

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

**Update prepared by
Climate Prediction Center / NCEP
January 1, 2007**

Outline

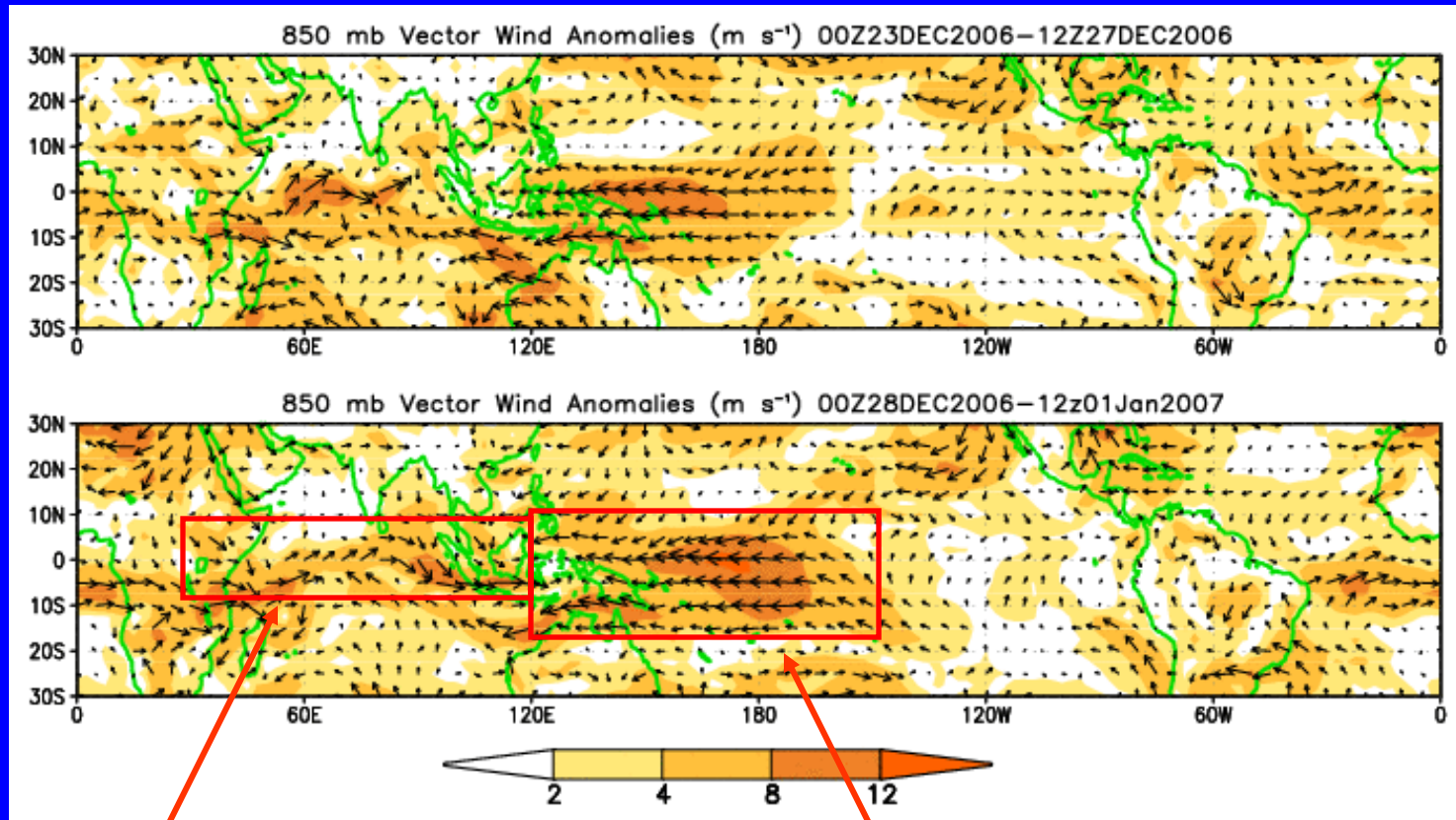
- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**

Overview

- The latest observations indicate the development of a moderate to strong MJO.
- During week 1, there is an increased chance for above (below) normal rainfall extending from the Maritime Continent into the western Pacific Ocean (sections of Brazil) due to the current MJO conditions. Favorable conditions exist for tropical cyclogenesis for areas northwest of Australia and east of the Philippines.
- Tropical cyclones Clovis and Isobel will impact Madagascar and northwest Australia respectively early in the period.
- Dry (wet) conditions are expected to shift to the eastern Indian Ocean and western Maritime Continent (western and central Pacific Ocean) during week 2. Favorable conditions for tropical cyclogenesis will remain for the northwest Pacific Ocean.

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

Note that shading denotes the magnitude of the anomalous wind vectors

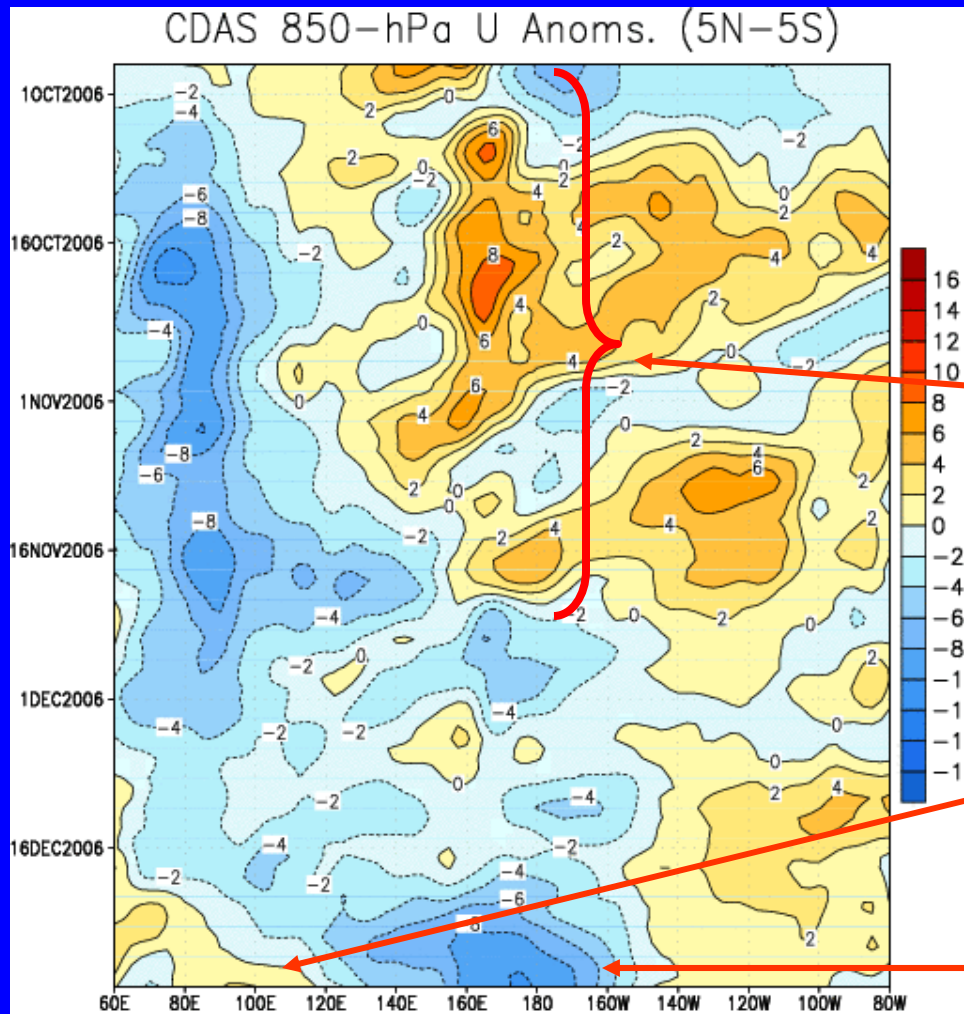


Westerly anomalies in the Indian Ocean remain and have shifted east into the western Maritime Continent.

Easterly anomalies have strengthened and encompass the area from east of the Date Line to the Maritime Continent.

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

Time
↓



Longitude

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

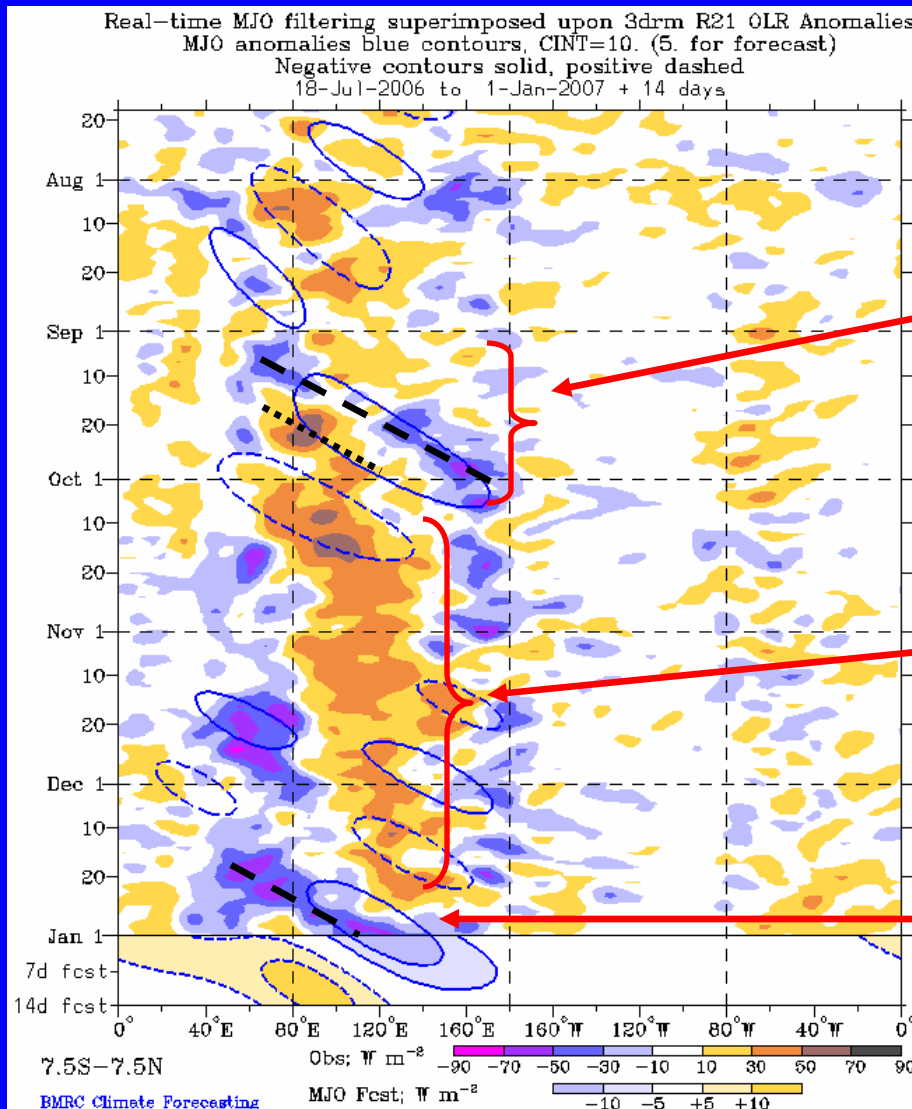
Stronger-than-average easterlies (blue shading)

Periods of westerly anomalies were frequent near and west of the Date Line during September, October, and early November.

For the first time in a few months, westerly anomalies are now evident in the equatorial Indian Ocean.

Easterly anomalies have strengthened considerably near the Date Line.

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



Drier-than-average conditions (/red shading)

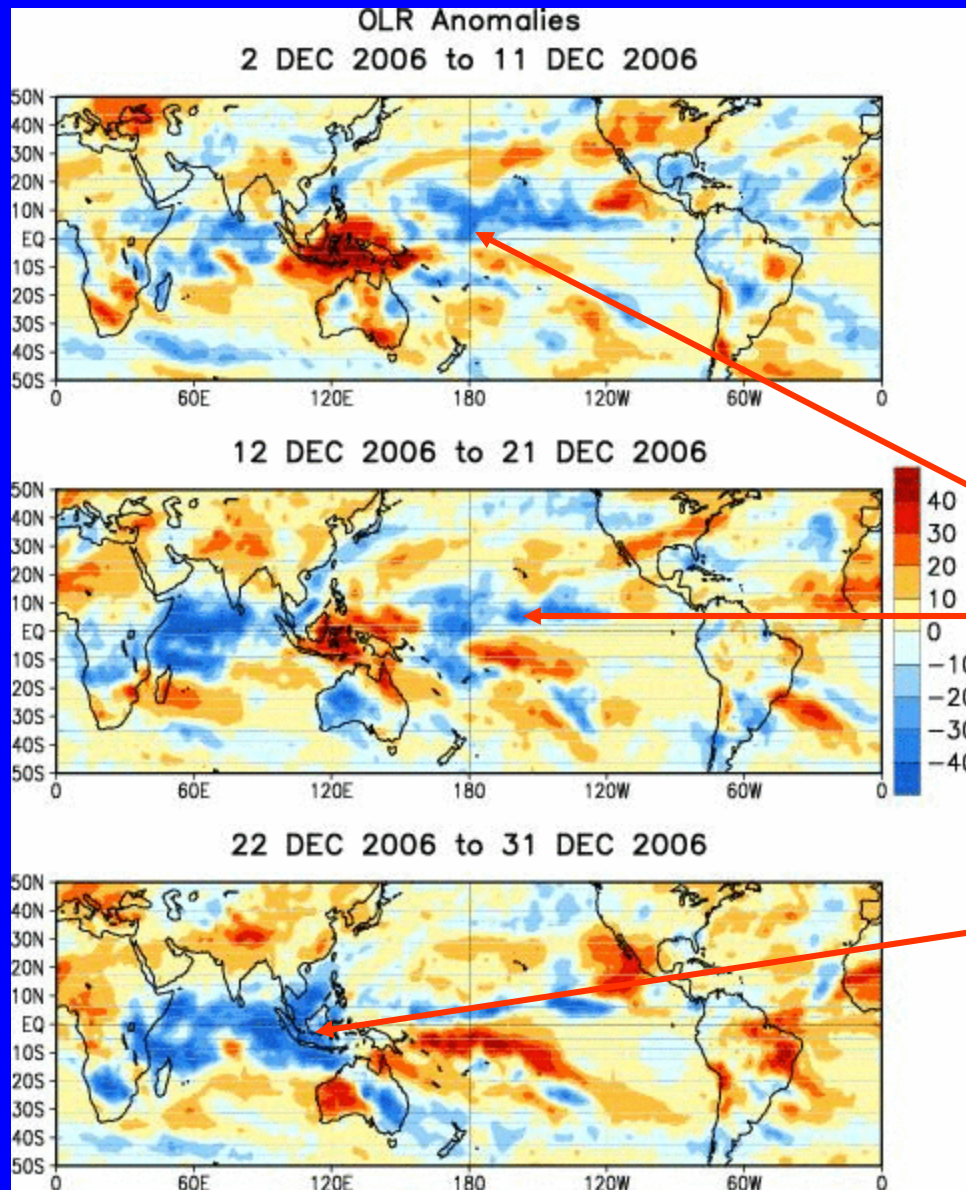
Wetter-than-average conditions (blue shading)

OLR anomalies associated with the MJO propagated eastward from the Indian to western Pacific Oceans beginning in early September.

Strong suppressed convection was evident across the Maritime Continent during the October to mid December time period.

Enhanced convection associated with the current MJO event shifted eastward from the Indian Ocean to the Maritime Continent during the past week.

Anomalous OLR: Last 30 days



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

Dry conditions prevailed across sections of the Maritime Continent and Australia during the first two-thirds of December.

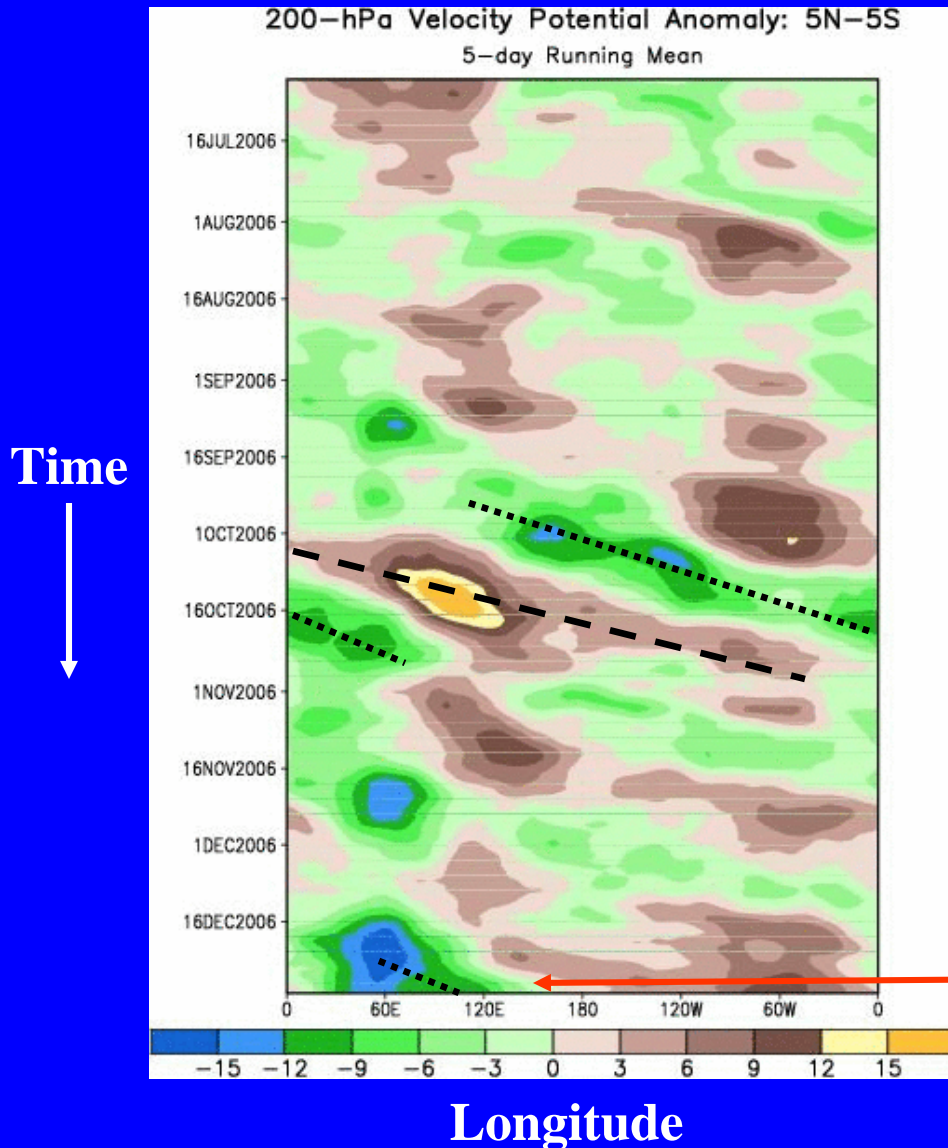
During the first half of December, enhanced convection was more prevalent in the central Pacific, particularly in areas north of the Date Line.

An extensive area of enhanced convection was observed in the Indian Ocean and most recently 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.



The MJO was incoherent during much of July, August, and September.

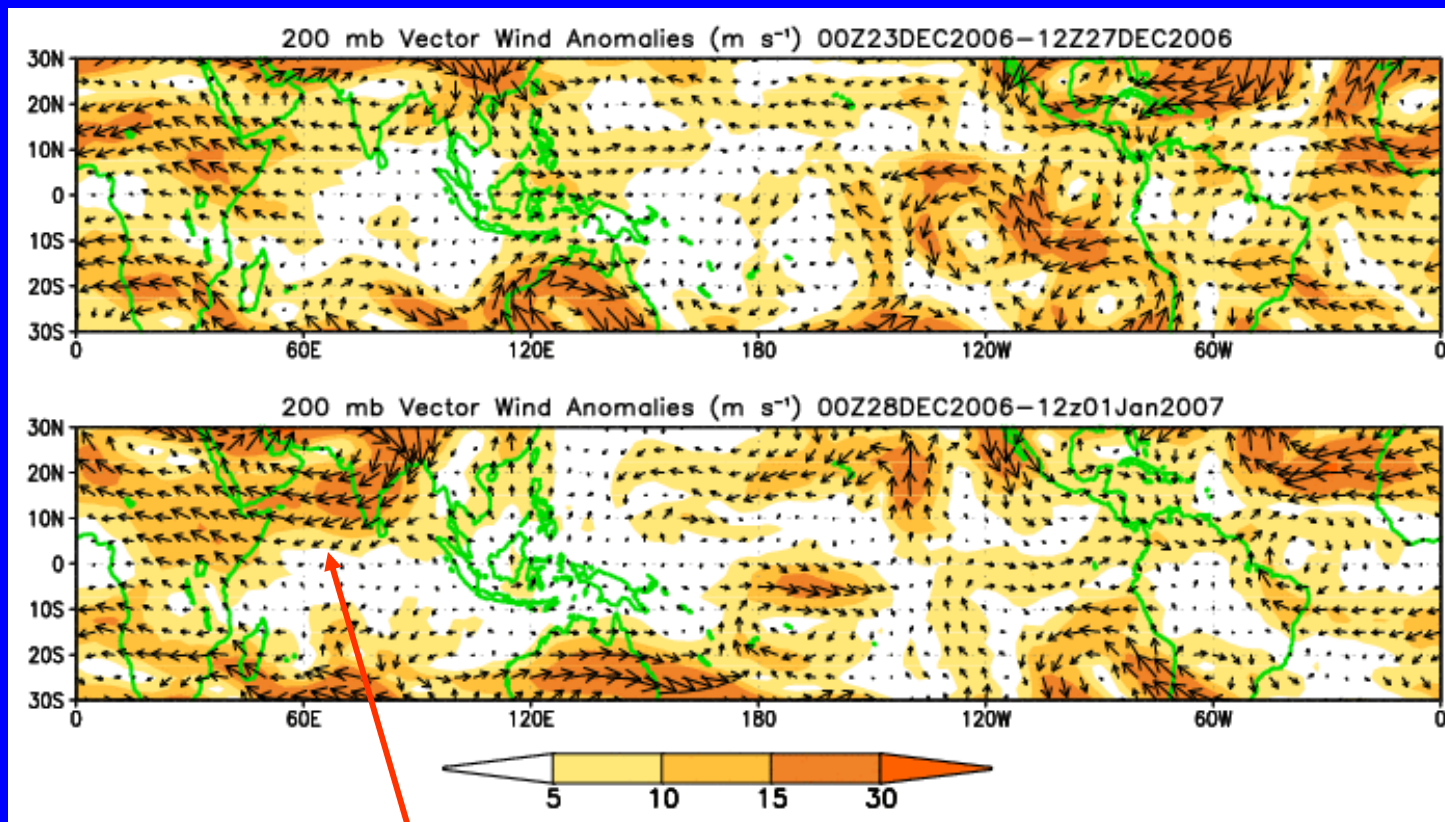
Moderate to strong MJO activity was observed from late-September to mid-October.

The MJO weakened considerably during the late October to mid-December time period.

Recently anomalies have shifted slightly eastward.

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

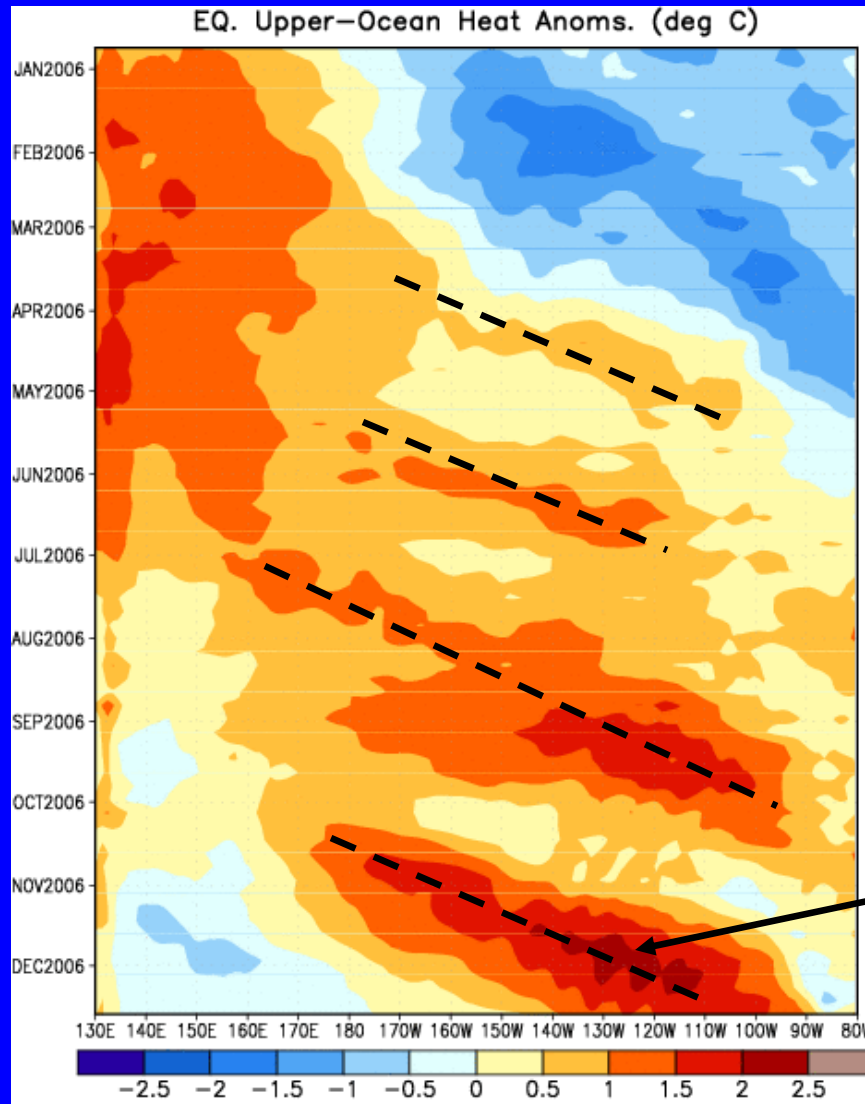
Note that shading denotes the magnitude of the anomalous wind vectors.



Clockwise circulation across South Asia during the last ten days associated with enhanced convection.

Heat Content Evolution in the Eq. Pacific

Time



Longitude

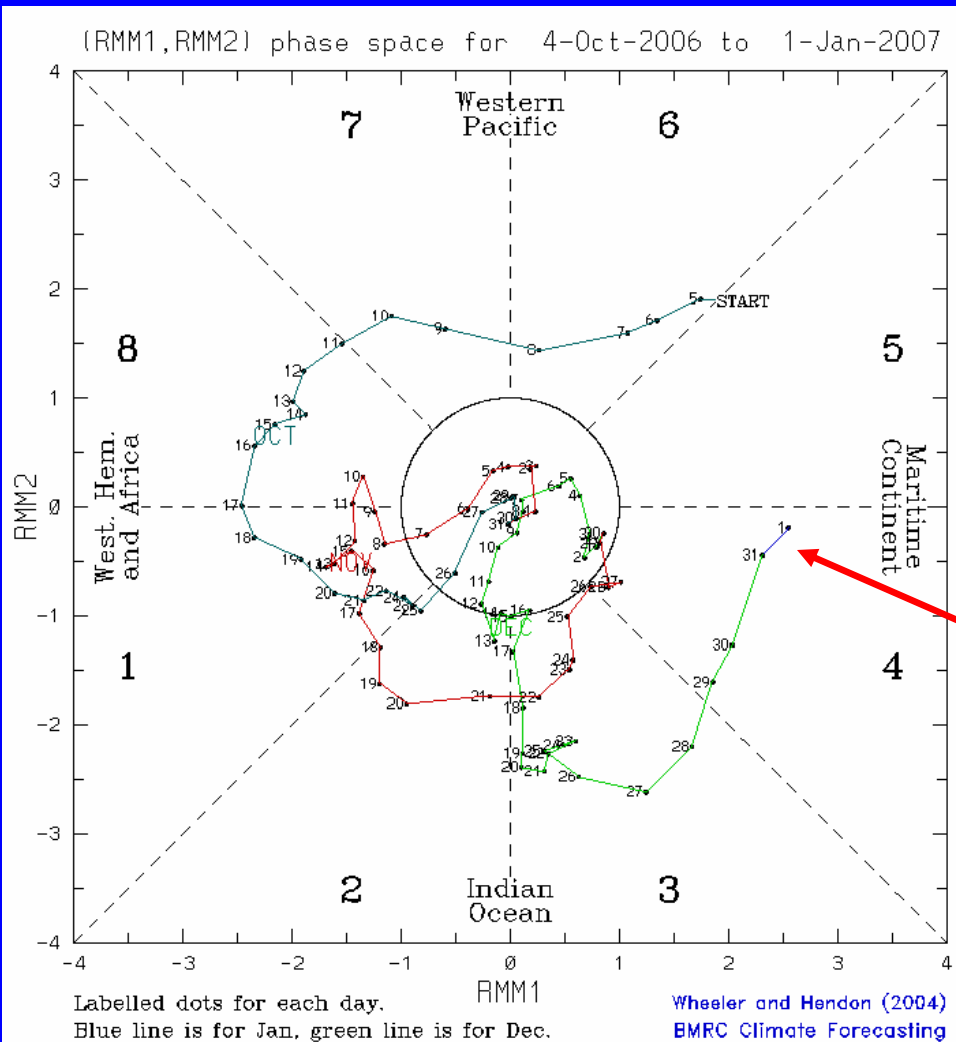
Starting in April, above normal upper oceanic water temperatures expanded from the western Pacific into the eastern Pacific in part due to Kelvin wave activity.

The latest downwelling Kelvin wave was initiated in early October and appears to be the strongest in over a year. Anomalously warm waters have reached the coast of South America.

MJO Index (Magnitude and Phase)

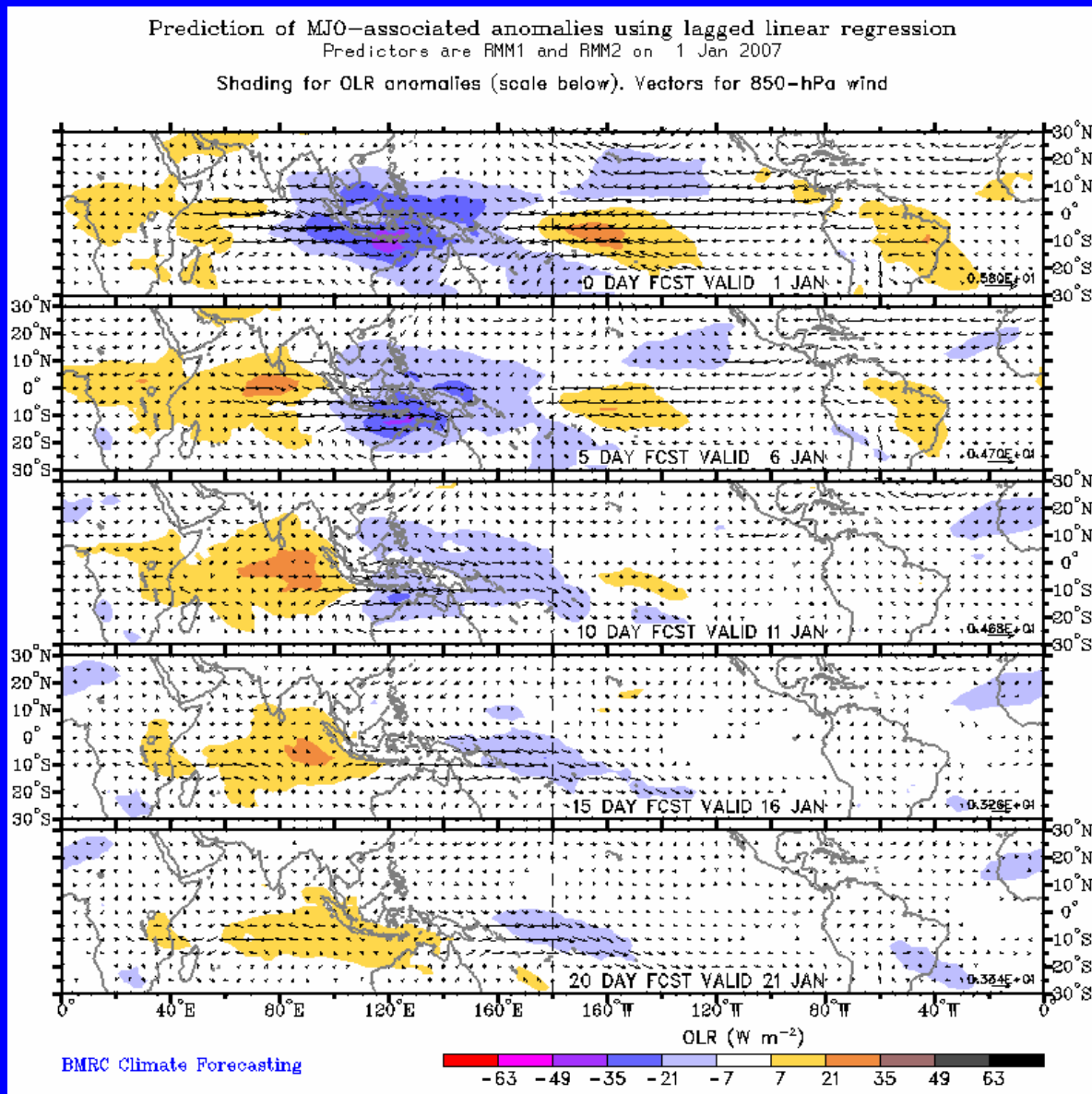
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850 hPa zonal wind, 200 hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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.



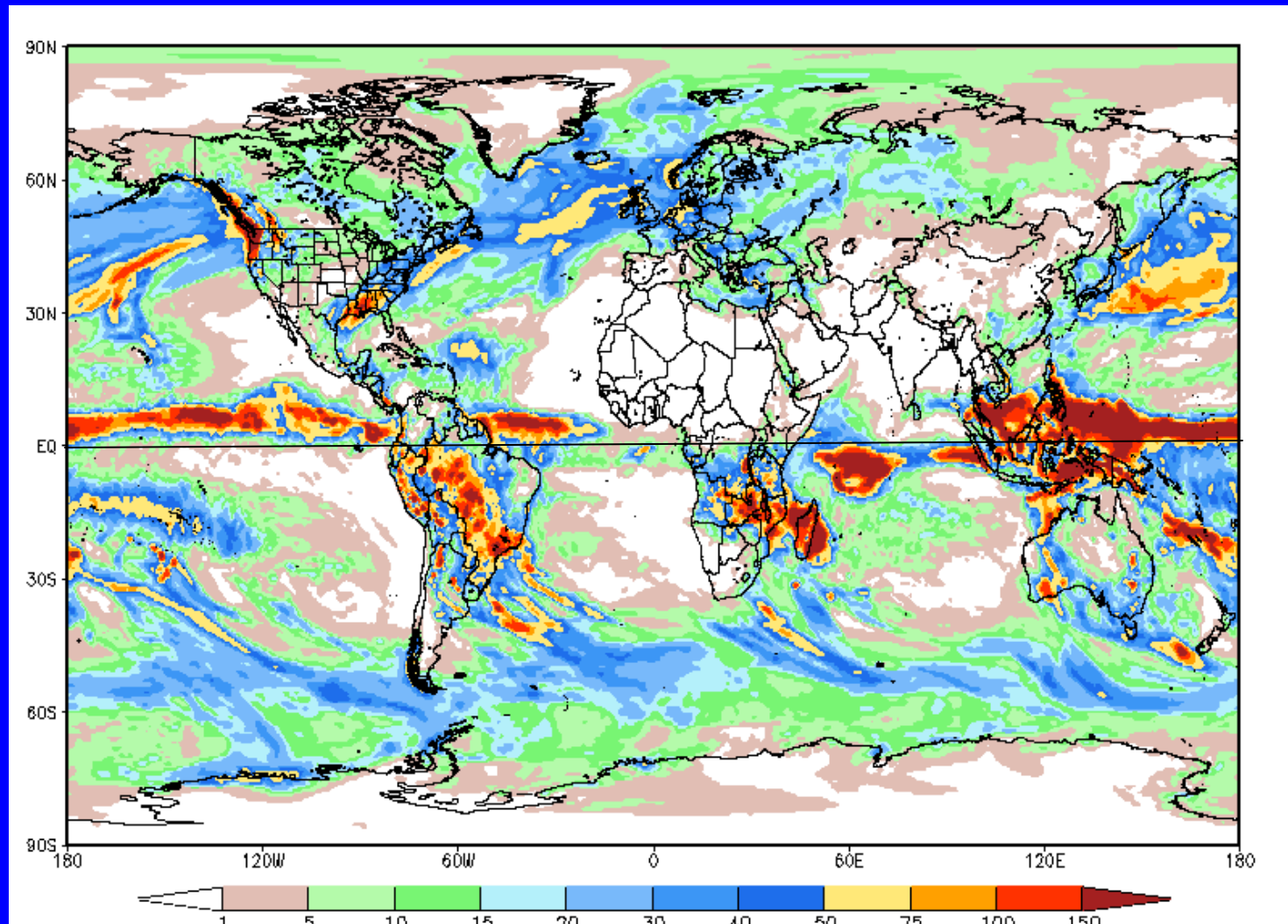
The MJO has strengthened and is currently centered across the Maritime Continent having shifted eastward during the past week.

Statistical OLR MJO Forecast



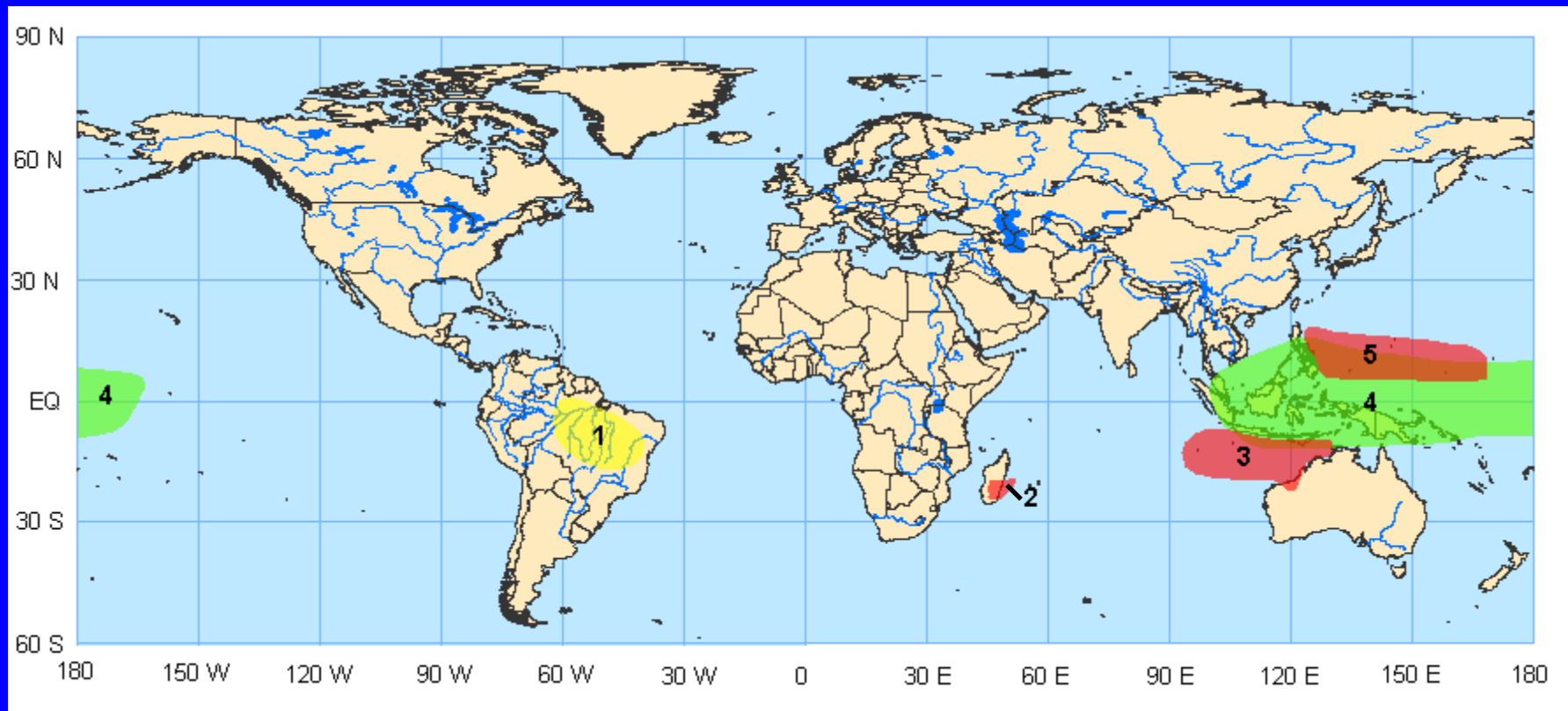
The forecast indicates enhanced convection across the Maritime Continent during the next 5-10 days while suppressed convection develops in the Indian Ocean.

Global Forecast System (GFS) Week 1 Precipitation Forecast



Potential Benefits/Hazards – Week 1

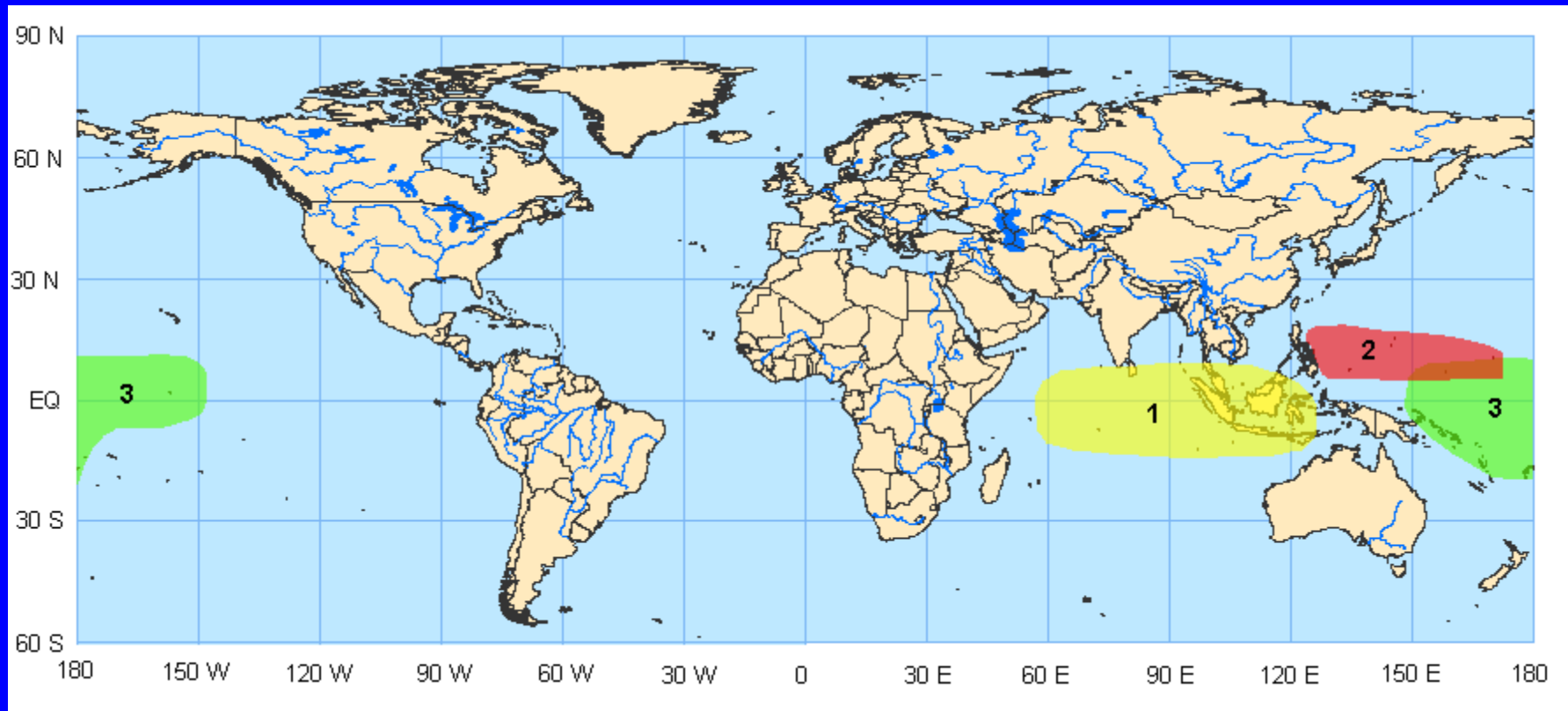
Valid January 2 – January 8, 2007



1. An increased chance for below normal rainfall for sections of Brazil.
2. Tropical cyclone Clovis will impact Madagascar early in the period.
3. Favorable conditions exist for tropical cyclogenesis northwest of Australia. Tropical cyclone Isobel will impact northwest Australia early in the period.
4. An increased chance for above normal rainfall for the Maritime Continent and sections of the western Pacific Ocean.
5. Favorable conditions exist for tropical cyclogenesis east of the Philippines.

Potential Benefits/Hazards – Week 2

Valid January 9 – January 15, 2006



1. An increased chance for below normal rainfall for the eastern Indian Ocean and western Maritime Continent.
2. Favorable conditions exist for tropical cyclogenesis east of the Philippines.
3. An increased chance for above normal rainfall for the western and central Pacific Ocean.

Summary

- The latest observations indicate the development of a moderate to strong MJO.
- During week 1, there is an increased chance for above (below) normal rainfall extending from the Maritime Continent into the western Pacific Ocean (sections of Brazil) due to the current MJO conditions. Favorable conditions exist for tropical cyclogenesis for areas northwest of Australia and east of the Philippines.
- Tropical cyclones Clovis and Isobel will impact Madagascar and northwest Australia respectively early in the period.
- Dry (wet) conditions are expected to shift to the eastern Indian Ocean and western Maritime Continent (western and central Pacific Ocean) during week 2. Favorable conditions for tropical cyclogenesis will remain for the northwest Pacific Ocean.