

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

**Update prepared by
Climate Prediction Center / NCEP
December 25, 2006**

Outline

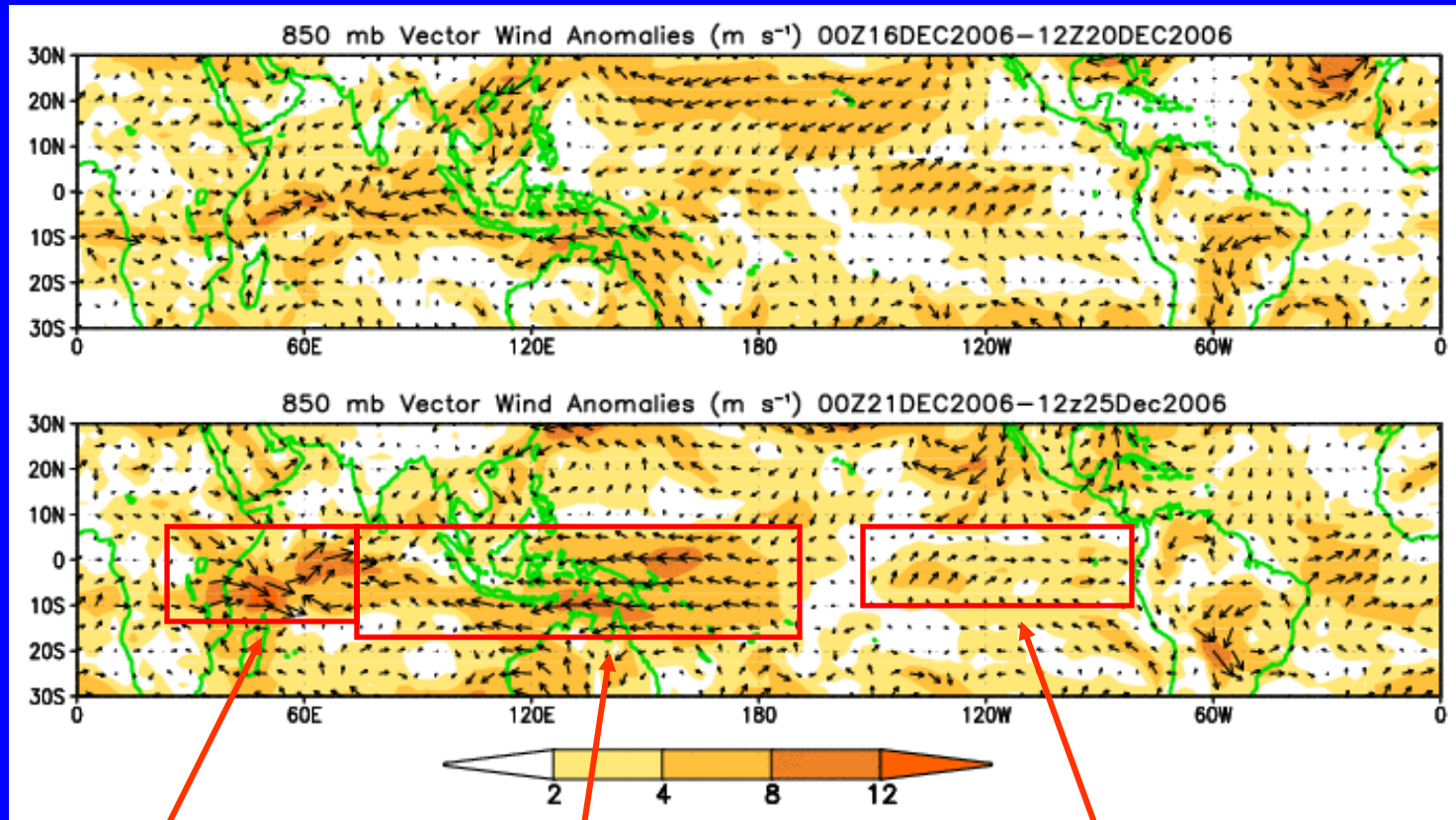
- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**

Overview

- The latest observations indicate that the MJO remains weak but needs to be closely monitored.
- During week 1, there is an increased chance of above (below) normal rainfall for sections of the tropical western Pacific Ocean (southern Maritime Continent and northern Australia) due to the current El Nino conditions. Also, wet conditions are expected for much of the Indian Ocean and sections of the western Maritime Continent.
- Wet (dry) conditions are expected to remain for sections of the eastern Indian Ocean, western Maritime Continent and western Pacific Ocean (southern maritime Continent and northern Australia) during week 2.
- Favorable conditions for tropical cyclogenesis are expected to exist for sections of the Indian Ocean during both weeks 1 and 2.

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

Note that shading denotes the magnitude of the anomalous wind vectors

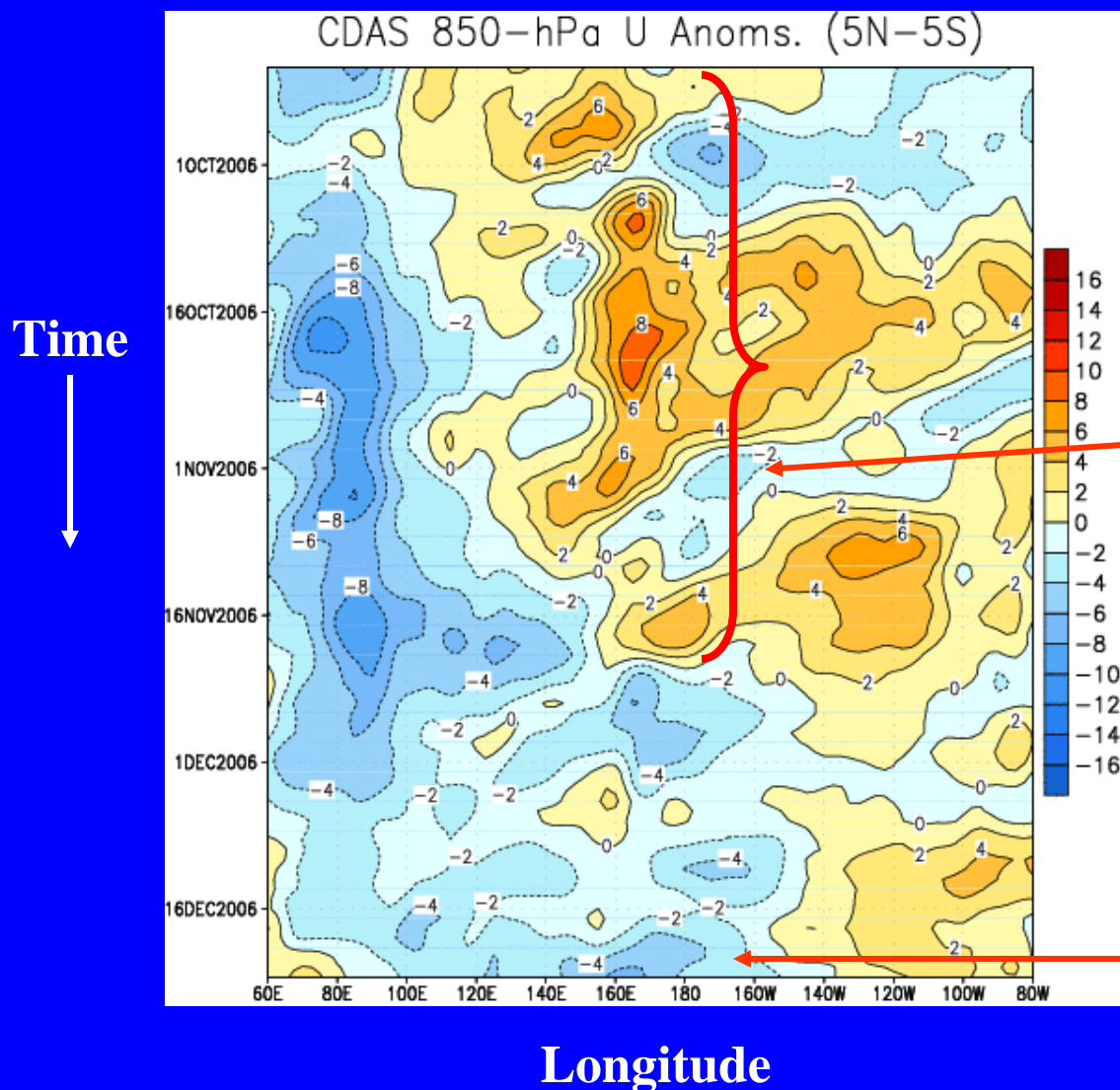


Robust westerly anomalies remain in the Indian Ocean associated with the enhanced convection during the past 1-2 weeks.

Easterly anomalies now stretch from the eastern Indian Ocean to the Date Line.

Westerly anomalies remain (albeit weaker) across sections of the equatorial eastern Pacific Ocean.

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



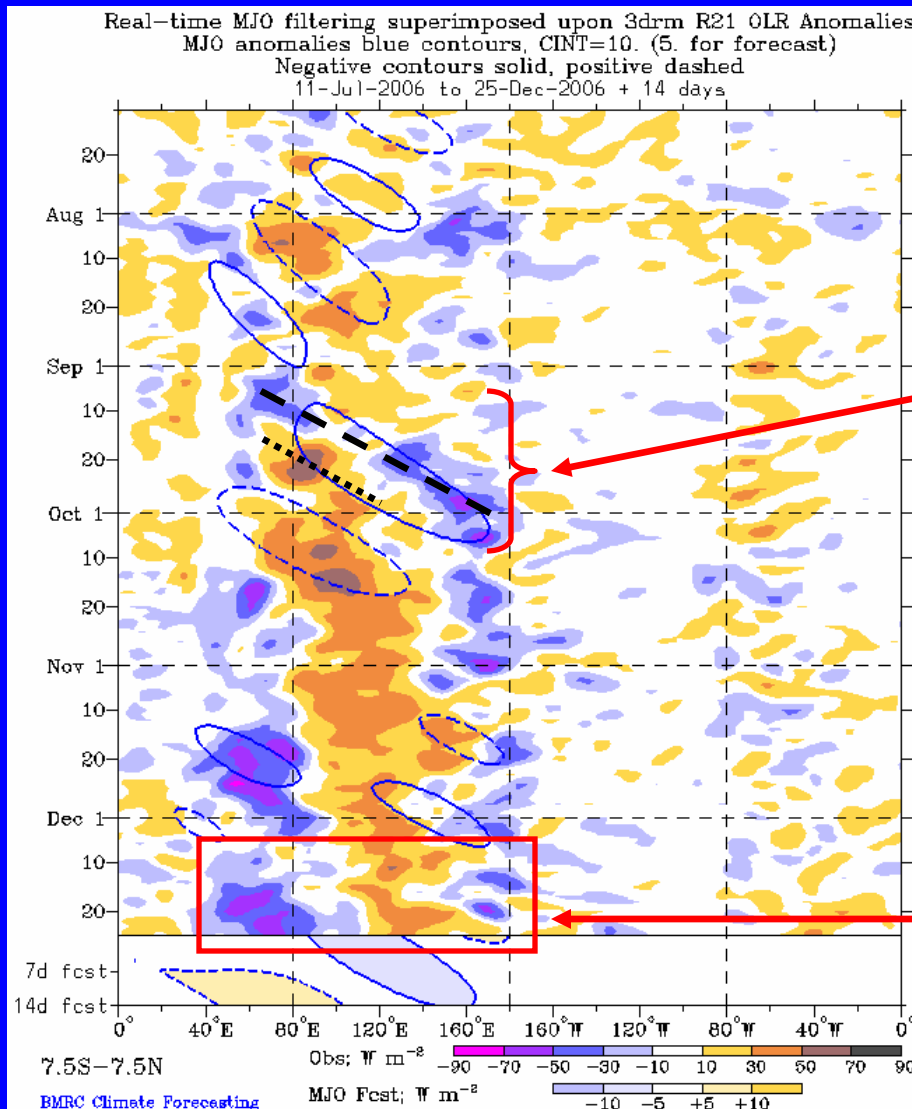
Weaker-than-average easterlies or westerlies (orange/red shading)

Stronger-than-average easterlies (blue shading)

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

Easterly anomalies have strengthened some during the past few days near the Date Line.

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



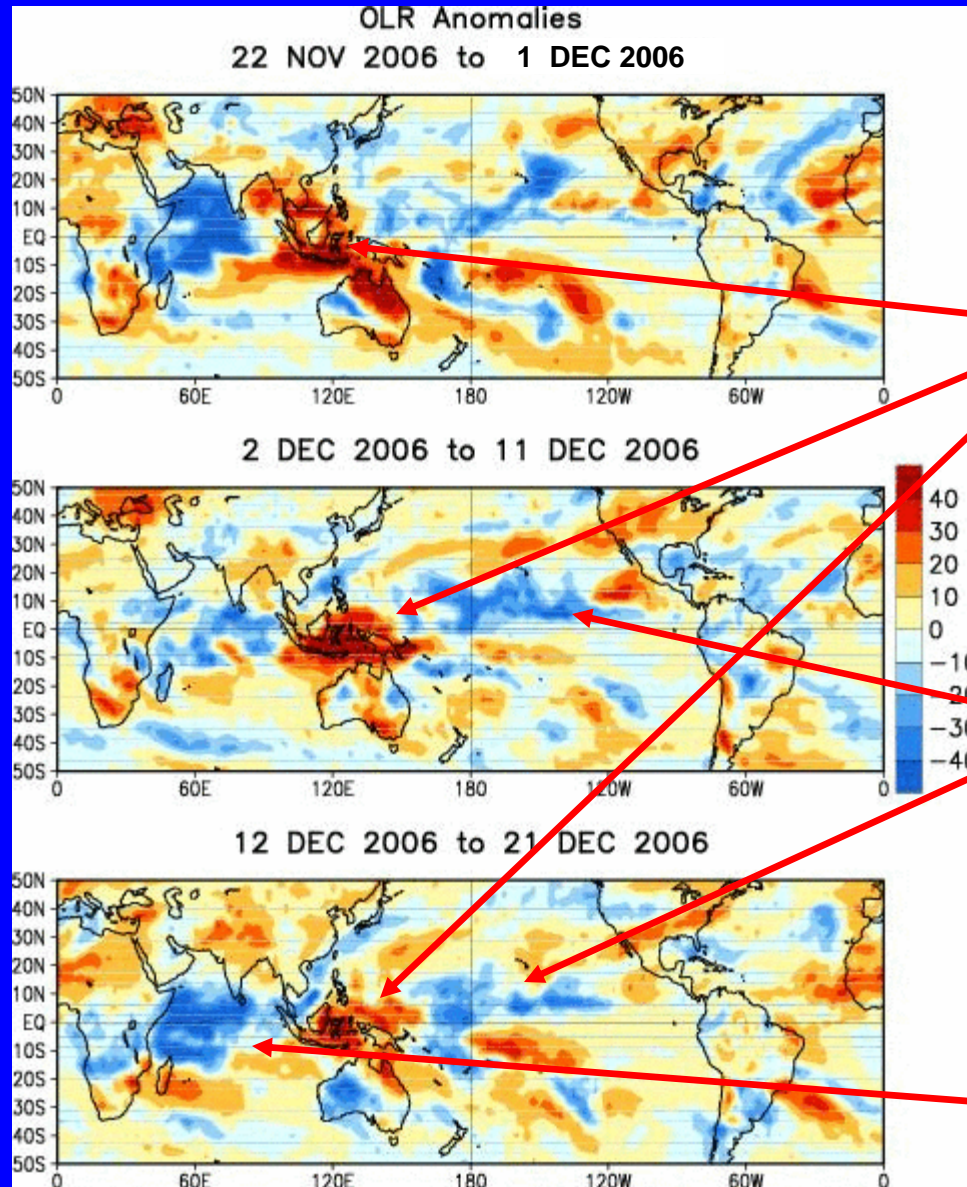
Drier-than-average conditions (/red shading)

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.

Suppressed convection across the Maritime Continent continues to shift gradually eastward while enhanced convection continues in the Indian Ocean. Periodic areas of enhanced convection continue near the Date Line.

Anomalous OLR: Last 30 days



Drier-than-average conditions (red shading)

Wetter-than-average conditions (blue shading)

Dry conditions have been persistent across sections of the Maritime Continent and Australia throughout the period.

During mid-late December, enhanced convection was more prevalent across the western and central Pacific Ocean.

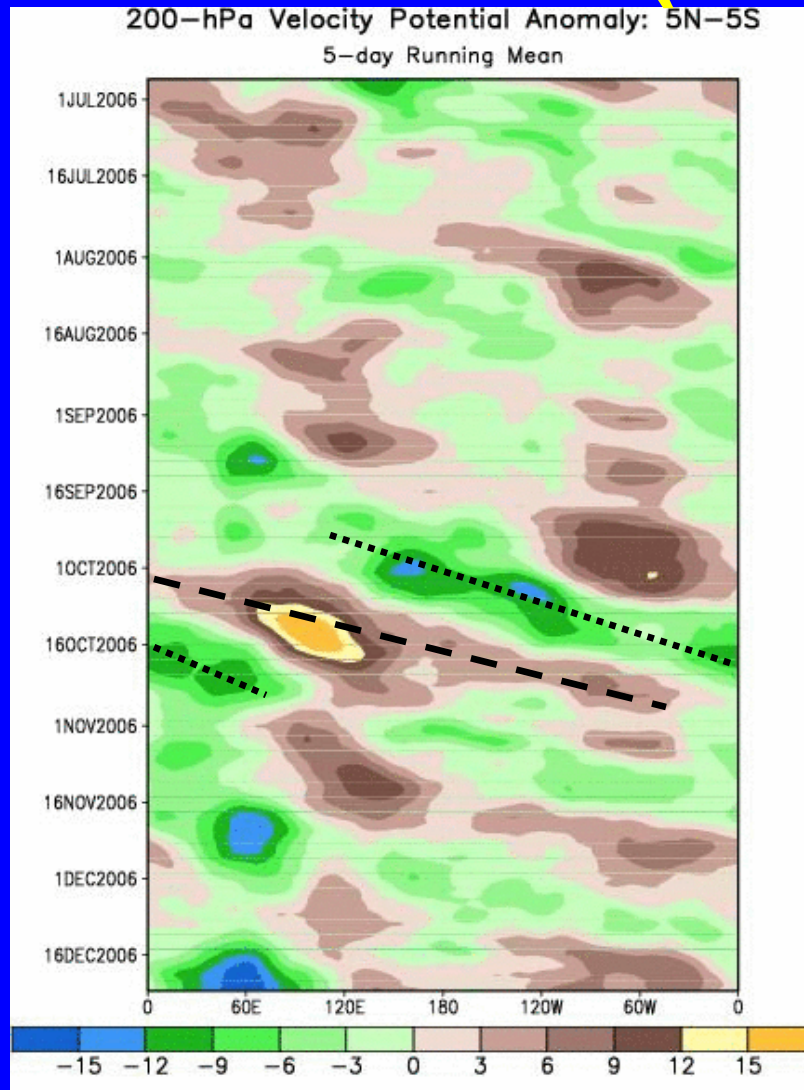
Extensive enhanced convection has redeveloped across the western Indian Ocean during the past ten days.

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

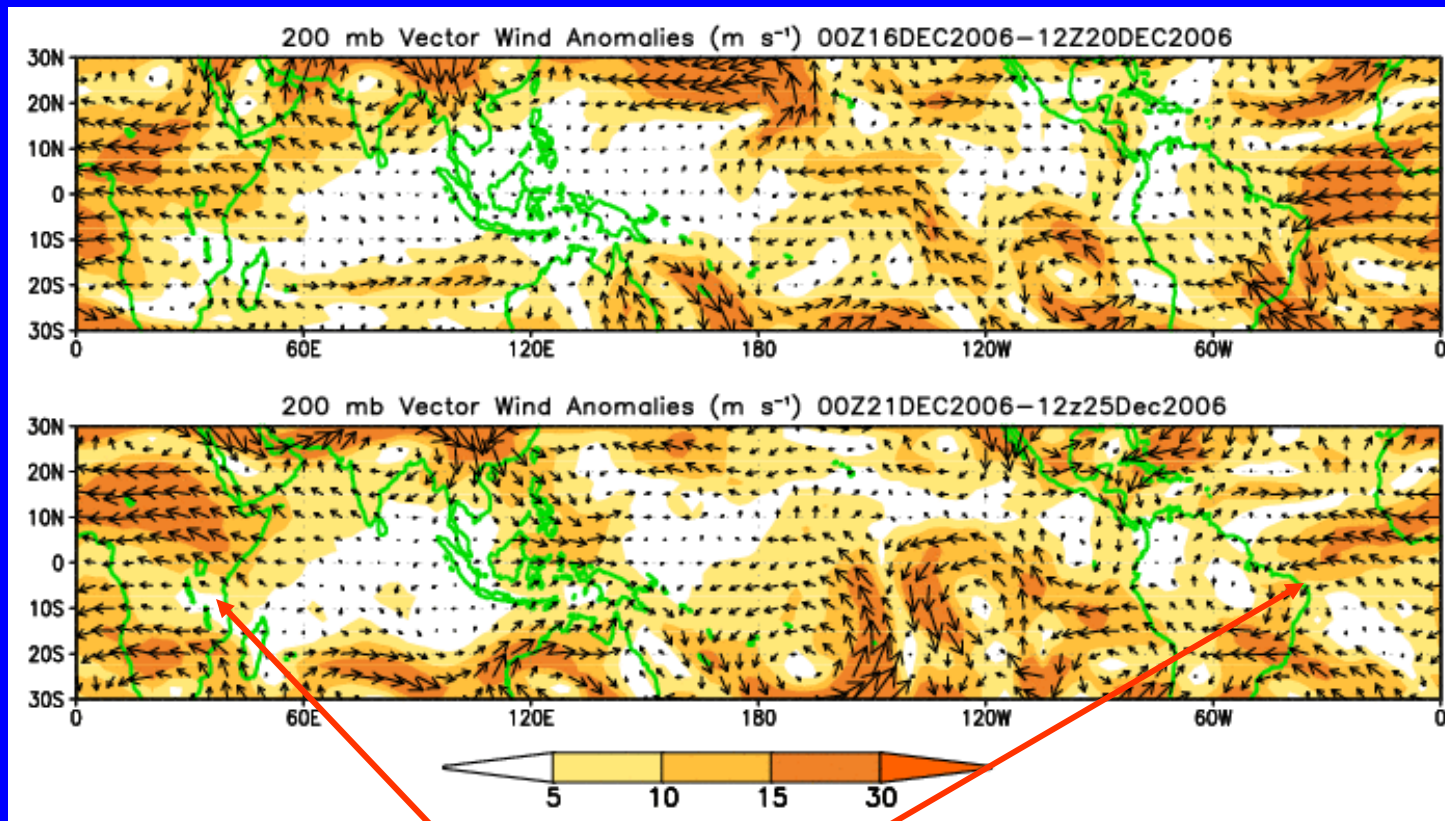
The MJO was incoherent during much of August and September.

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.

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

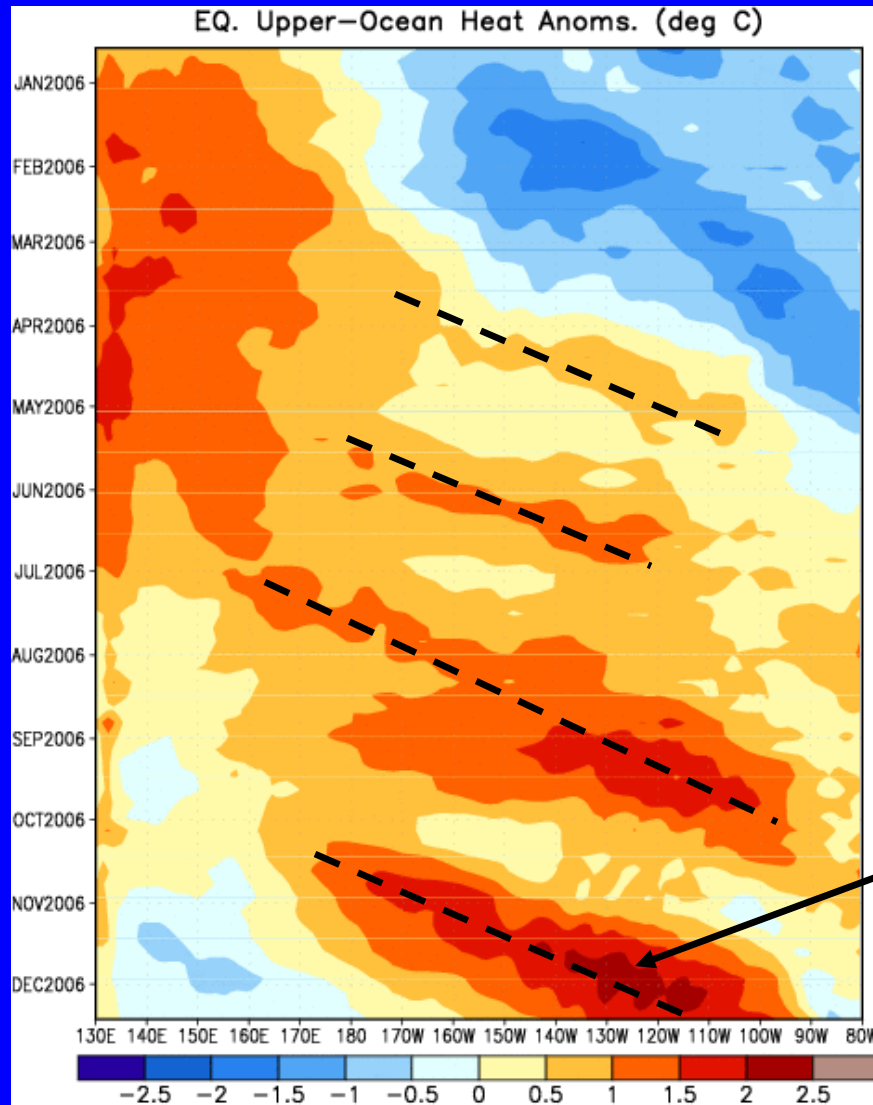
Note that shading denotes the magnitude of the anomalous wind vectors.



Strong easterly anomalies centered along the equator stretch from the Atlantic Ocean to Africa.

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 and close to reaching the South America coast.

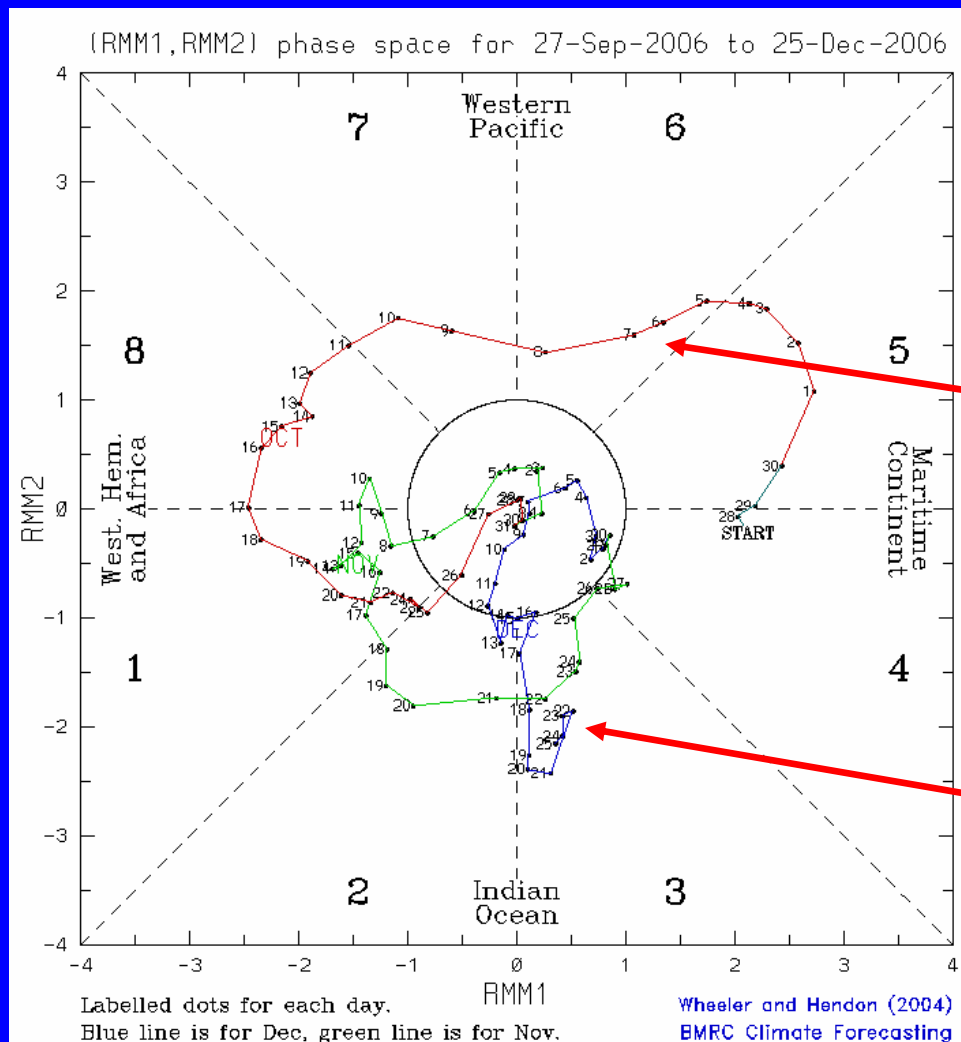
MJO Index (Magnitude and Phase)

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).

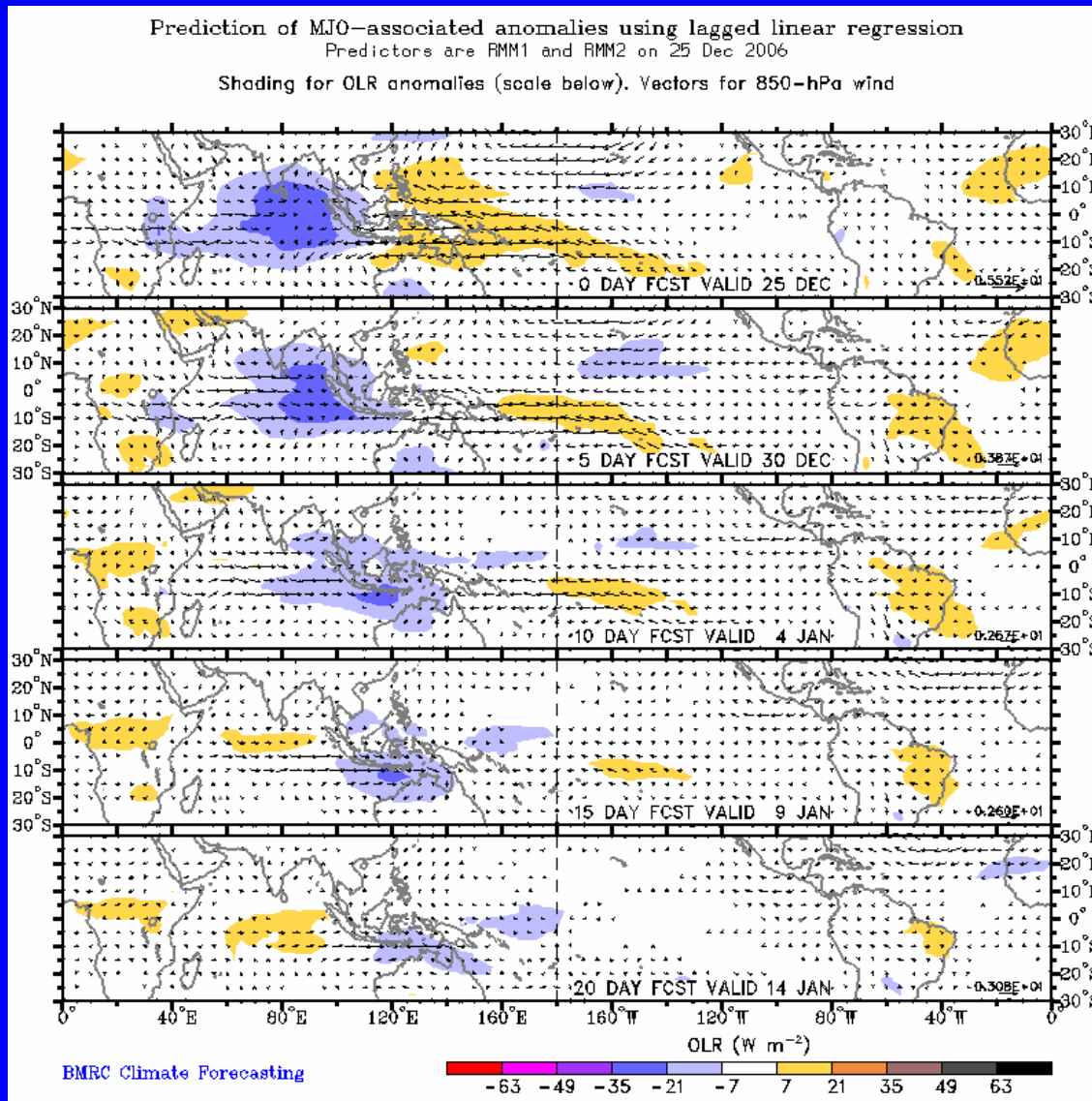
The axes represent the time series of the two leading modes of variability and are used to measure the amplitude while the triangular areas indicate the phase or location of the enhanced phase of the MJO. The farther away from the center of the circle the stronger the MJO. Different color lines indicate different months.

The MJO was strong during October as indicated by a strong projection and eastward propagation from the Maritime Continent to the Indian Ocean (red line).

Although the MJO projection has strengthened, the MJO remains weak as indicated by only minor eastward movement.



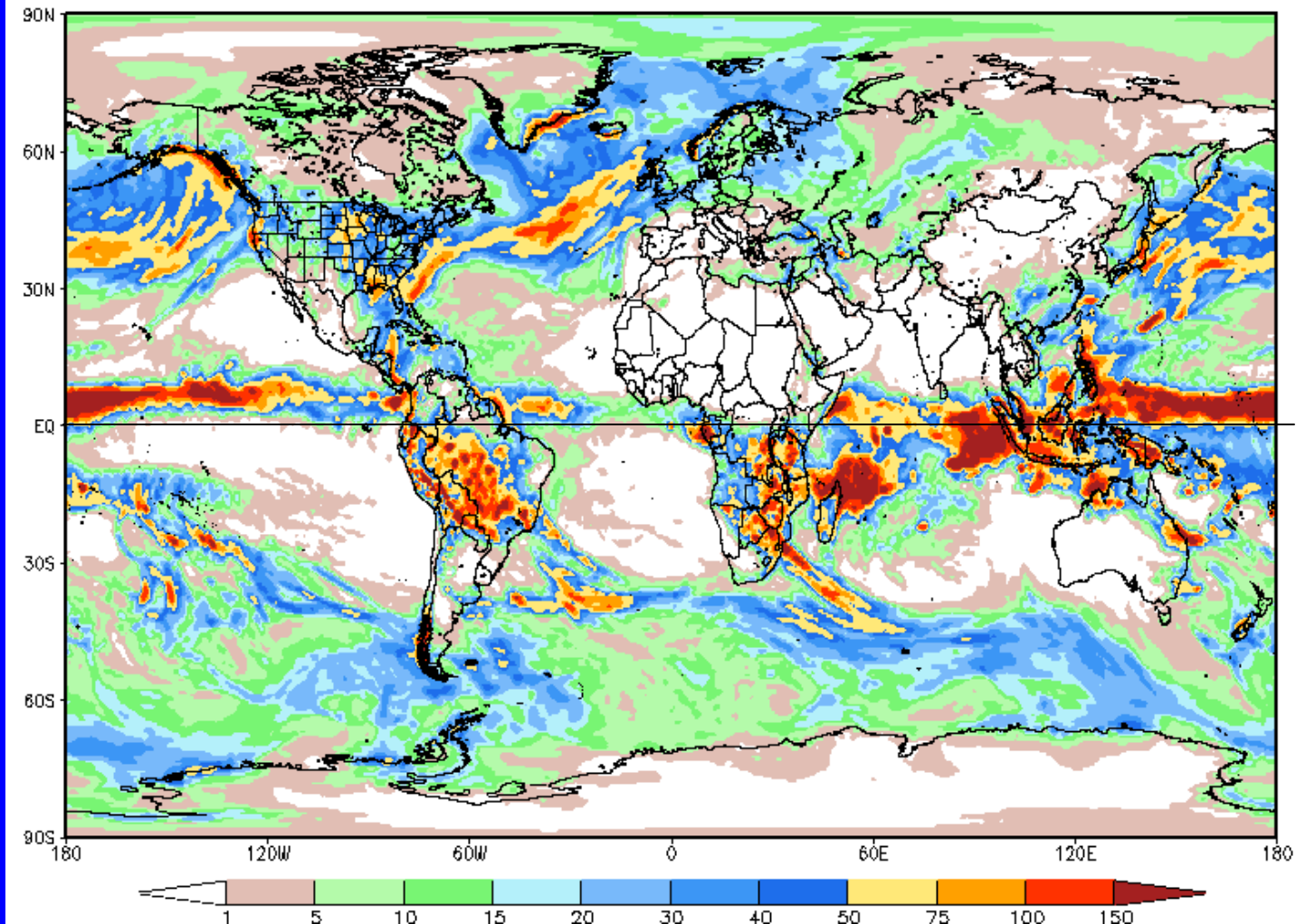
Statistical OLR MJO Forecast



The forecast indicates enhanced convection in the Indian Ocean and western Maritime Continent during the next 5-10 days.

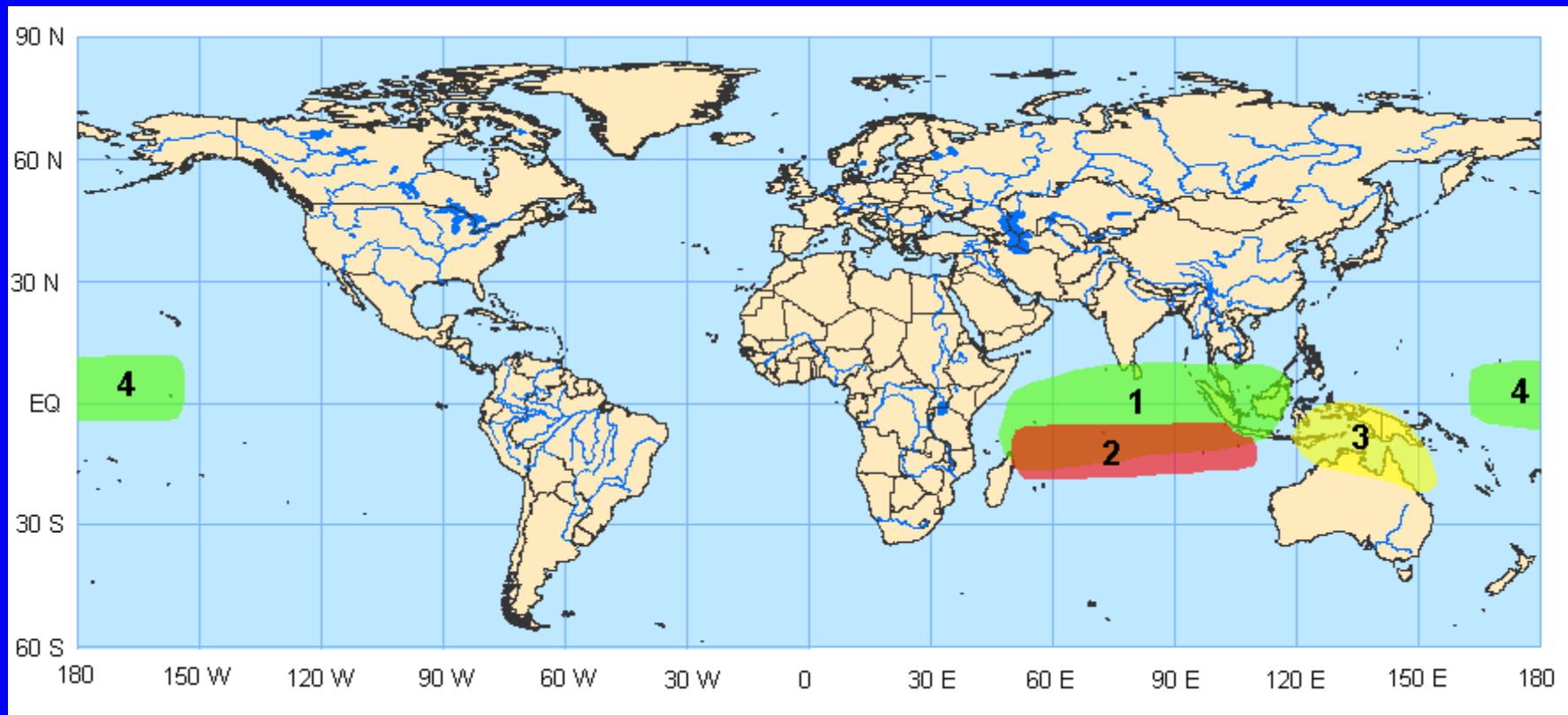
Global Forecast System (GFS) Week 1 Precipitation Forecast

NOAA GFS 37.5 km Week 1 Total Precipitation (mm)
Issued at Dec 26 2006 00Z for the period ending at Jan 2 2007 00Z



Potential Benefits/Hazards – Week 1

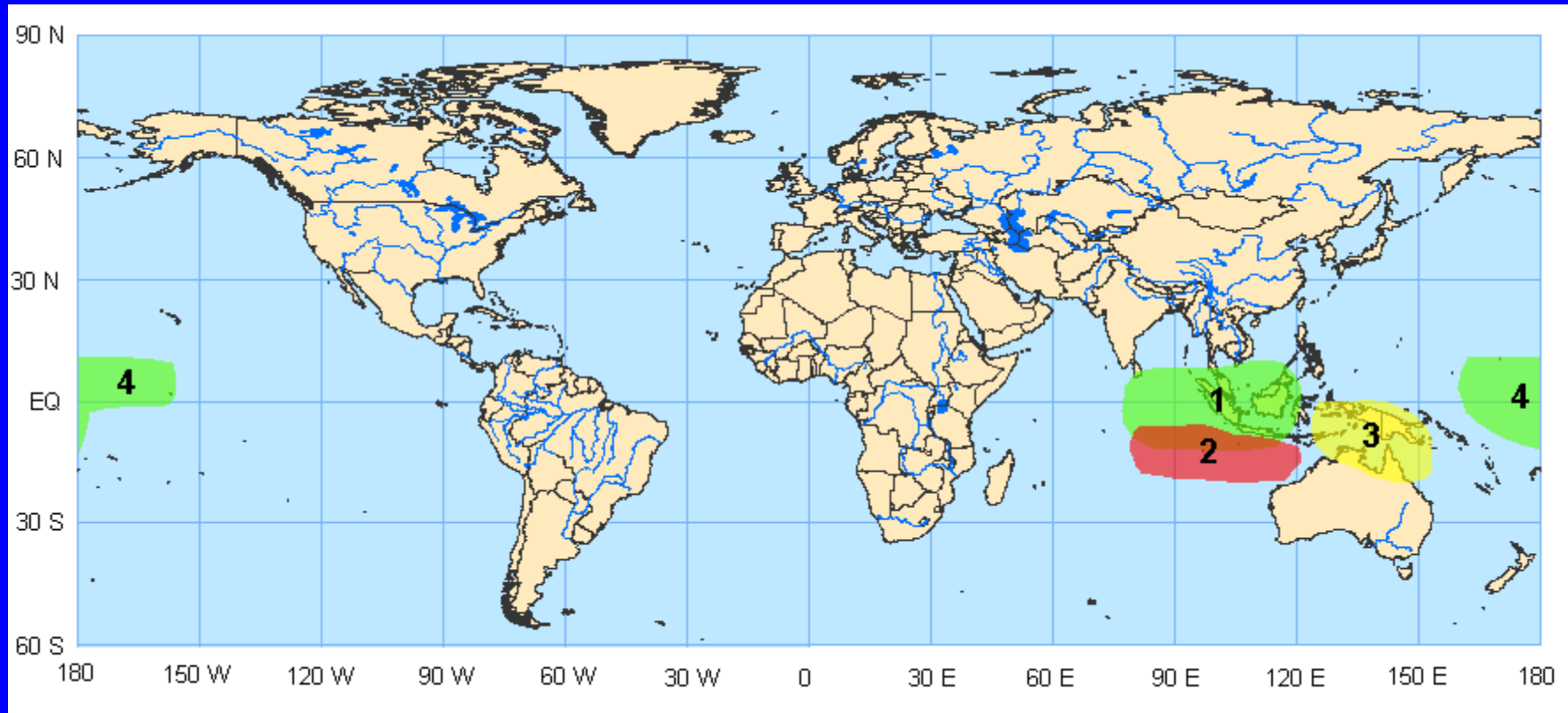
Valid December 26 – January 1, 2007



1. An increased chance for above normal rainfall for much of the Indian Ocean and western Maritime Continent.
2. Favorable conditions exist for tropical cyclogenesis for the Indian Ocean.
3. An increased chance for below normal rainfall across the southern Maritime Continent and northern Australia.
4. An increased chance for above normal rainfall for sections of the western Pacific Ocean.

Potential Benefits/Hazards – Week 2

Valid January 2 – January 8, 2006



1. An increased chance for above normal rainfall for the eastern Indian Ocean and western Maritime Continent.
2. Favorable conditions exist for tropical cyclogenesis for the southern Indian Ocean.
3. An increased chance for below normal rainfall for sections of the southern Maritime Continent and northern Australia.
4. An increased chance for above normal rainfall for sections of the western Pacific Ocean.

Summary

- The latest observations indicate that the MJO remains weak but needs to be closely monitored.
- During week 1, there is an increased chance of above (below) normal rainfall for sections of the tropical western Pacific Ocean (southern Maritime Continent and northern Australia) due to the current El Nino conditions. Also, wet conditions are expected for much of the Indian Ocean and sections of the western Maritime Continent.
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