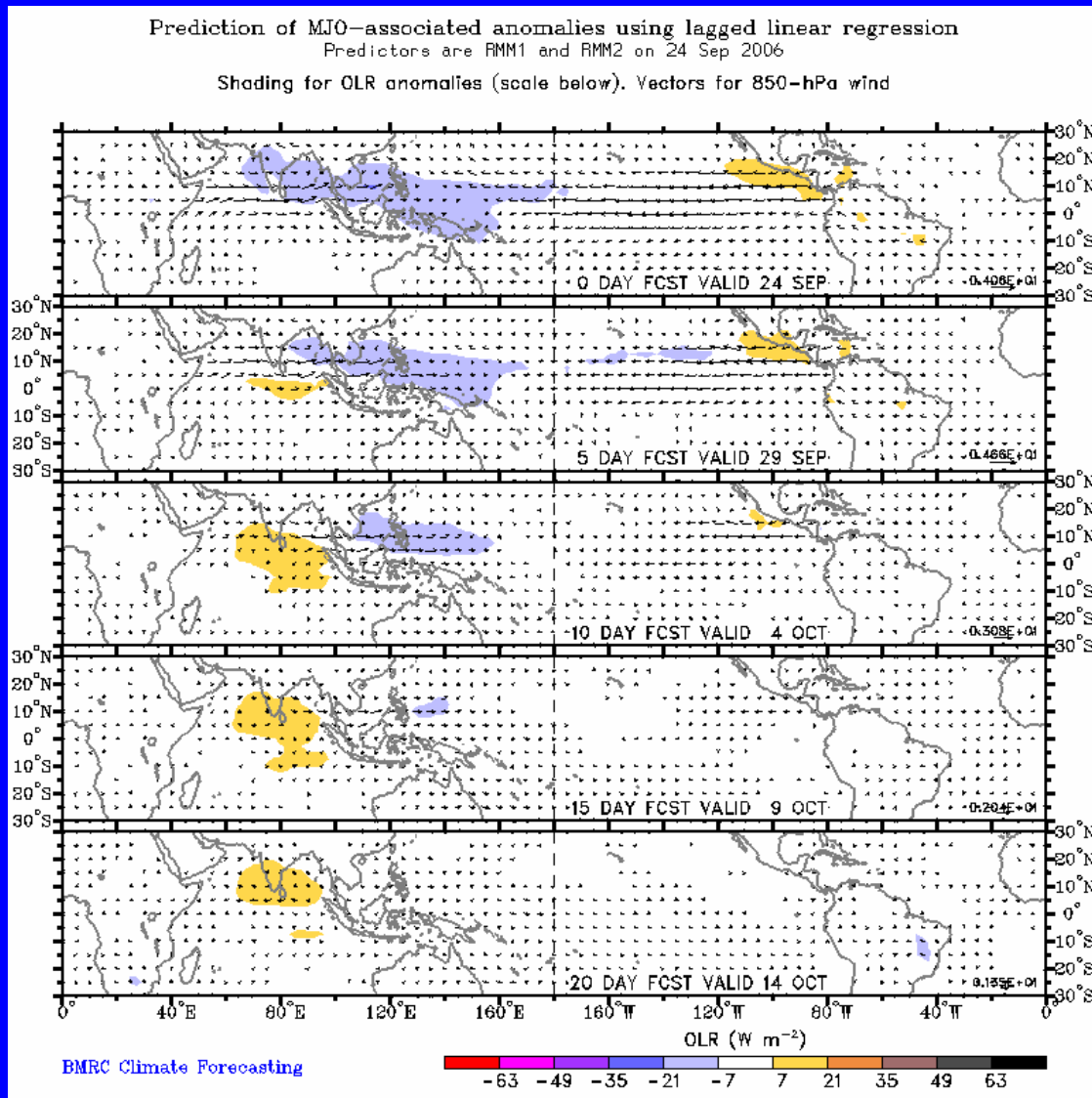
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850 hPa zonal wind, 200 hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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.



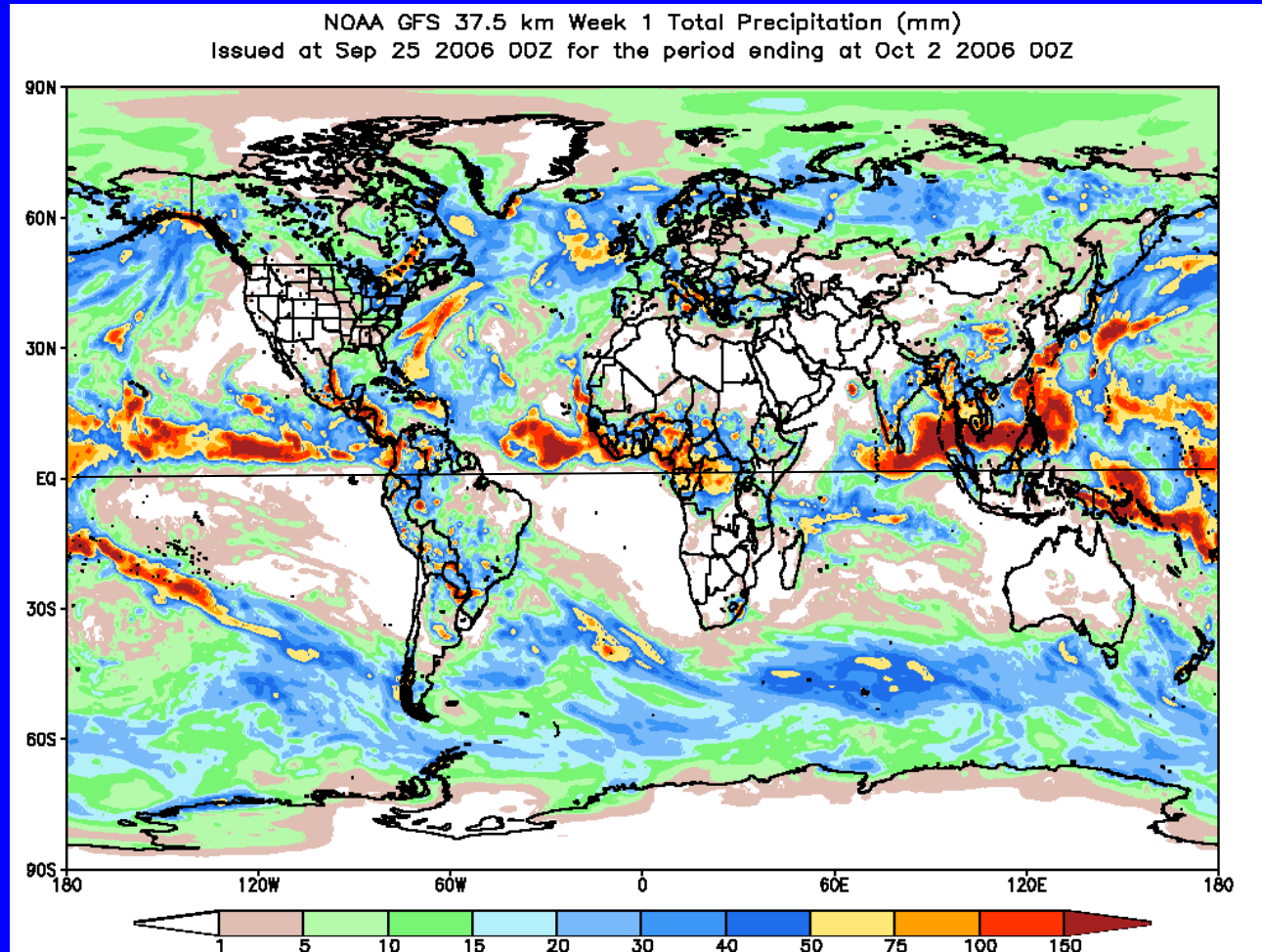
In recent days, the MJO signal has strengthened.

Statistical OLR MJO Forecast



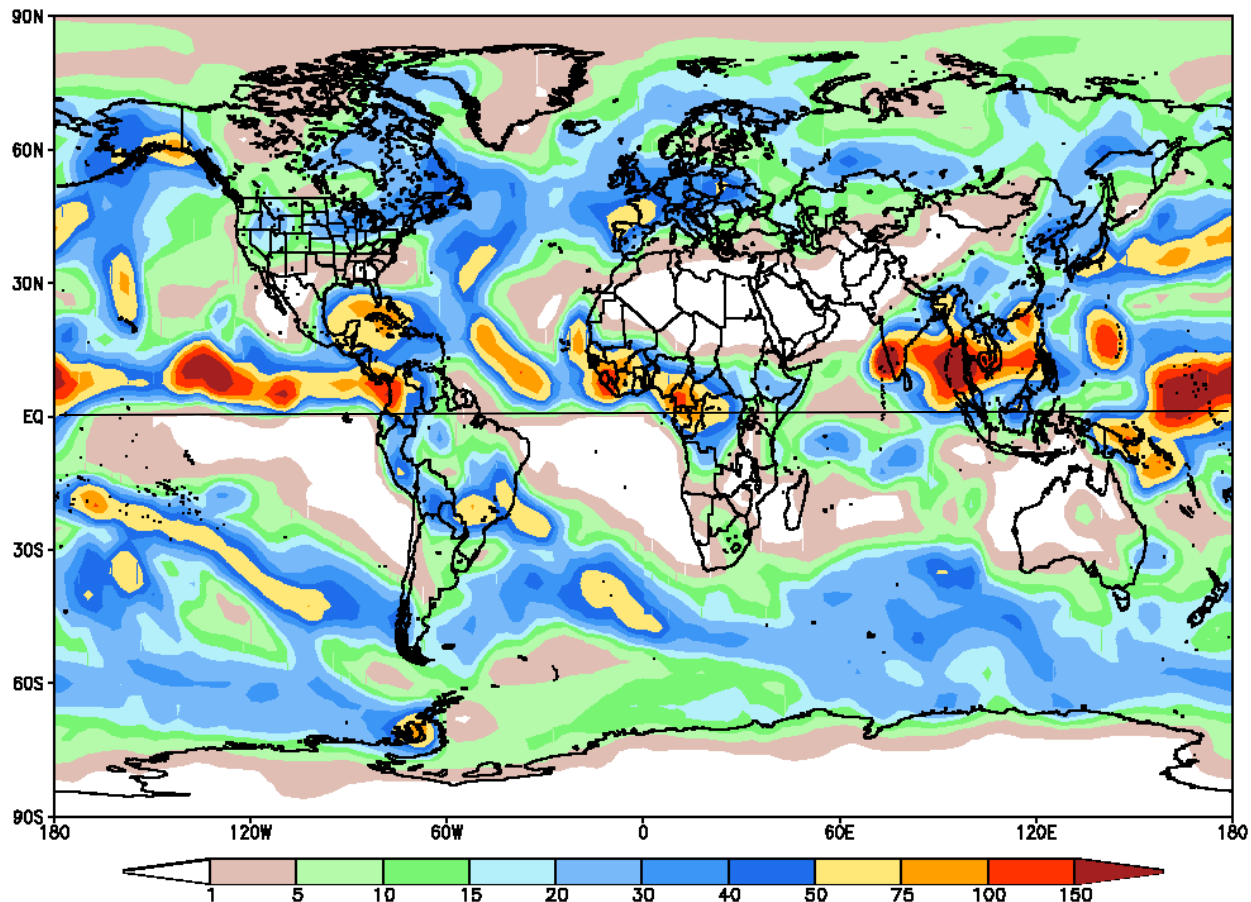
Enhanced convection is forecast for the western Pacific Ocean with drier than normal conditions across the Indian Ocean and southern India.

Global Forecast System (GFS) Week 1 Precipitation Forecast



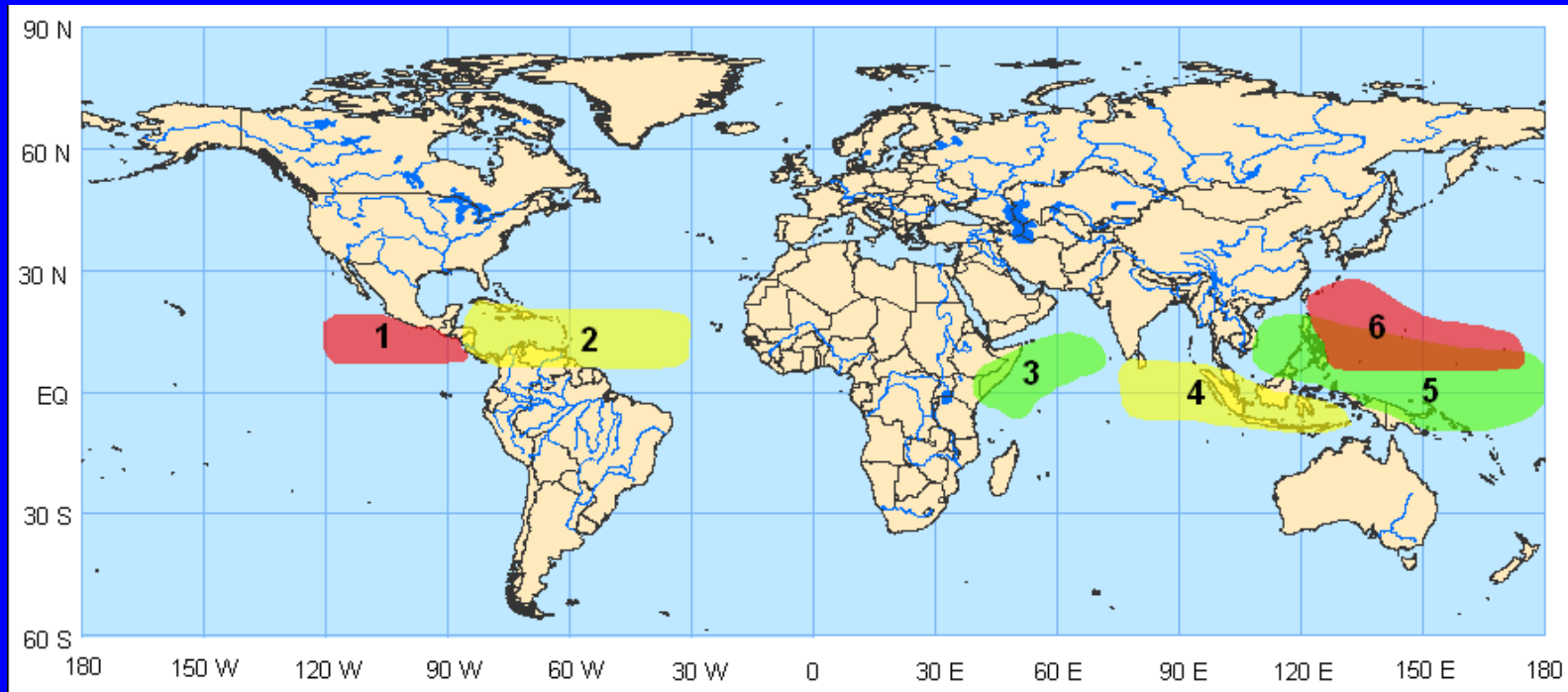
Global Forecast System (GFS) Week 2 Precipitation Forecast

NOAA GFS 100 km Week 2 Total Precipitation (mm)
Issued Sep 25 2006 00Z for the period ending at Oct 8 2006 00Z



Potential Benefits/Hazards – Week 1

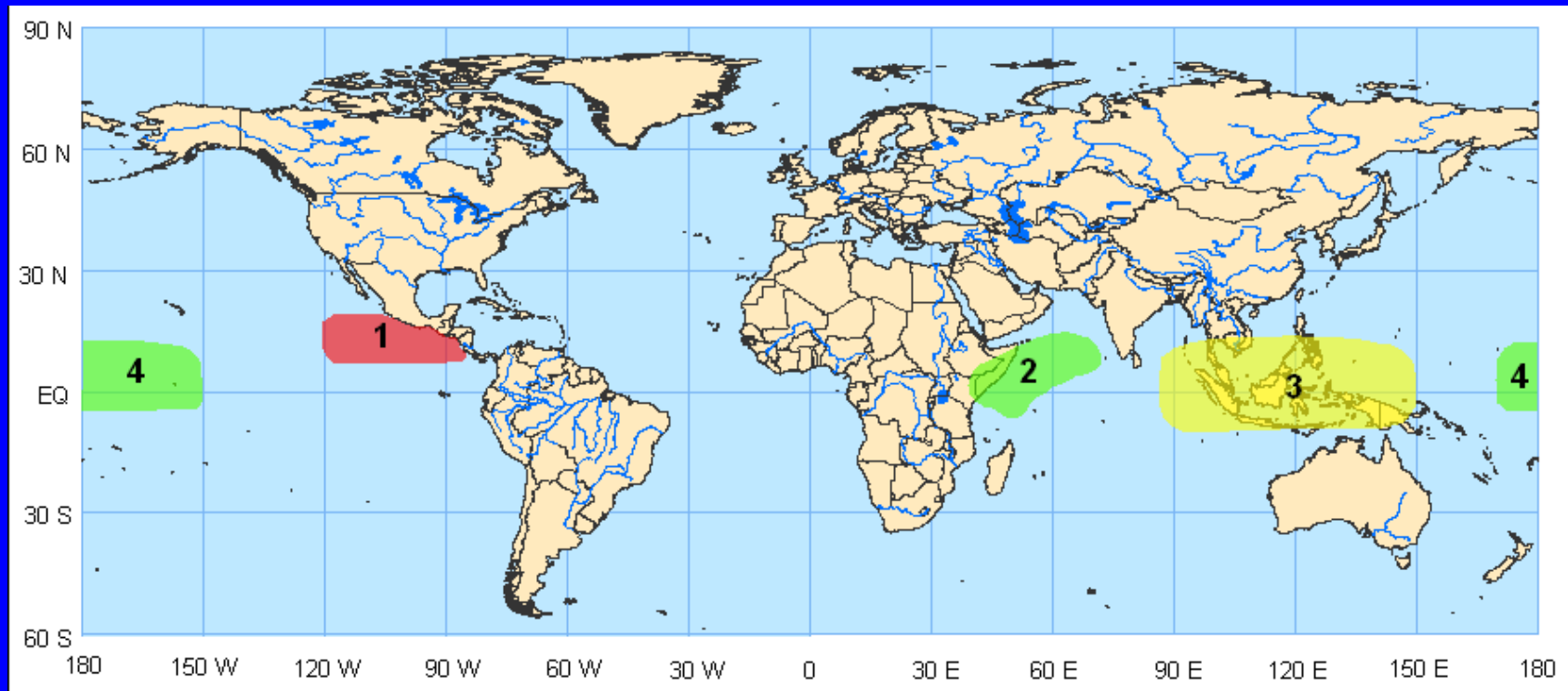
Valid September 26 – October 2, 2006



1. Favorable conditions exist for tropical cyclogenesis in the eastern Pacific mainly during the second half of the period.
2. An increased chance of below average rainfall for the Caribbean Sea and western tropical Atlantic Ocean.
3. An increased chance of above average rainfall for the western Indian Ocean and parts of northeast Africa.
4. An increased chance of below average rainfall for the east-central Indian Ocean and southwestern parts of the Maritime continent.
5. An increased chance of above average rainfall for the South China Sea, the Philippines, northeastern sections of the Maritime Continent, and the Pacific Ocean west of the date line.
6. Favorable conditions exist for tropical cyclogenesis near the Philippines and the western Pacific Ocean.

Potential Benefits/Hazards – Week 2

Valid October 3 – October 9, 2006



1. Favorable conditions exist for tropical cyclogenesis in the eastern Pacific Ocean.
2. An increased chance of above average rainfall in the western Indian Ocean and parts of northeast Africa.
3. An increased chance of below average rainfall for the Maritime Continent.
4. An increased chance of above average rainfall in the central Pacific Ocean.

Summary

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