

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

Update prepared by
Climate Prediction Center / NCEP
October 16, 2006

Outline

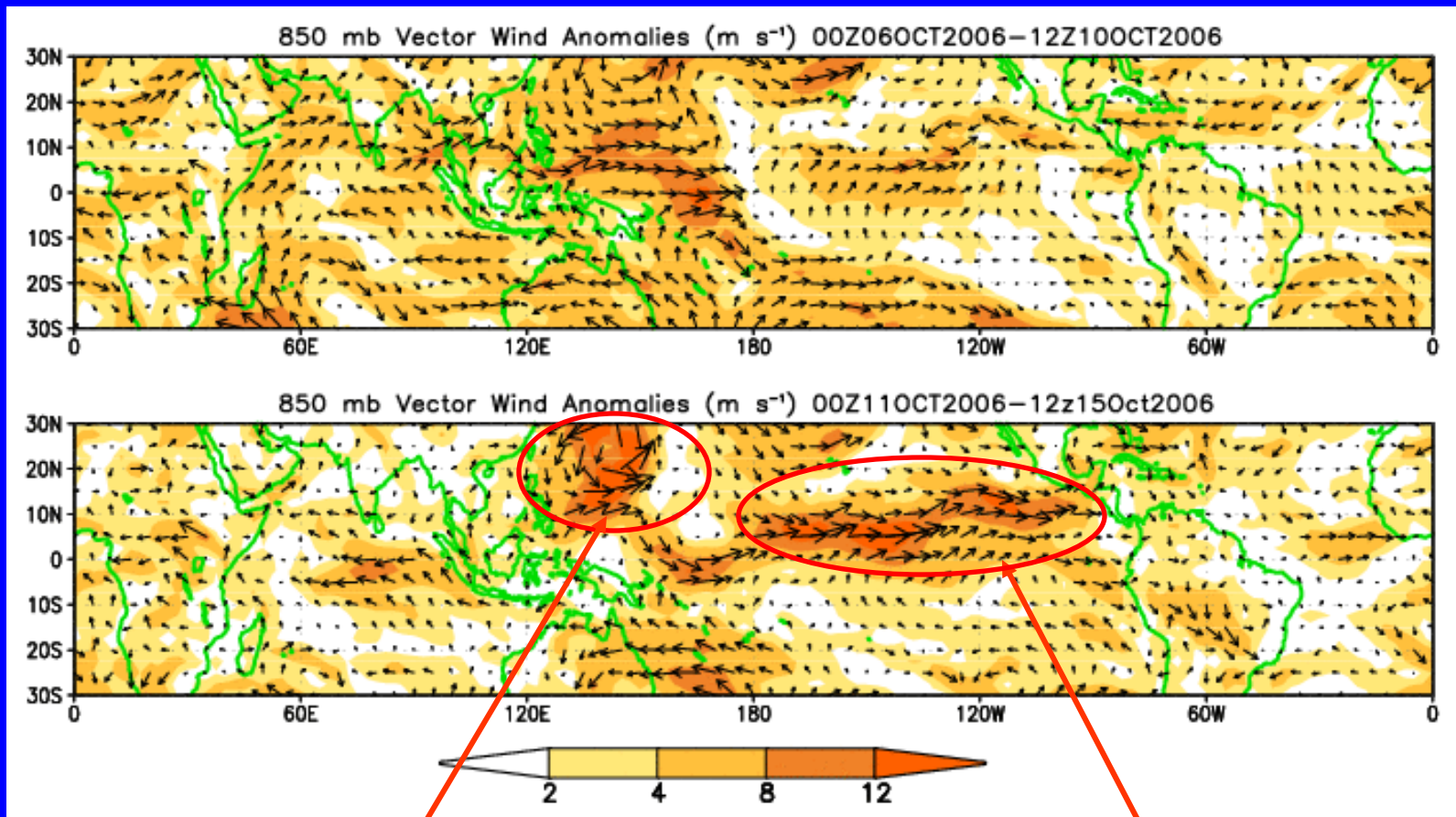
- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**

Overview

- The latest observations indicate that a moderate MJO continues.
- Wetter than normal conditions are expected for sections of the west-central, east, and south Pacific Ocean, Central America, sections of South America, parts of equatorial Africa, and the western Indian Ocean. Drier than normal conditions are expected for southeast Asia and the Maritime Continent. Although less likely, tropical cyclone development is possible in the west-central Pacific east of 150 E.
- During week 2, above (below) average rainfall is expected for the western and central Indian Ocean (Maritime Continent). Conditions may become favorable for tropical cyclone development in the Bay of Bengal.

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

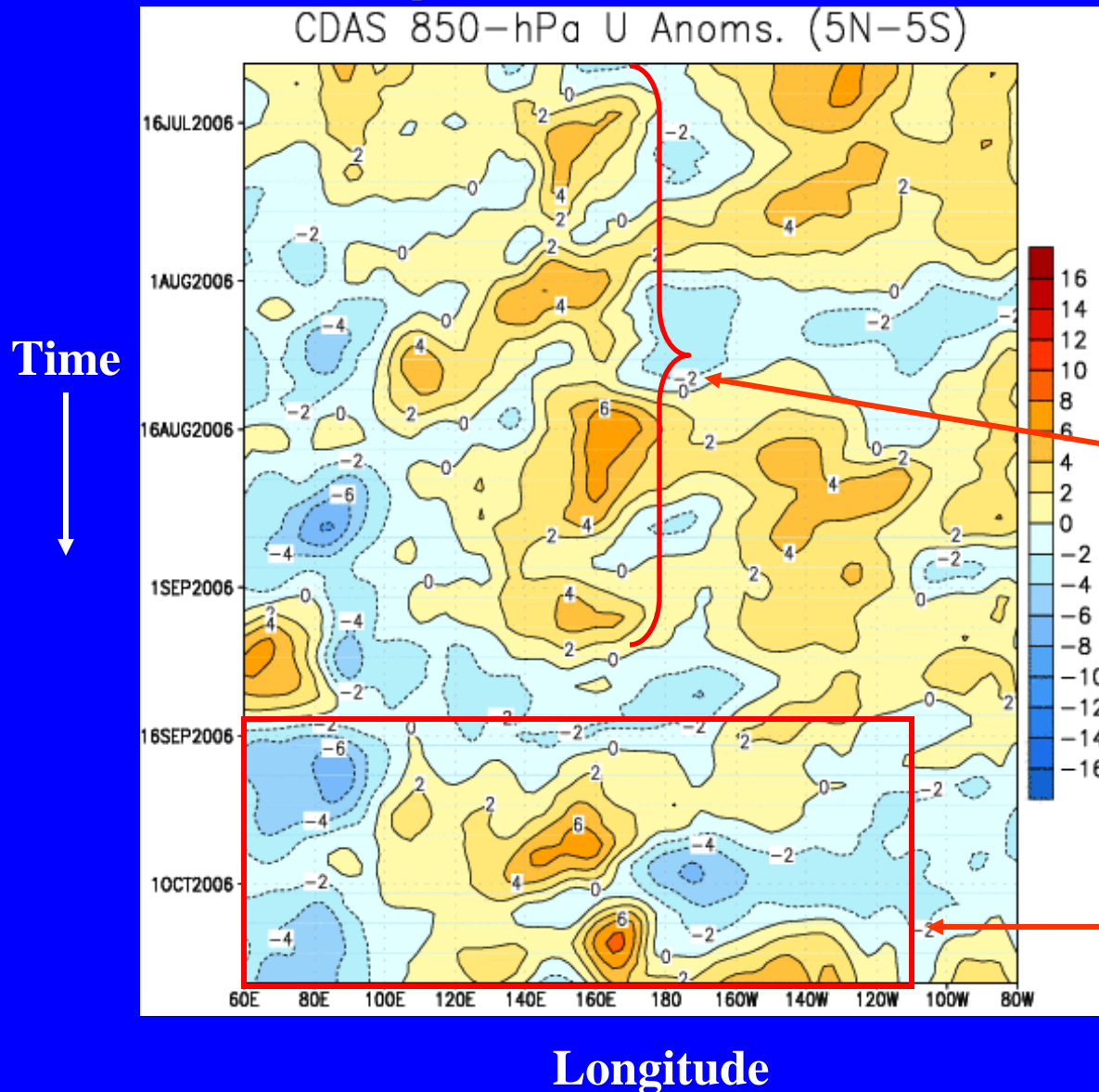
Note that shading denotes the magnitude of the anomalous wind vectors



A cyclonic wind anomaly is associated with Typhoon Soulik in the western Pacific.

Westerly anomalies have strengthened east of the Date Line.

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



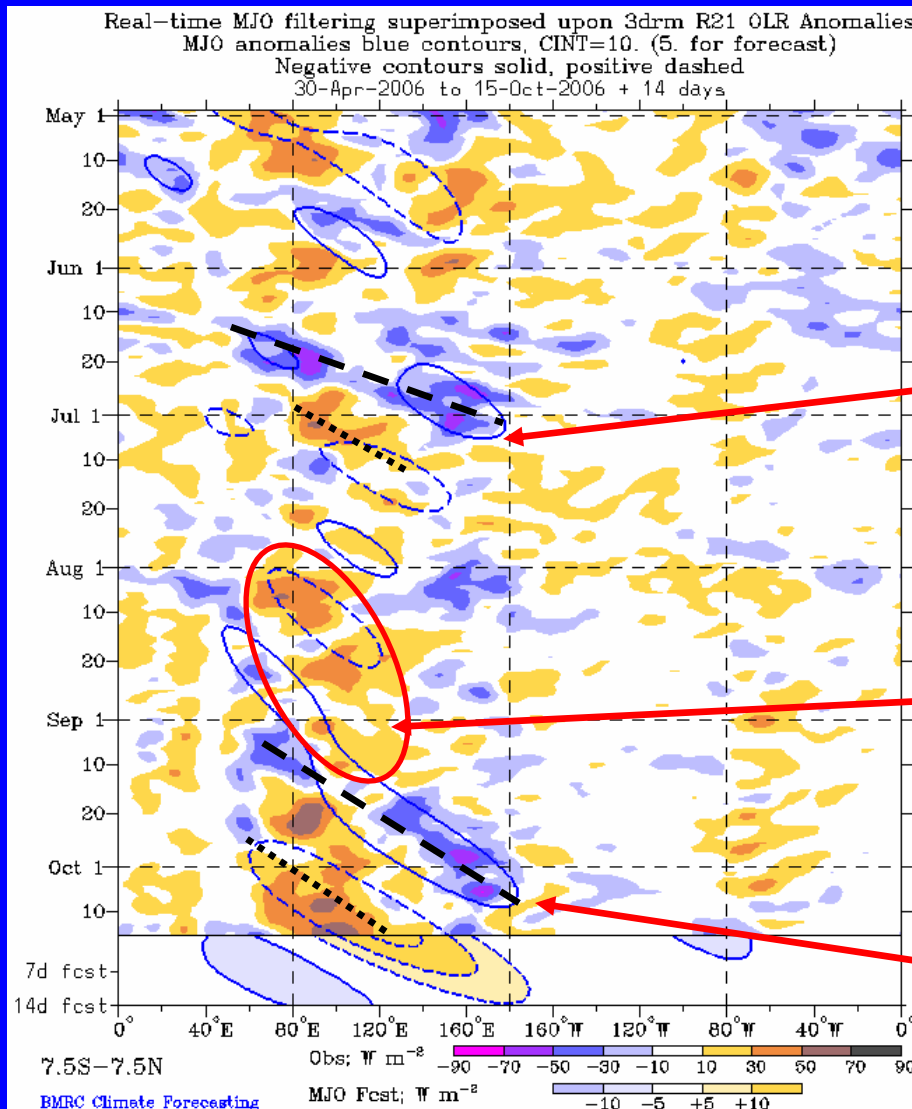
Weaker-than-average easterlies or westerlies (orange/red shading)

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.

Since mid-September, westerly anomalies have returned to the western Pacific and shifted eastward, while stronger than normal easterlies enhanced upwelling west of Indonesia.

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



Drier-than-average conditions (/red shading)

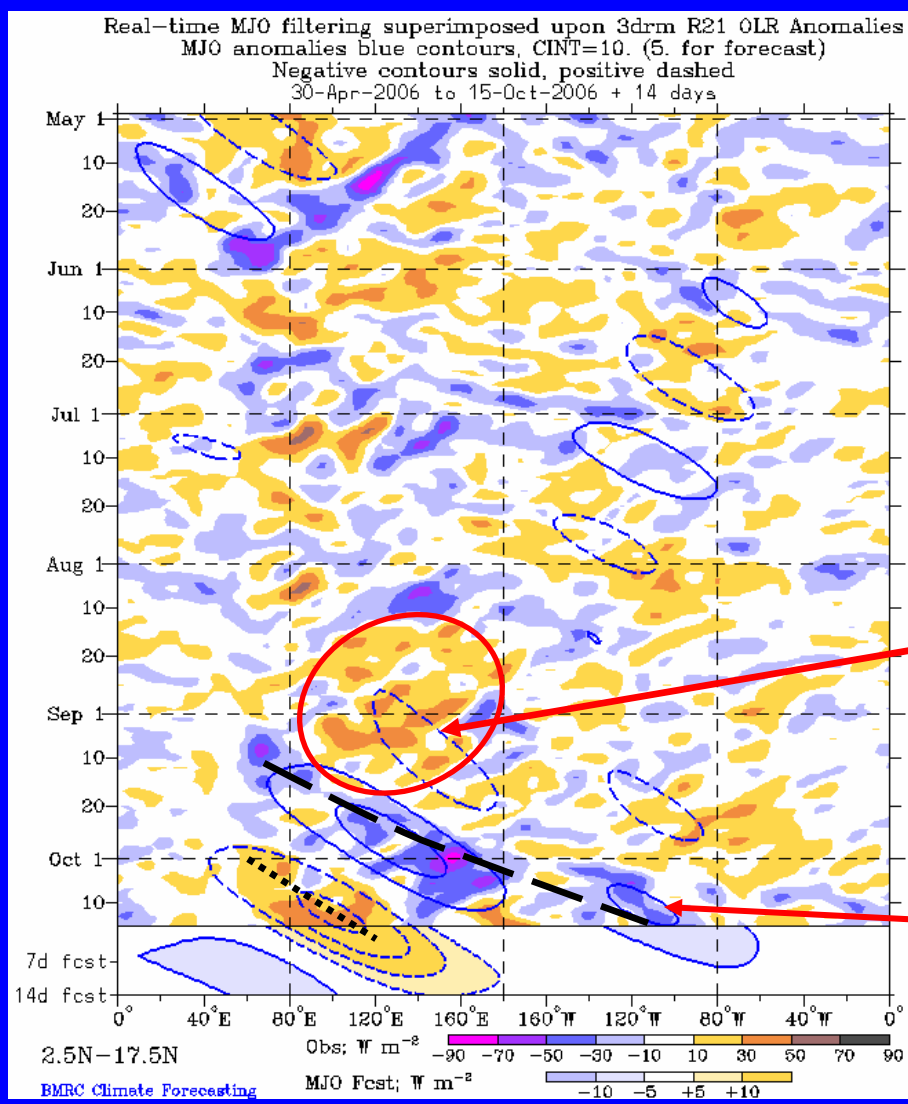
Wetter-than-average conditions (blue shading)

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.

OLR anomalies associated with the MJO developed over the eastern Indian Ocean and shifted east.

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



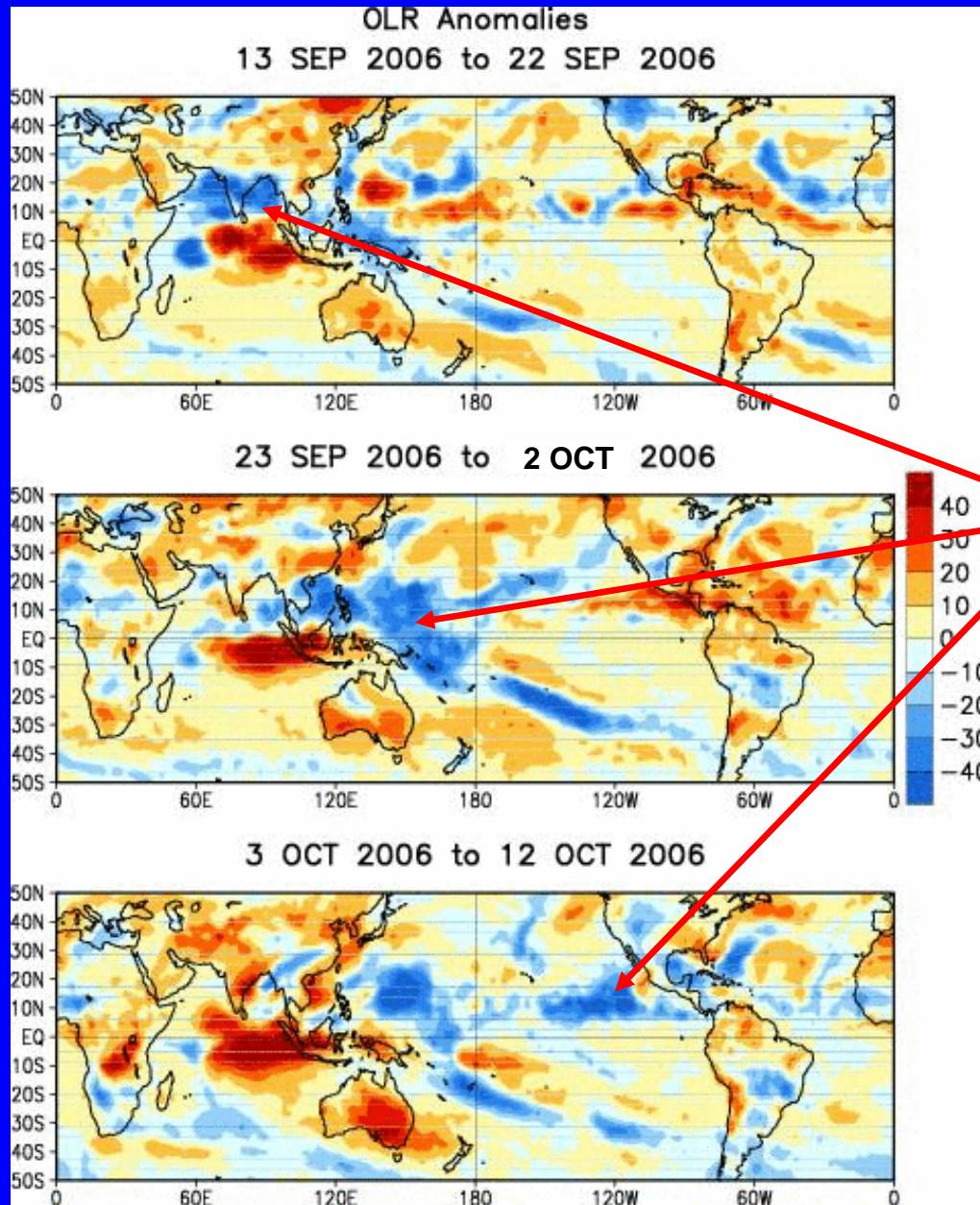
Drier-than-average conditions (/red shading)

Wetter-than-average conditions (blue shading)

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

From late September into early October, enhanced convection associated with the MJO has shifted eastward across the Pacific Ocean.

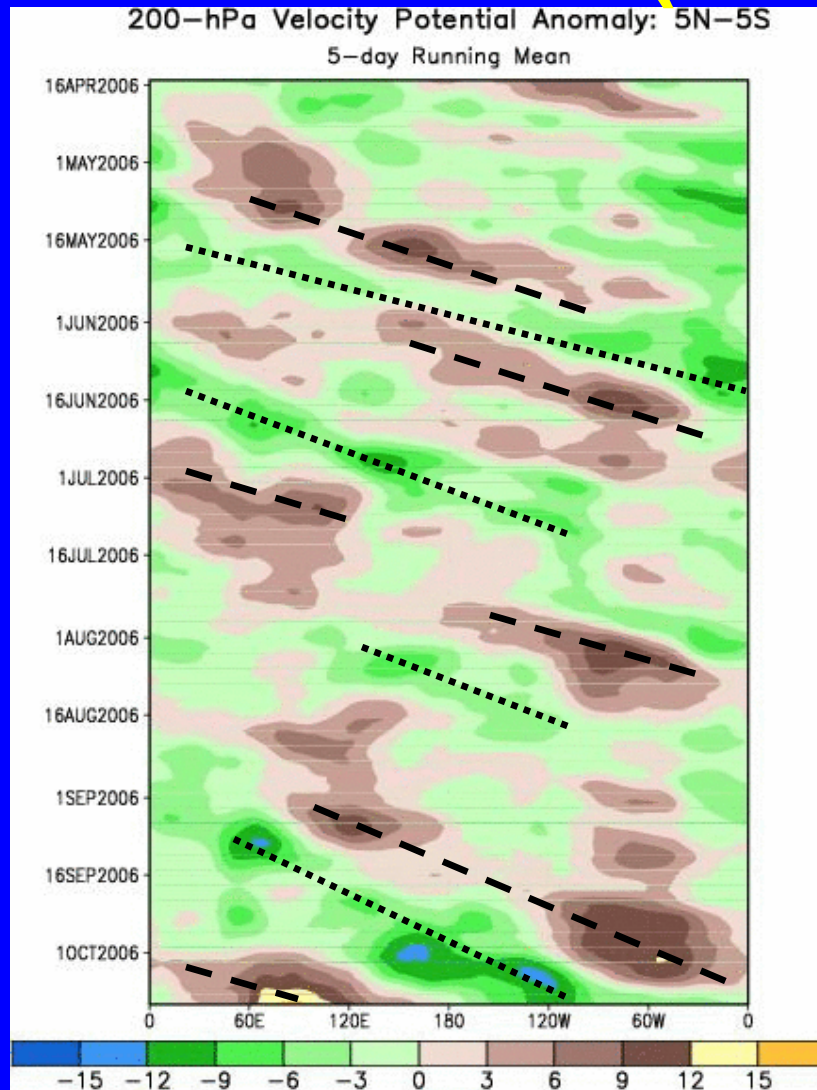
Anomalous OLR: Last 30 days



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

Beginning mid-September as the MJO developed, wet conditions in proximity to India have shifted east across the Pacific Ocean while dry conditions developed in the Indian Ocean.

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



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

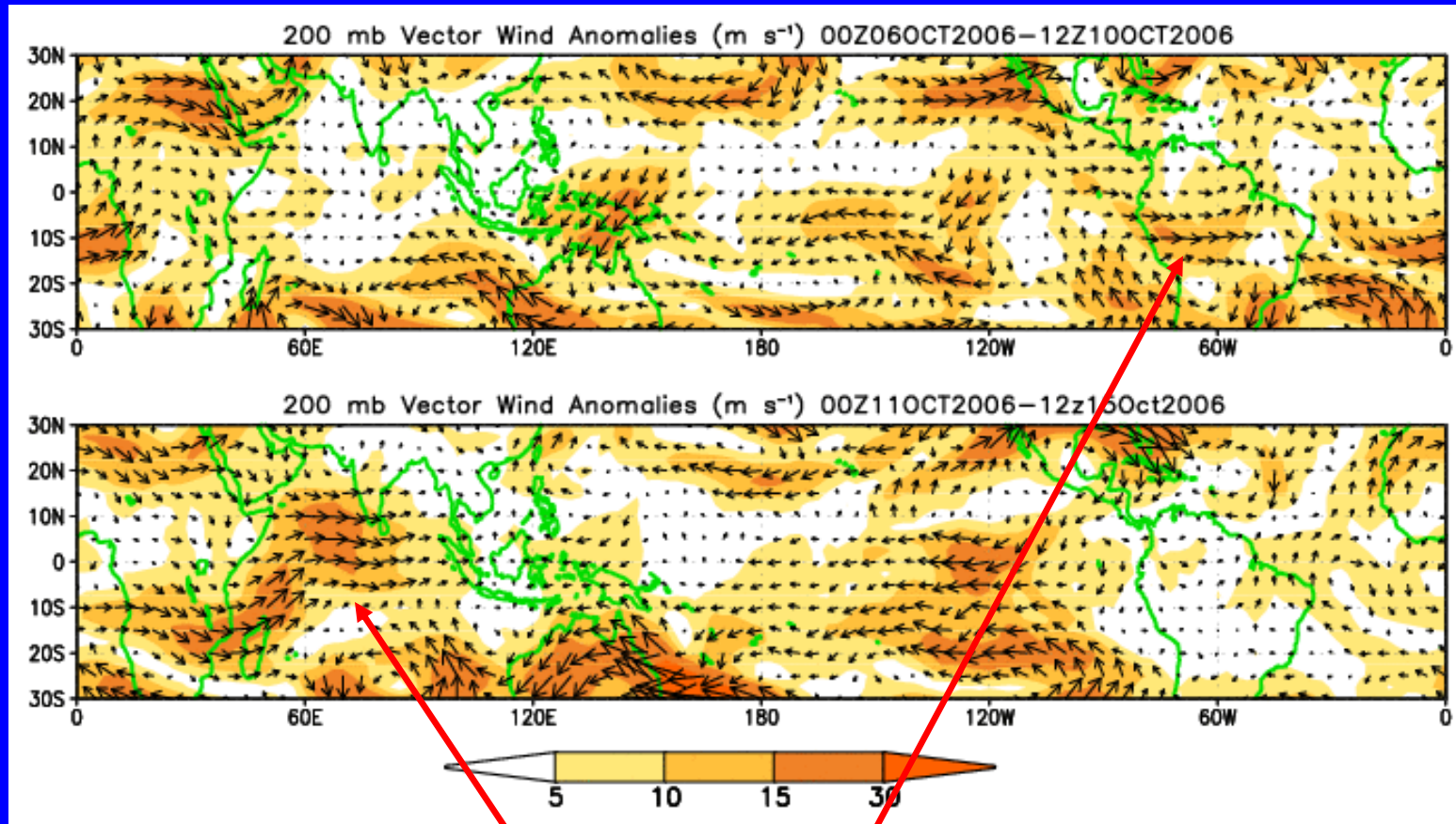
Negative anomalies (green shading) indicate favorable conditions for precipitation.

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

Recently, the MJO has intensified as both anomalies have shifted east during September and early October.

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

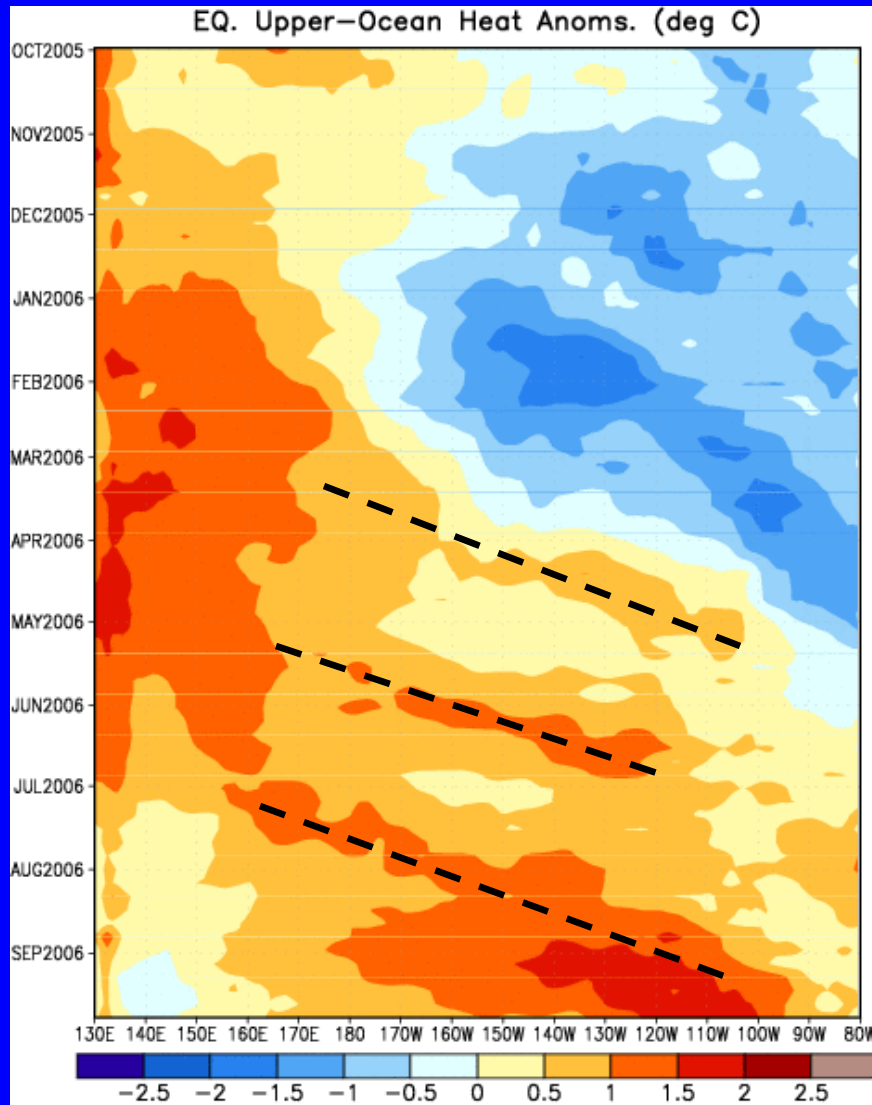
Note that shading denotes the magnitude of the anomalous wind vectors.



Westerly anomalies consistent with an established MJO have shifted from South America into the Indian Ocean.

Heat Content Evolution in the Eq. Pacific

Time



Longitude

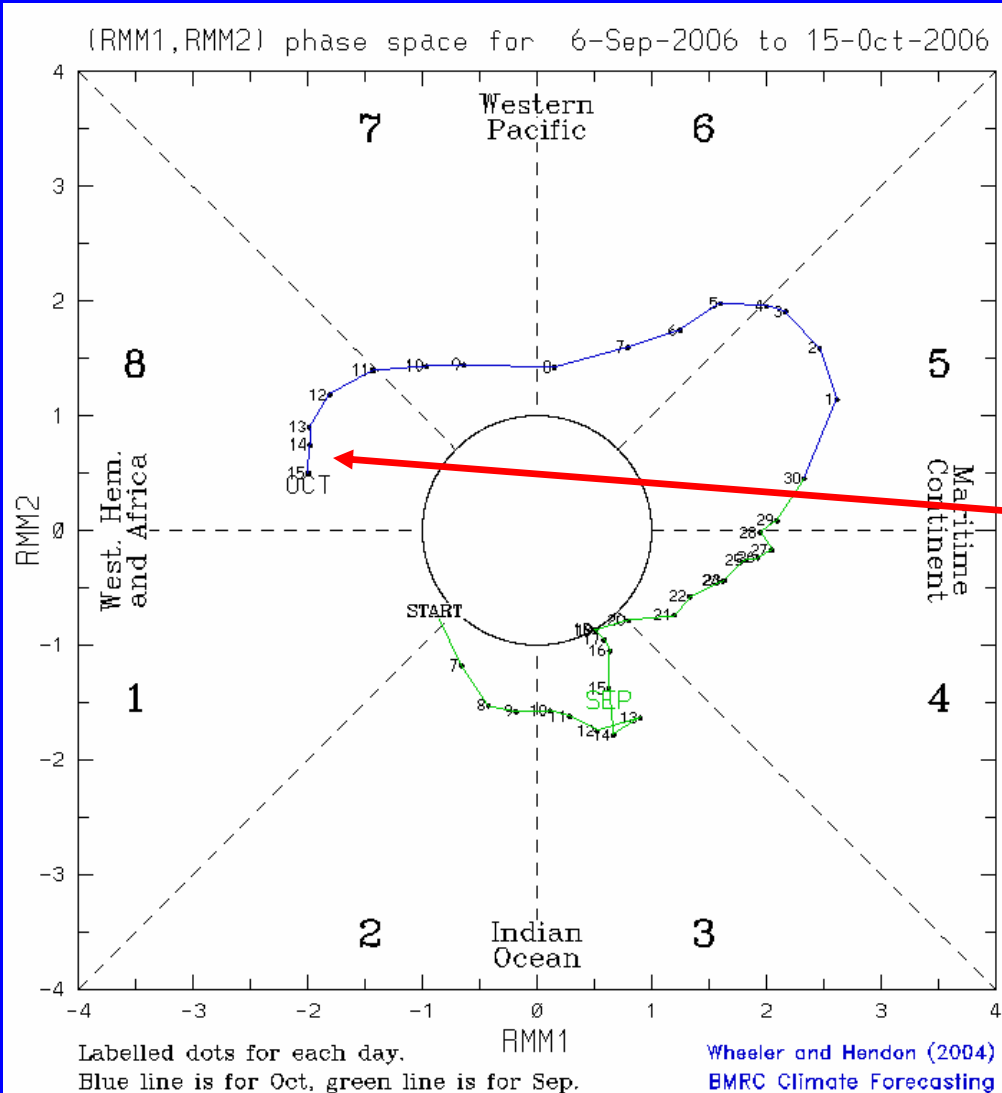
Starting in April, above normal upper oceanic water temperatures expanded from the western Pacific into the eastern Pacific in part due to Kelvin wave activity.

During September, strong positive upper oceanic heat content anomalies were observed throughout the central and eastern equatorial Pacific.

MJO Index (Magnitude and Phase)

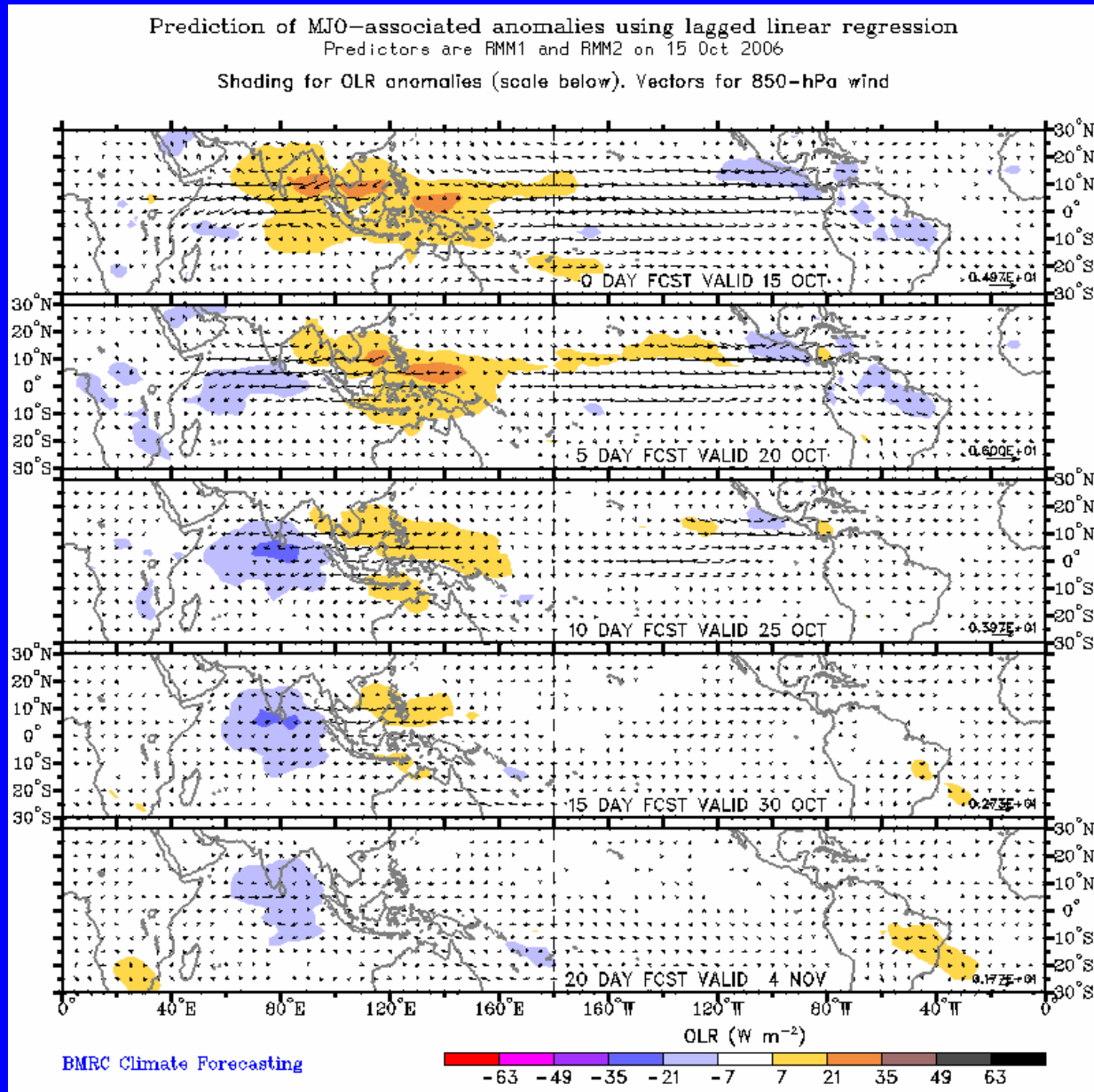
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850 hPa zonal wind, 200 hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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.



A moderate MJO continues with the enhanced phase currently over the western Hemisphere.

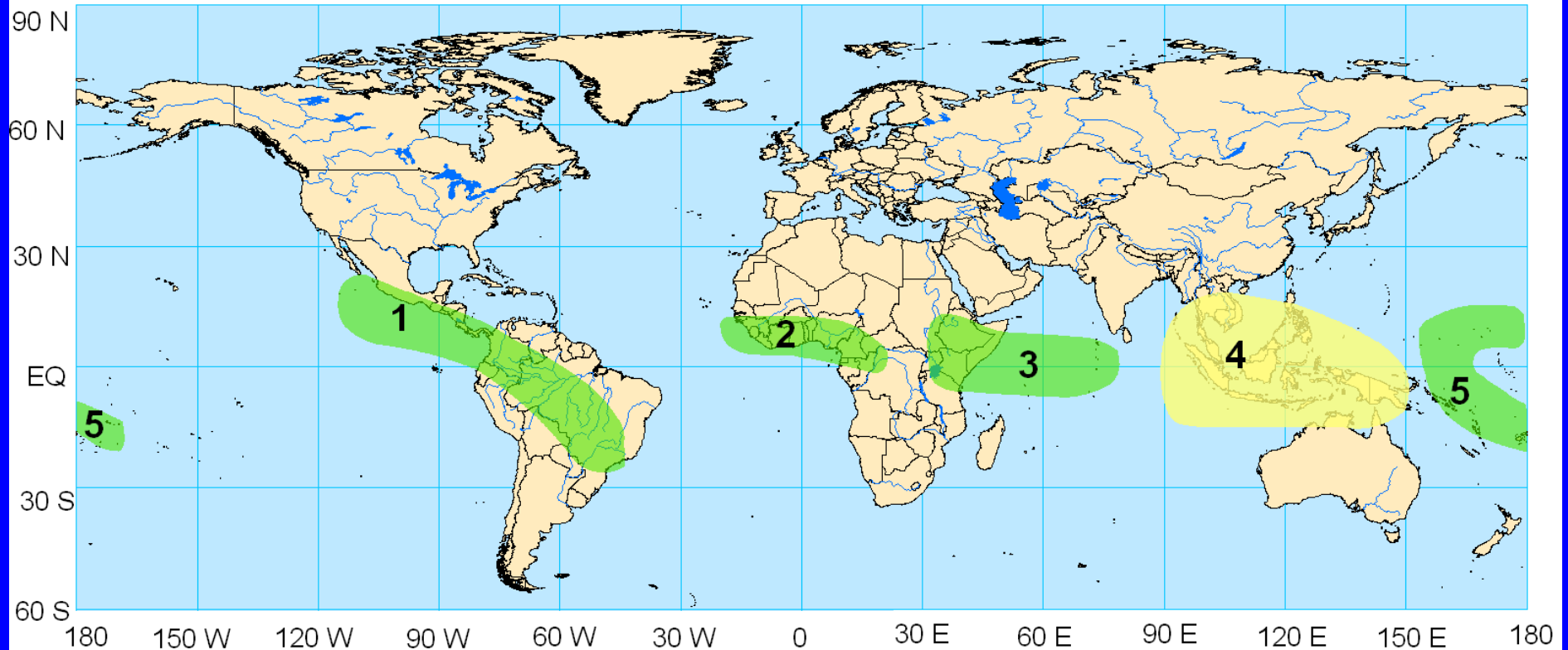
Statistical OLR MJO Forecast



Drier than normal conditions are forecast for the Maritime Continent and west Pacific with wetter than normal conditions developing across the Indian Ocean during the next 1-2 weeks.

Potential Benefits/Hazards – Week 1

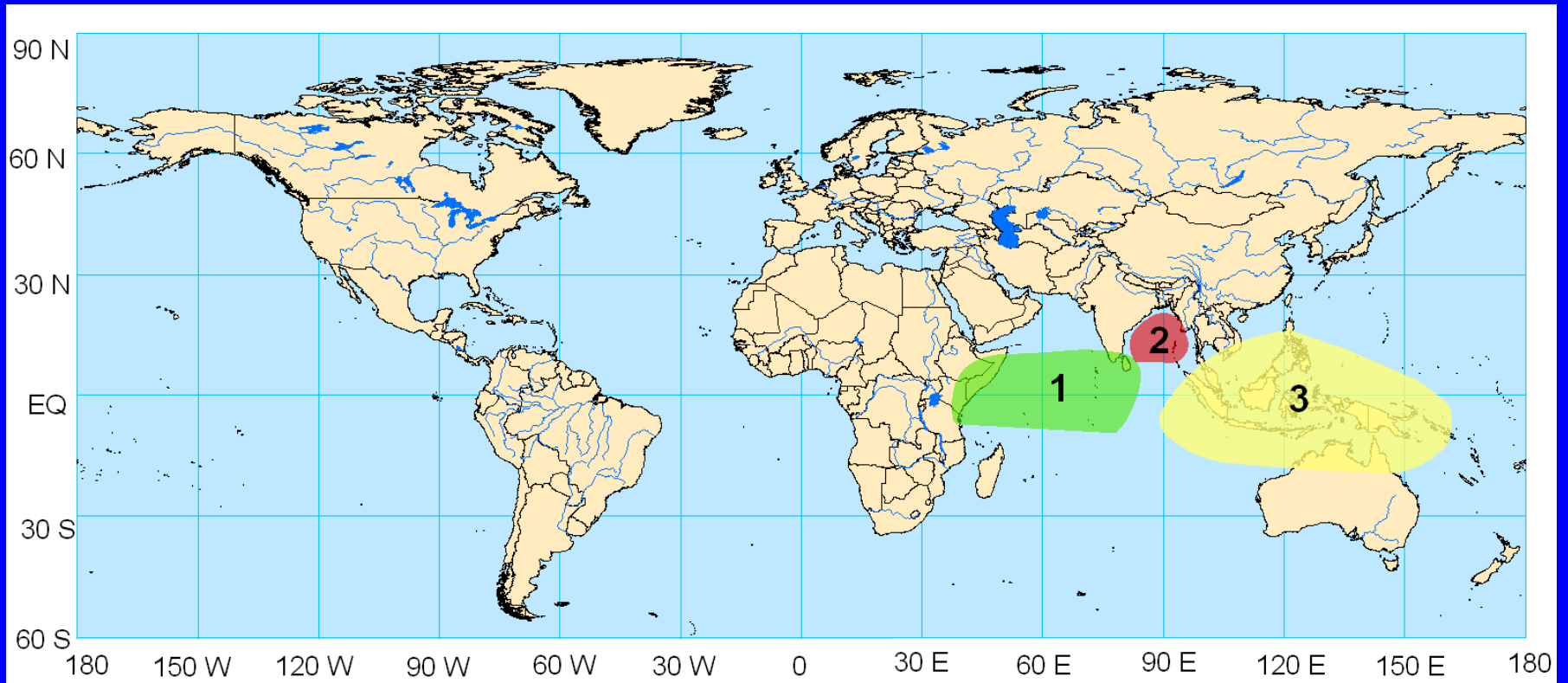
Valid October 17 - 23, 2006



1. An increased chance for above normal rainfall across the east Pacific, Central America, and parts of South America.
2. An increased chance for above normal rainfall for west Africa.
3. An increase chance for above normal rainfall across east Africa and the western Indian Ocean.
4. An increased chance for below normal rainfall across Southeast Asia.
5. An increased chance for above normal rainfall for parts of the west-central and south Pacific.

Potential Benefits/Hazards – Week 2

Valid October 24 - 30, 2006



1. An increased chance for above normal rainfall across the western and central Indian Ocean.
2. Favorable conditions for tropical cyclone development are expected in the Bay of Bengal.
3. An increased chance for below normal rainfall across the Maritime Continent.

Summary

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