

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

Update prepared by  
Climate Prediction Center / NCEP  
October 30, 2006

# Outline

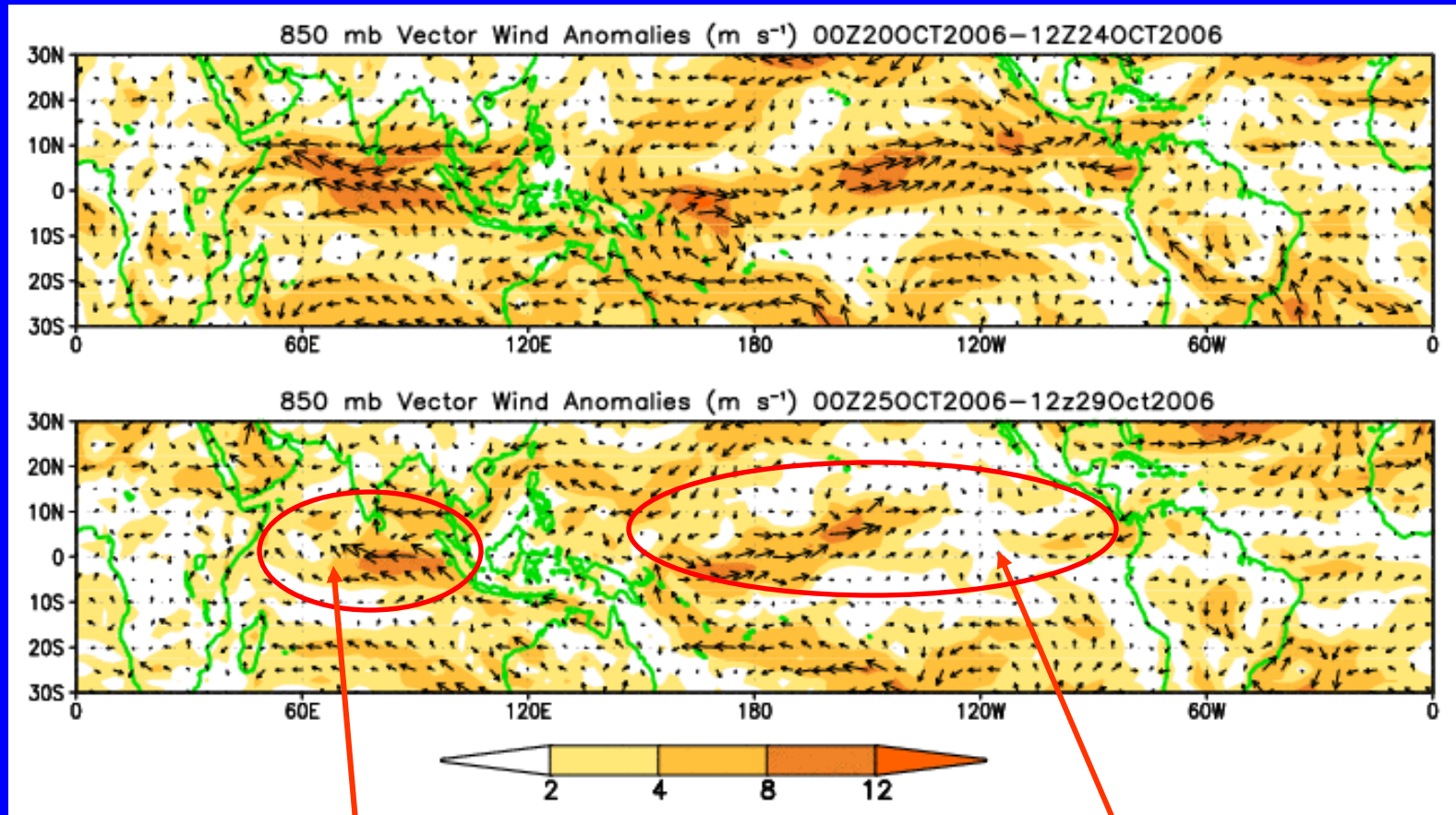
- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**

# Overview

- The latest observations indicate that the MJO has weakened.
- During week 1, wetter than normal conditions are expected for the equatorial central Indian Ocean and central Pacific Ocean near the Date Line. Drier than normal conditions are expected to continue across the southern Maritime Continent and surrounding waters. Typhoon Cimaron is forecast to impact the South China Sea and sections of Southeast Asia during the period.
- During week 2, the pattern of above (below) average rainfall is expected to persist for the equatorial Pacific Ocean (Maritime Continent).

# 850-hPa Vector Wind Anomalies ( $\text{m s}^{-1}$ )

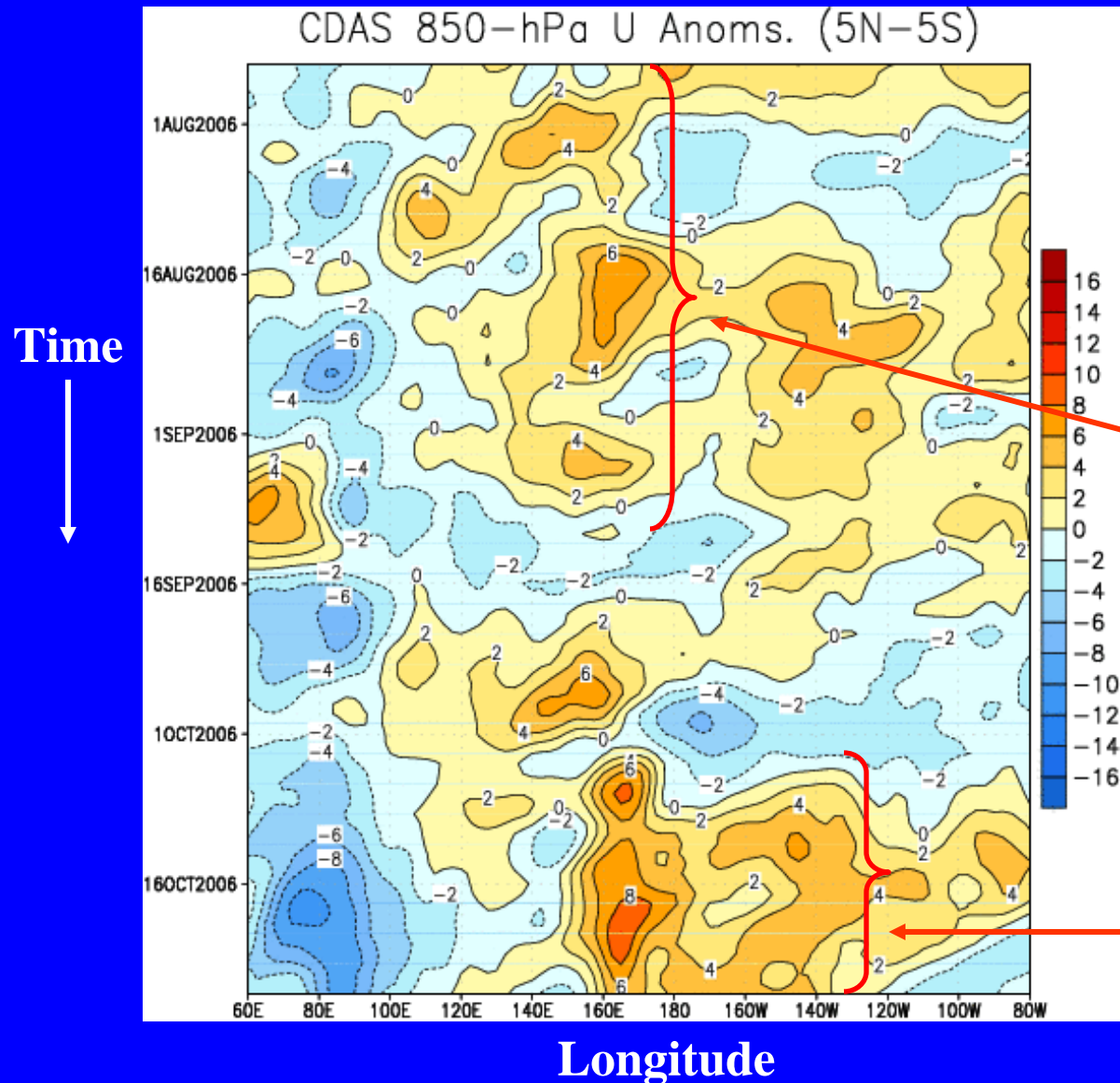
Note that shading denotes the magnitude of the anomalous wind vectors



Easterly anomalies have weakened slightly in the Indian Ocean.

Westerly anomalies have weakened across much of the Pacific Ocean.

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



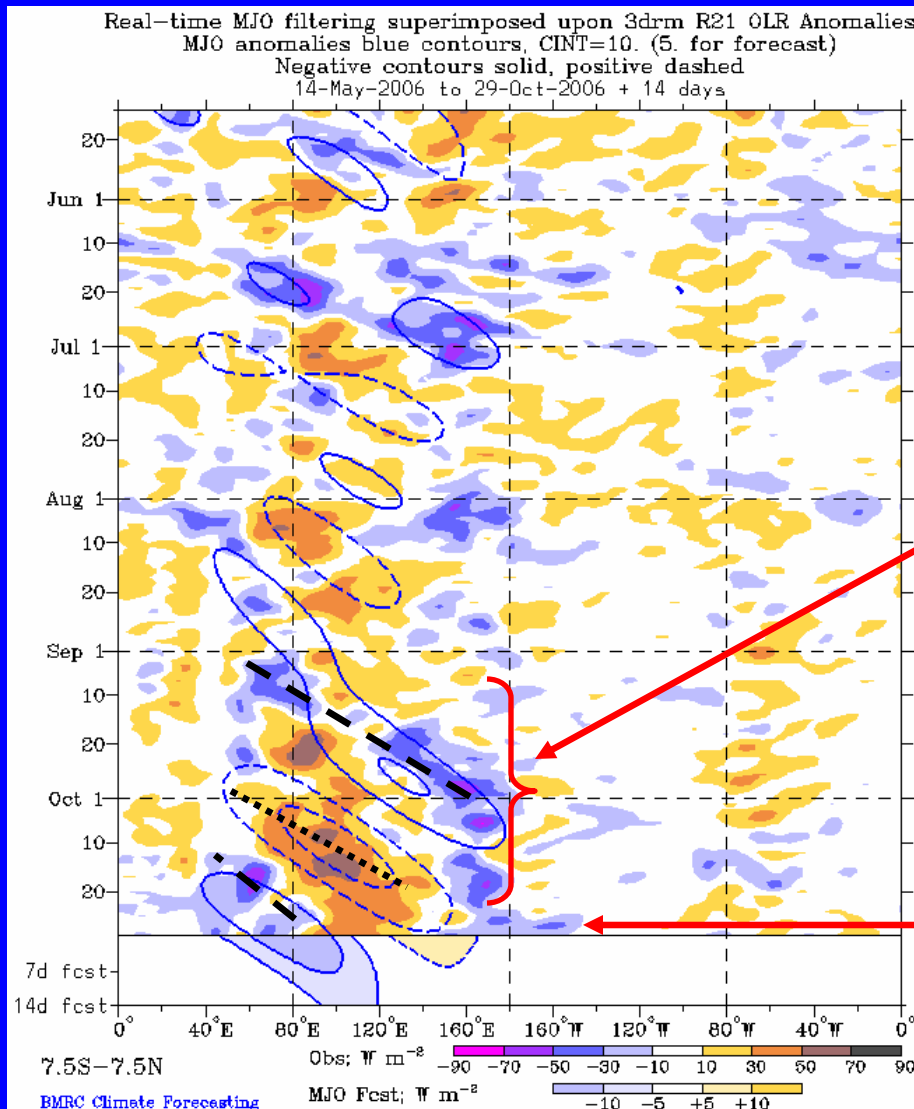
Weaker-than-average easterlies or westerlies (orange/red shading)

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.

During October, westerly anomalies have returned west of the date line and in the east-central Pacific, while stronger than normal easterlies have persisted in the Indian Ocean.

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



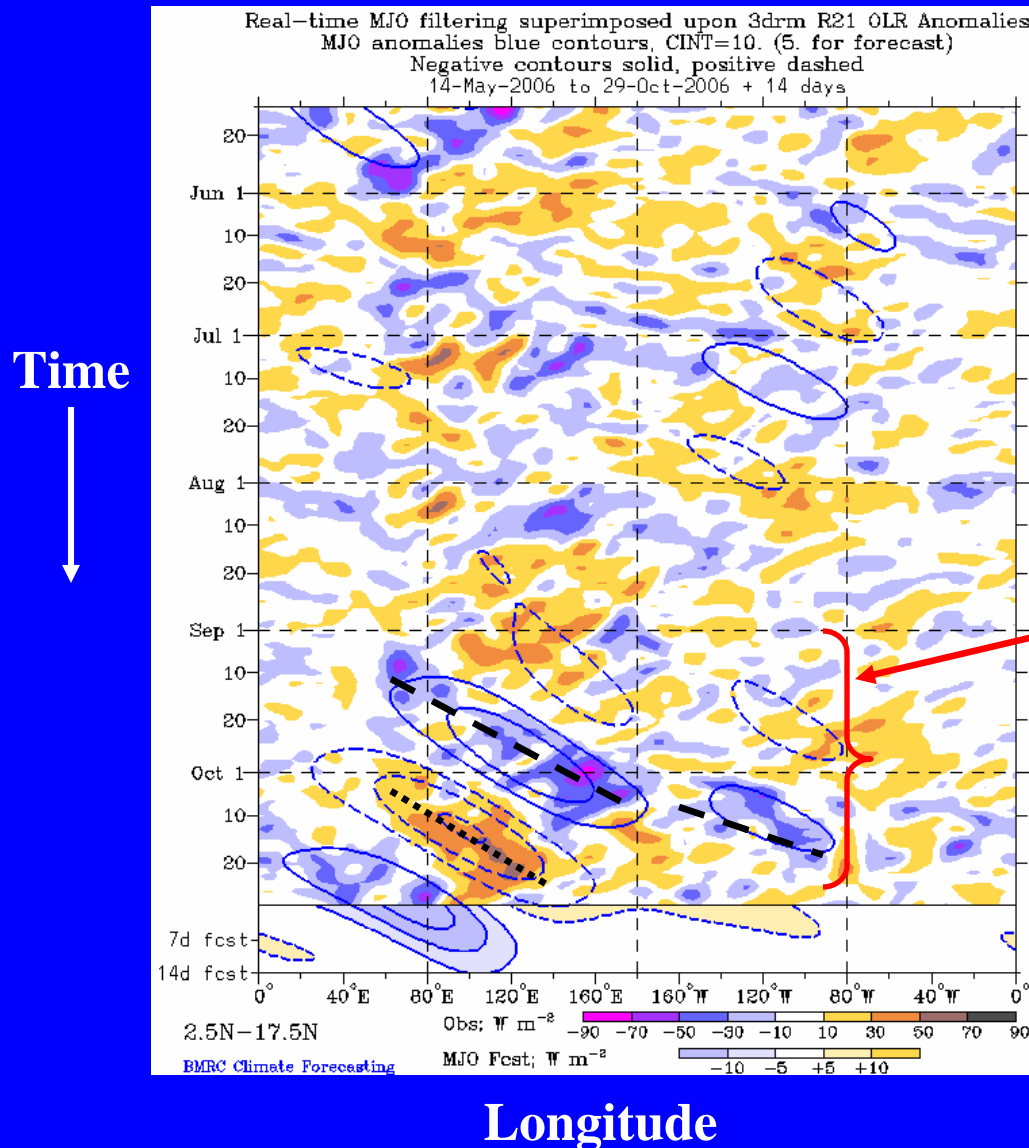
Drier-than-average conditions (/red shading)

Wetter-than-average conditions (blue shading)

OLR anomalies associated with the MJO developed in early-mid September over the eastern Indian Ocean and both negative and positive anomalies shifted east across the Maritime Continent.

Recently, enhanced (suppressed) convection has become more stationary near the Date Line (Maritime Continent).

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



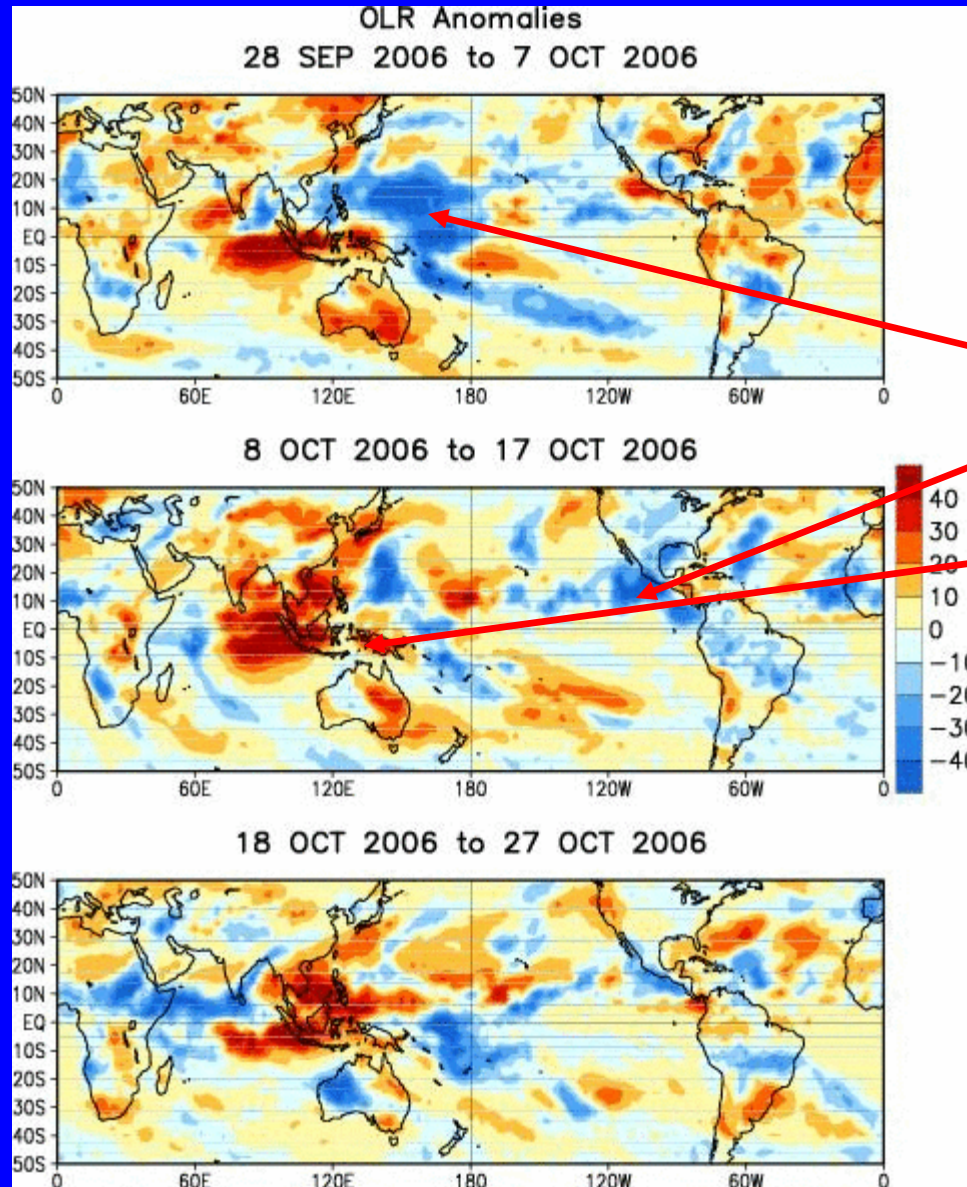
Drier-than-average conditions (/red shading)

Wetter-than-average conditions (blue shading)

From early-mid September, enhanced (suppressed) convection associated with the MJO shifted eastward across the Pacific Ocean (Maritime Continent).



# Anomalous OLR: Last 30 days



Drier-than-average conditions (red shading)

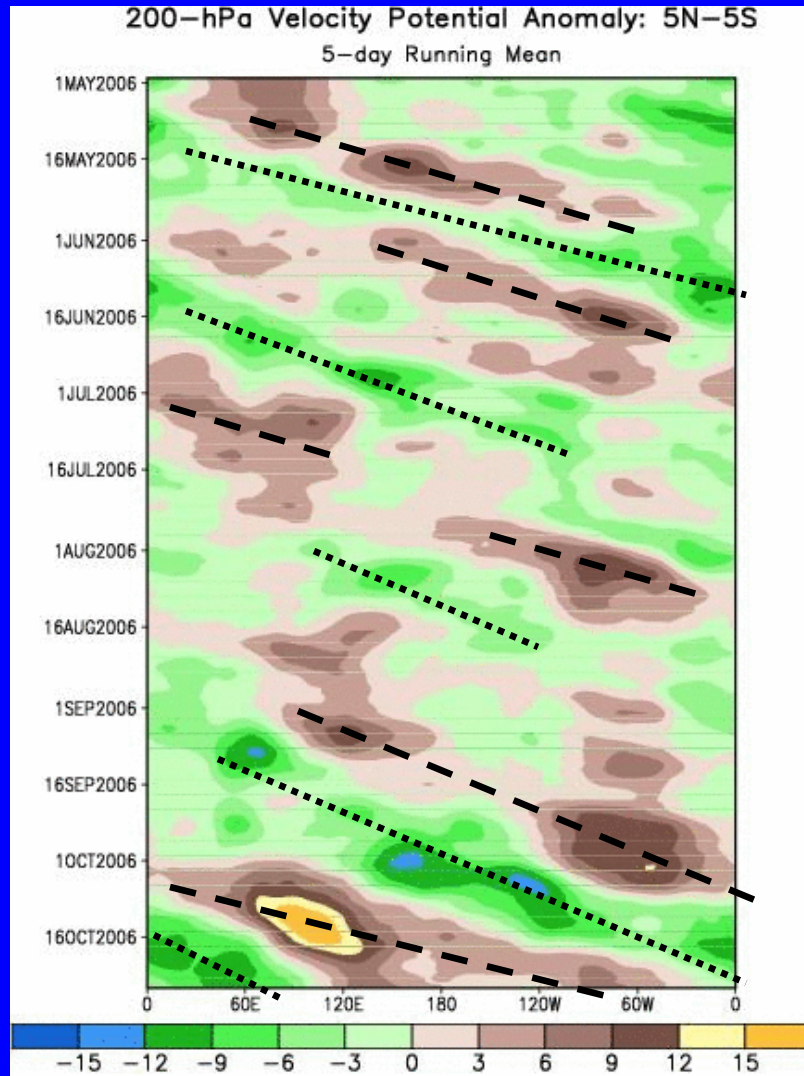
Wetter-than-average conditions (blue shading)

Beginning late September as the MJO developed, wet conditions have shifted east across the Pacific Ocean while dry conditions intensified across the Maritime Continent, Southeast Asia, and the eastern Indian Ocean.

During mid-October, wet conditions shifted over eastern Africa and the western Indian Ocean with dry conditions continuing across the Maritime Continent.



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



Time



Longitude

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

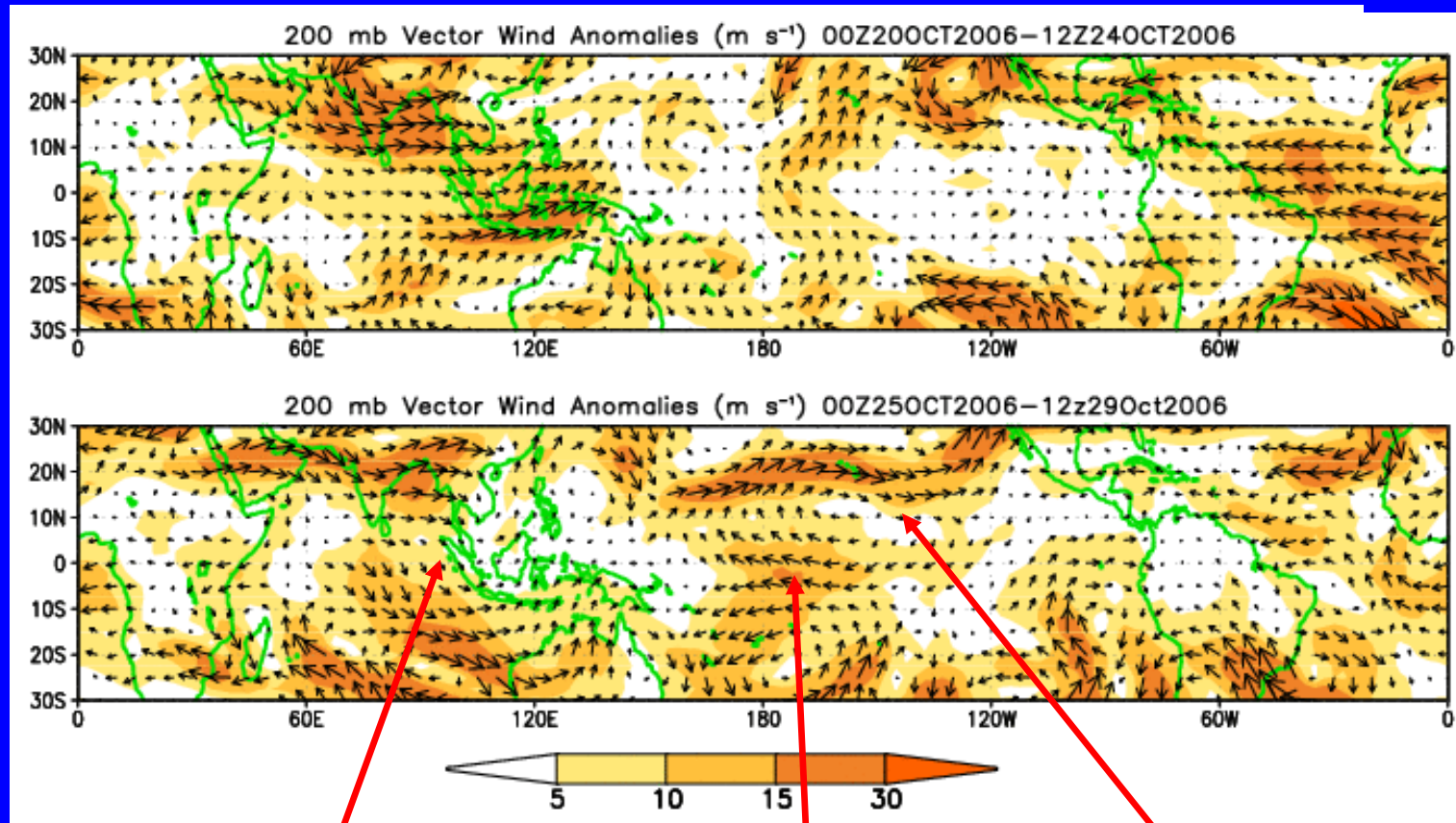
Negative anomalies (green shading) indicate favorable conditions for precipitation.

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

Moderate to strong MJO activity has been observed since early September.

# 200-hPa Vector Winds and Anomalies ( $\text{m s}^{-1}$ )

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



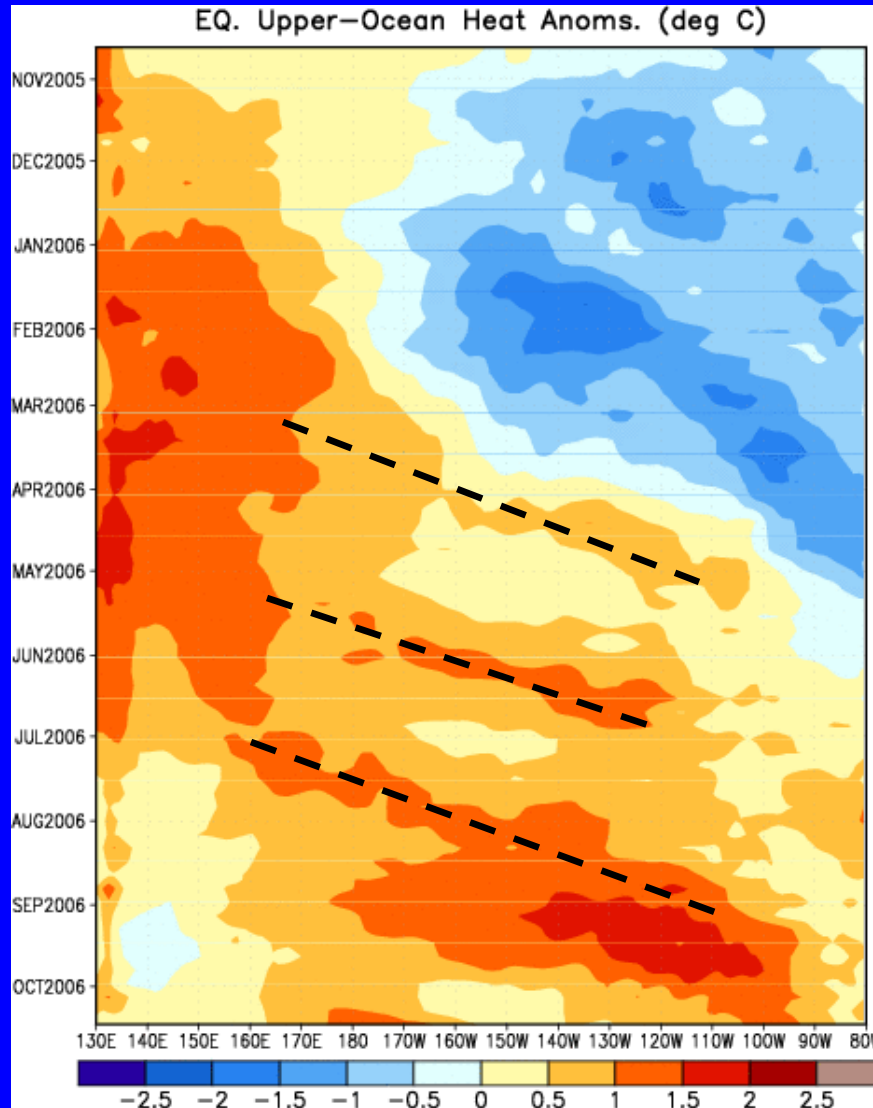
Westerly anomalies have weakened slightly over the Indian Ocean and Maritime continent.

Easterly anomalies have emerged in the central Pacific Ocean.

Strong subtropical jets streams are evident across South Asia and across the Pacific Ocean in the Northern Hemisphere.

# Heat Content Evolution in the Eq. Pacific

Time



Longitude

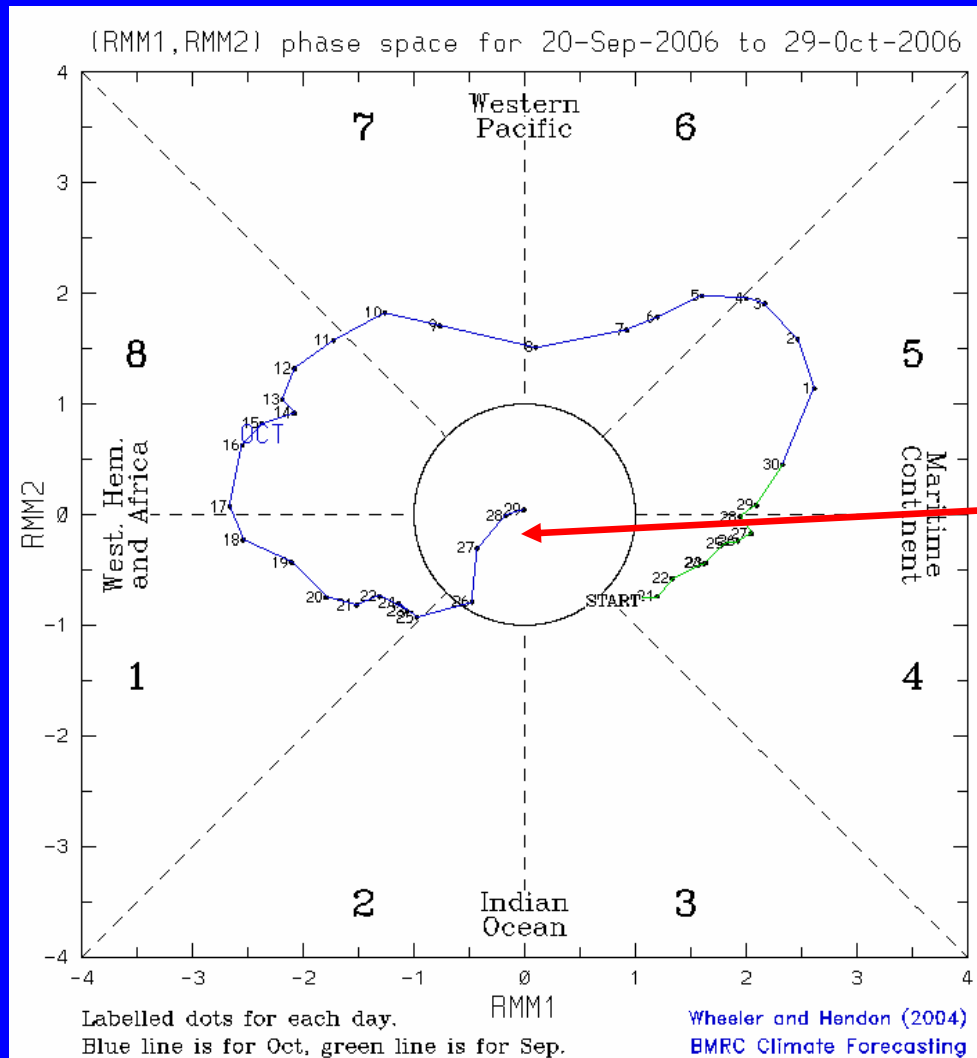
Starting in April, above normal upper oceanic water temperatures expanded from the western Pacific into the eastern Pacific in part due to Kelvin wave activity.

Currently, positive upper oceanic heat content anomalies are observed throughout the central and eastern equatorial Pacific.

# MJO Index (Magnitude and Phase)

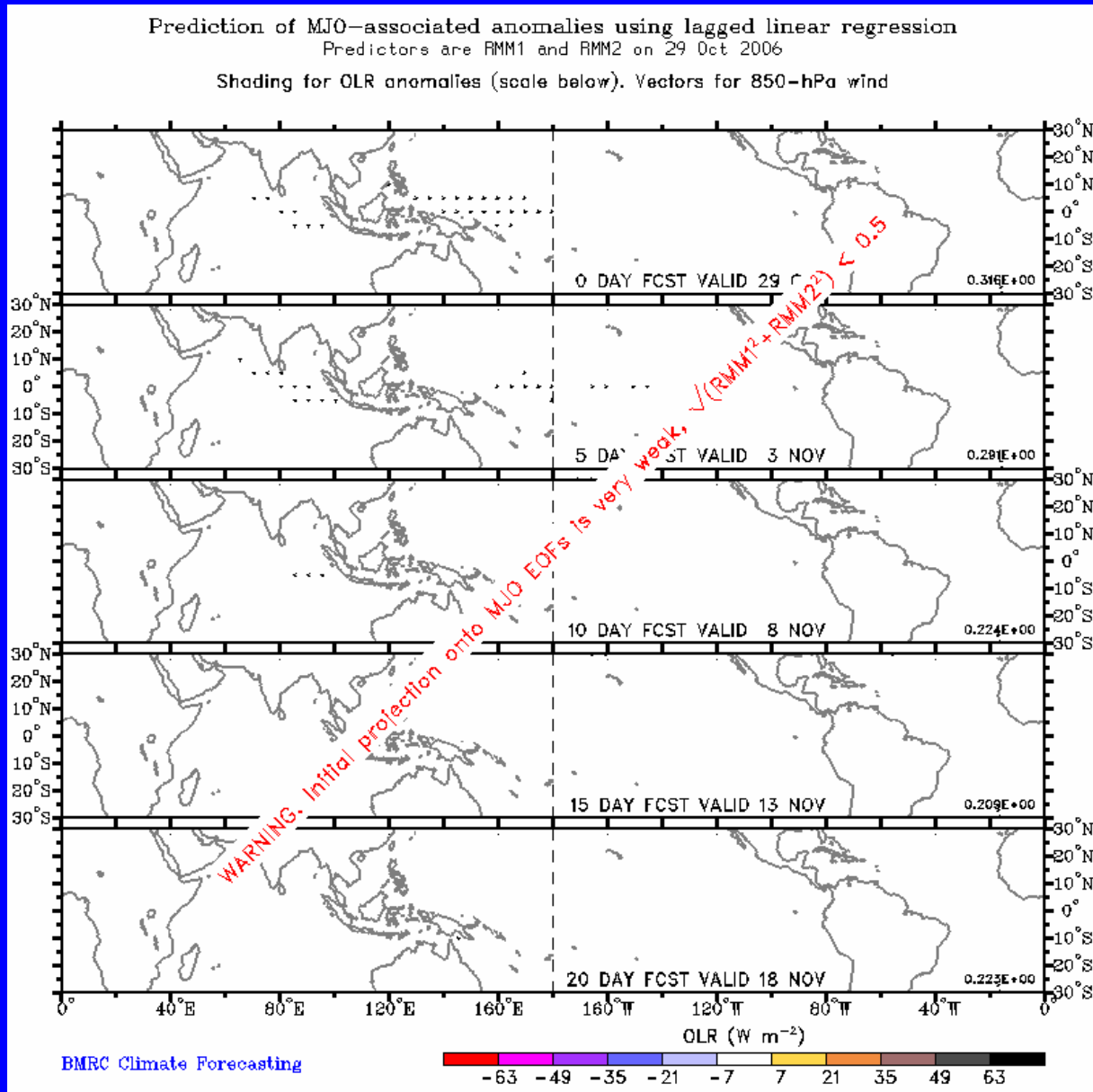
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850 hPa zonal wind, 200 hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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.



The MJO signal has weakened.

# Statistical OLR MJO Forecast

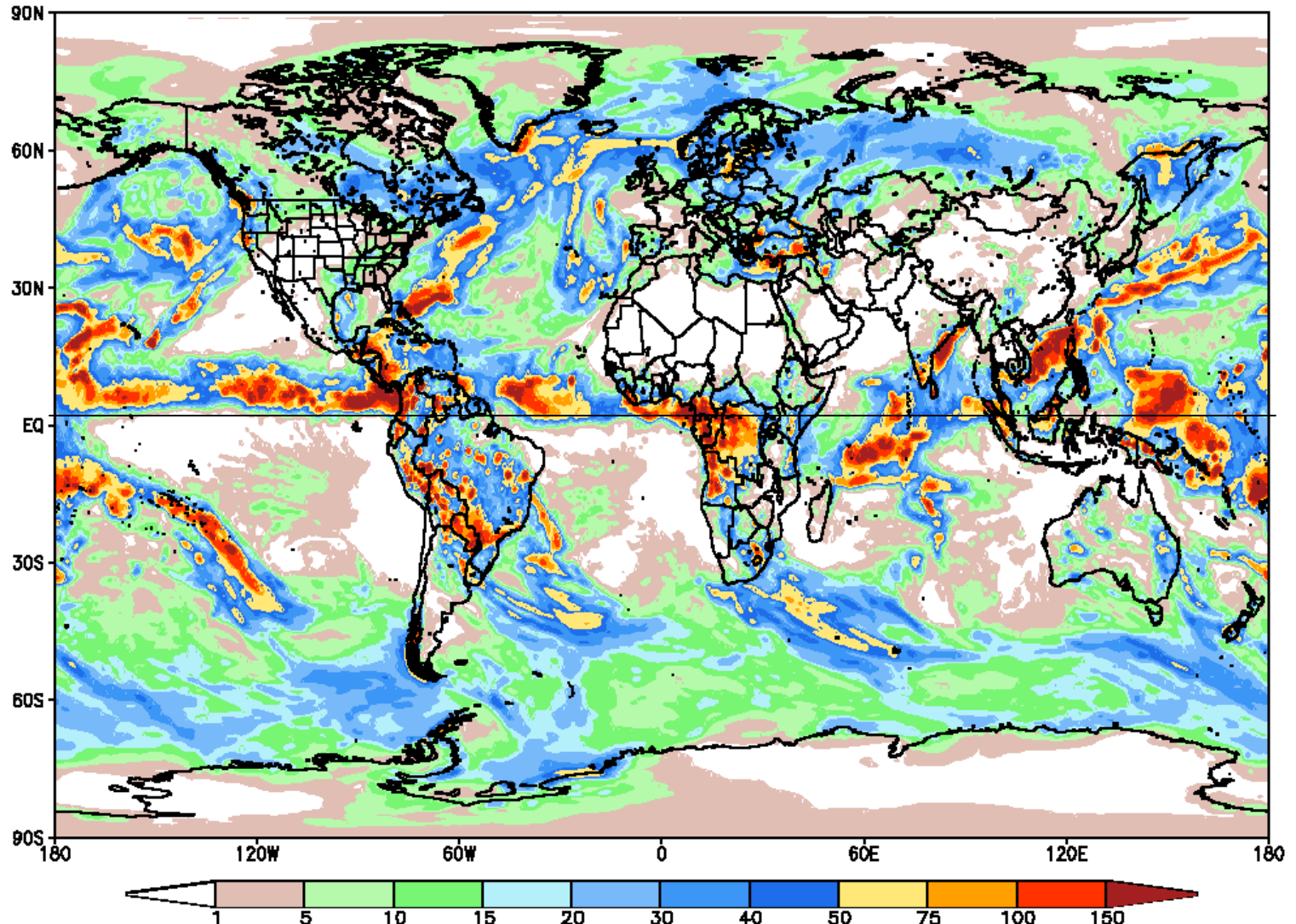


A statistical MJO forecast indicates that the MJO will remain weak during the next two weeks.



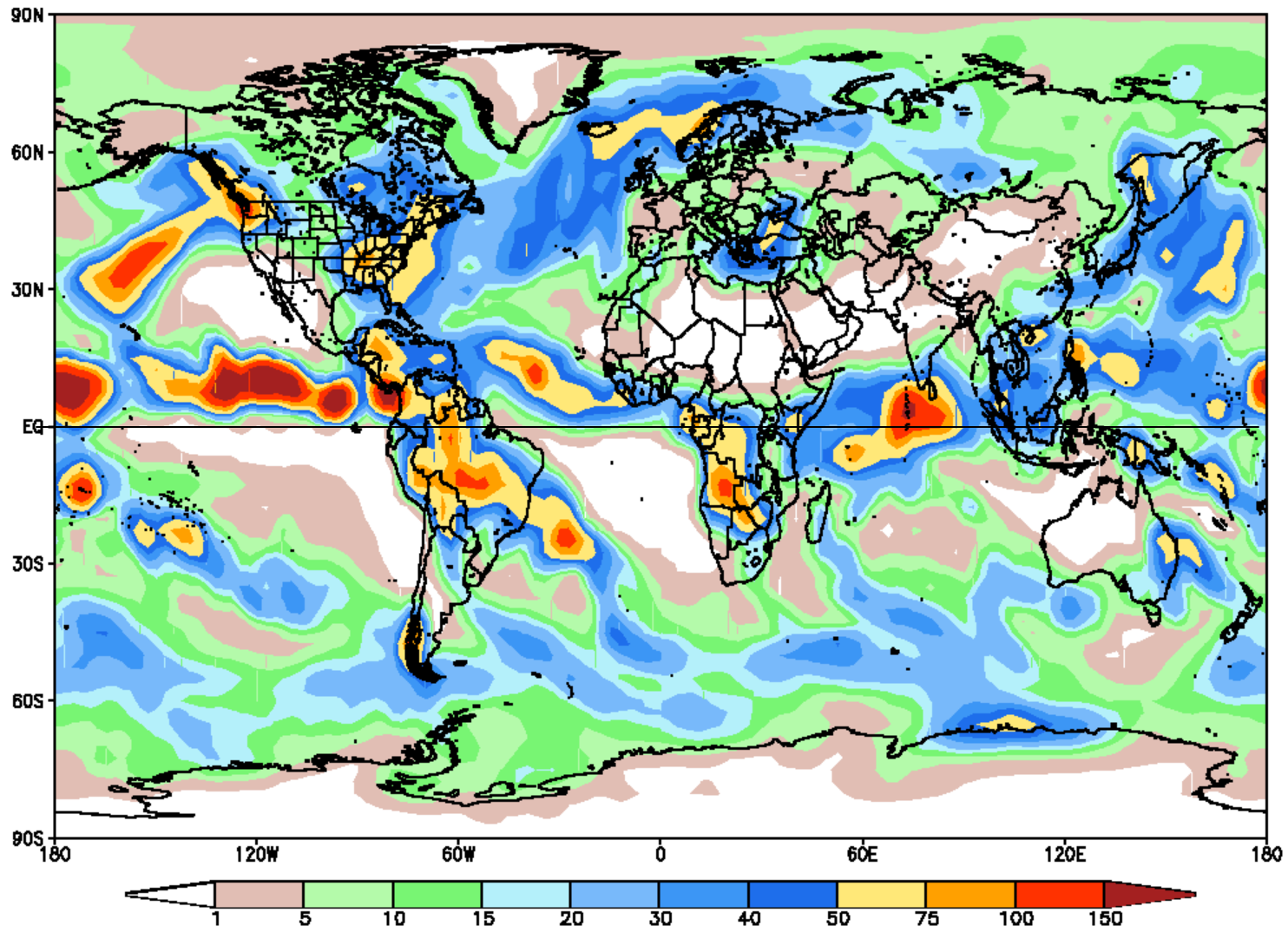
# Global Forecast System (GFS) Week 1 Precipitation Forecast

NOAA GFS 37.5 km Week 1 Total Precipitation (mm)  
Issued at Oct 30 2006 00Z for the period ending at Nov 6 2006 00Z



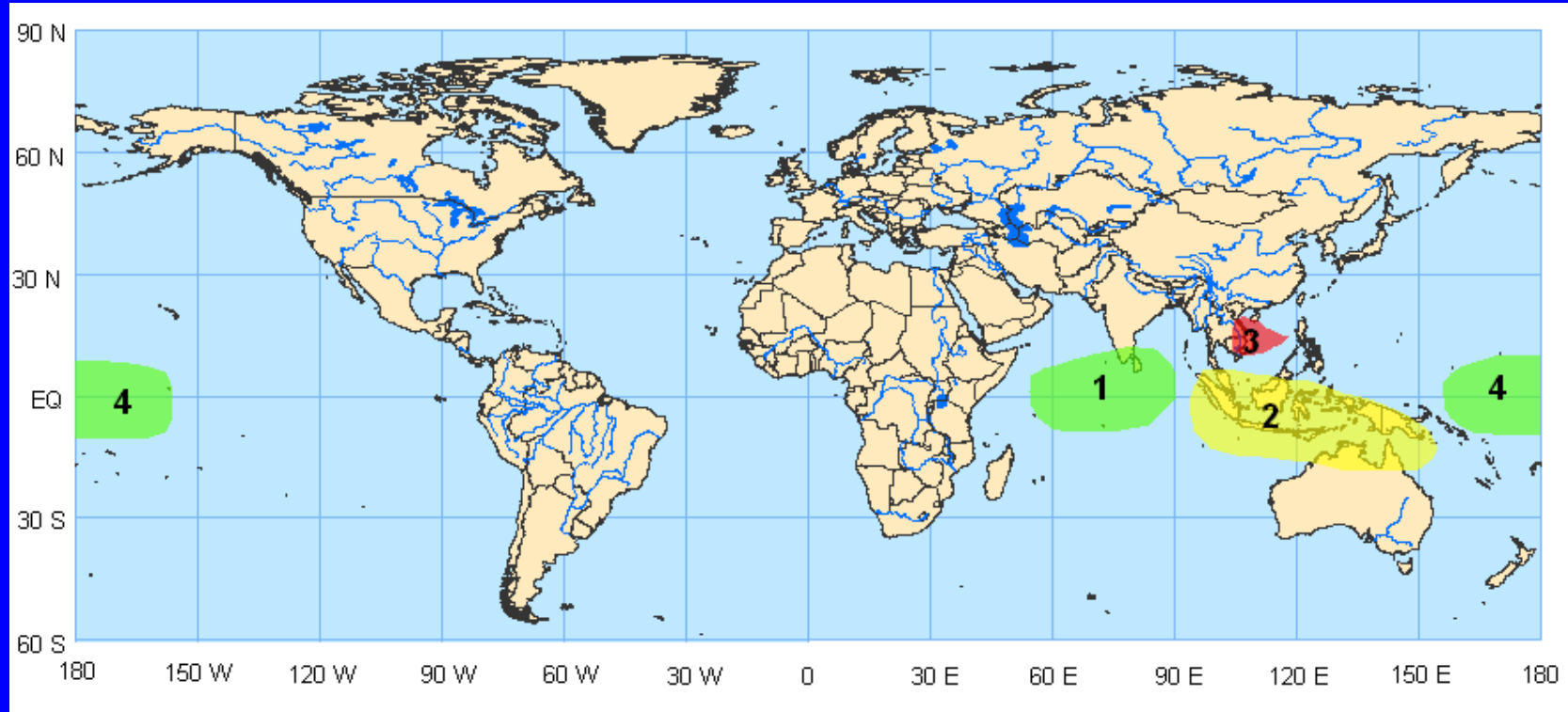
# Global Forecast System (GFS) Week 2 Precipitation Forecast

NOAA GFS 100 km Week 2 Total Precipitation (mm)  
Issued Oct 30 2006 00Z for the period ending at Nov 12 2006 00Z



# Potential Benefits/Hazards – Week 1

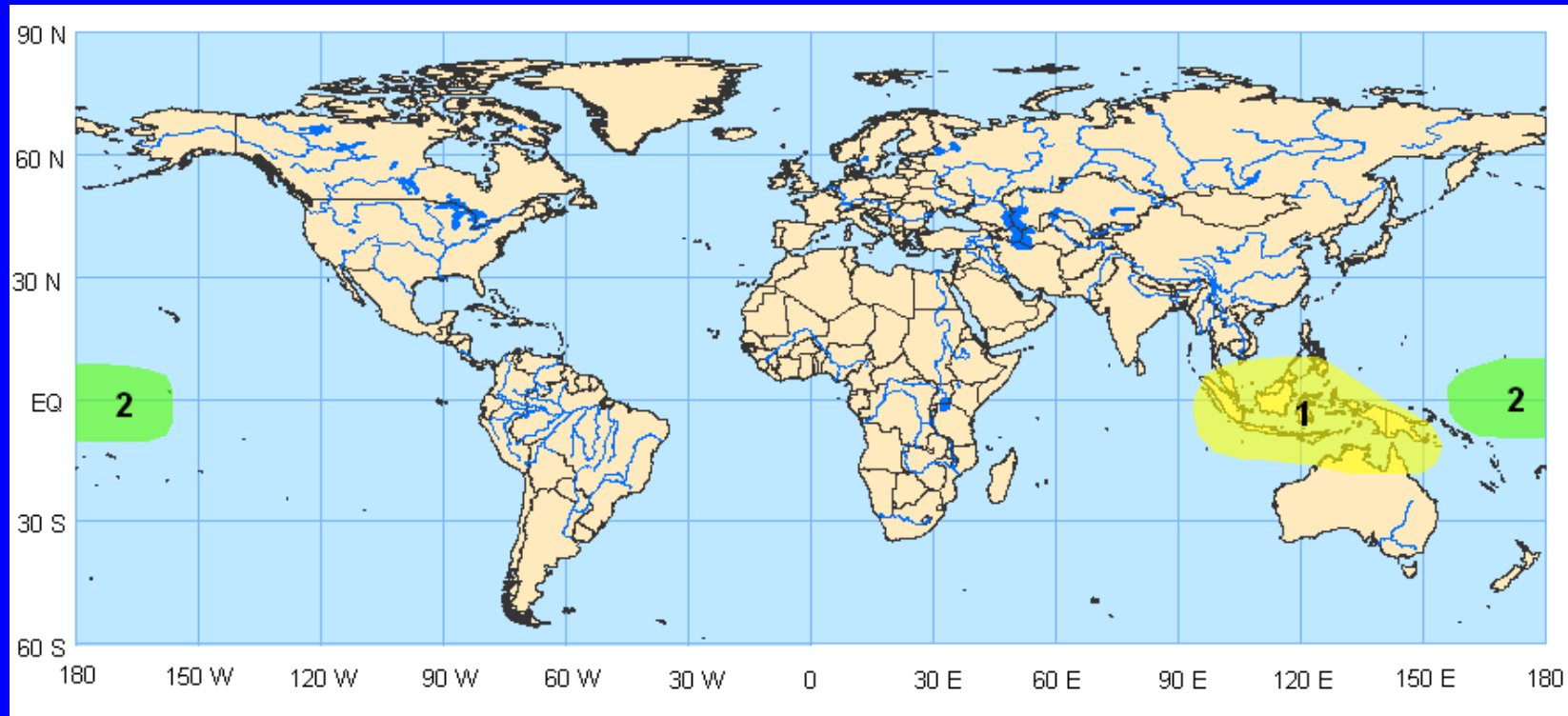
## Valid October 31 – November 6, 2006



1. An increased chance for above normal rainfall across the equatorial Indian Ocean and southern India
2. An increased chance for below normal rainfall across the southern Maritime Continent and adjacent waters
3. Typhoon Cimaron will impact the South China Sea and sections of Southeast Asia
4. An increased chance for above normal rainfall across the equatorial Pacific Ocean surrounding the Date Line.

# Potential Benefits/Hazards – Week 2

## Valid November 7 - 13, 2006



1. An increased chance for below normal rainfall across the Maritime Continent and adjacent waters
2. An increased chance for above normal rainfall across the equatorial Pacific Ocean surrounding the Date Line.

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- During week 2, the pattern of above (below) average rainfall is expected to persist for the equatorial Pacific Ocean (Maritime Continent).