

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

**Update prepared by  
Climate Prediction Center / NCEP  
December 11, 2006**

# Outline

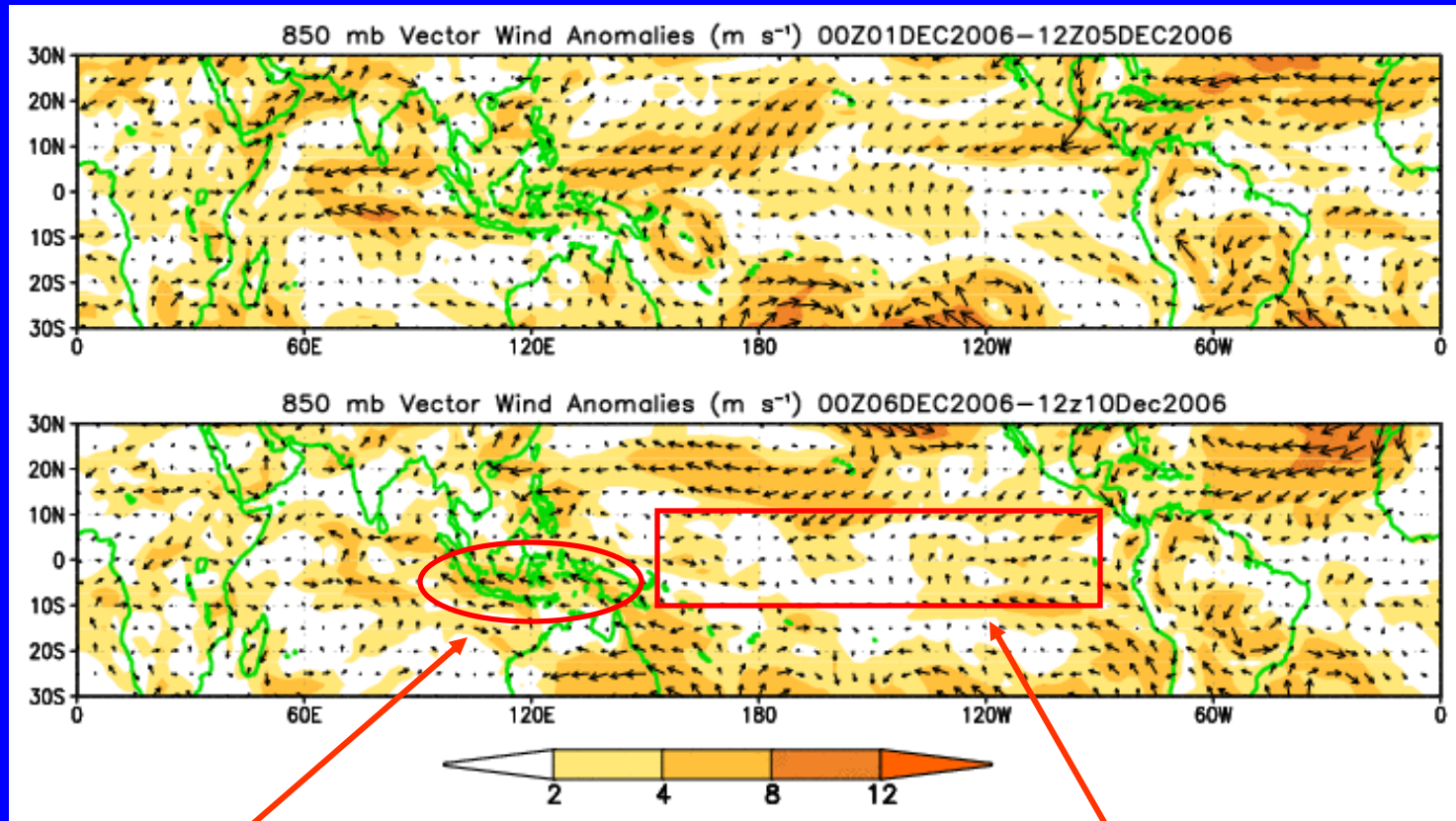
- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**

# Overview

- The latest observations indicate that the MJO remains weak.
- 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, it is expected that the US west coast and western Canada will experience periods of heavy rainfall and strong winds. Favorable conditions for tropical cyclogenesis remain in the western Pacific Ocean.
- Typhoon Utor is expected to impact the South China Sea throughout the period.
- Wet (dry) conditions are expected to persist for sections of the western Pacific Ocean (Maritime Continent) during week 2. In addition, the threat for periods of heavy rainfall and strong winds remain for the coasts of the US Pacific Northwest and western Canada.

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

Note that shading denotes the magnitude of the anomalous wind vectors

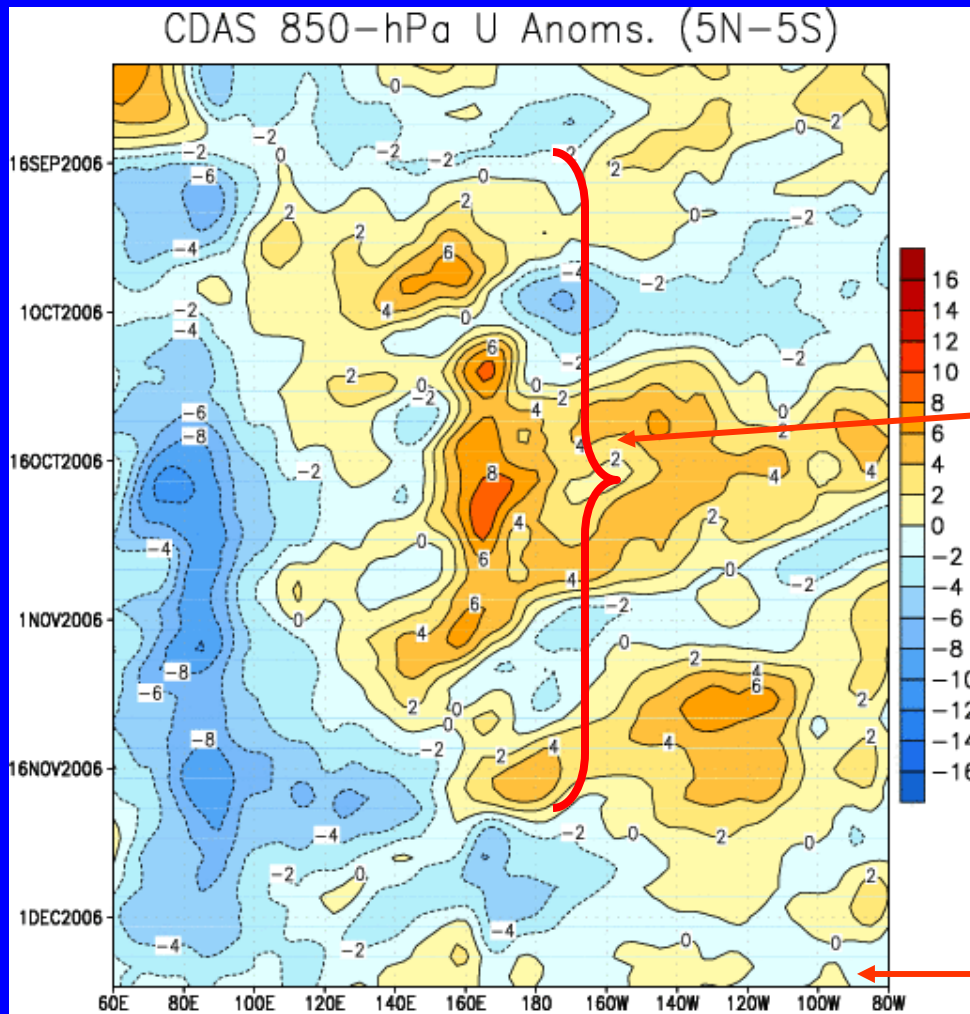


Weak easterly anomalies remain across the Maritime Continent.

Winds are close to average across much of the equatorial Pacific Ocean during the last five days.

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

Time



Longitude

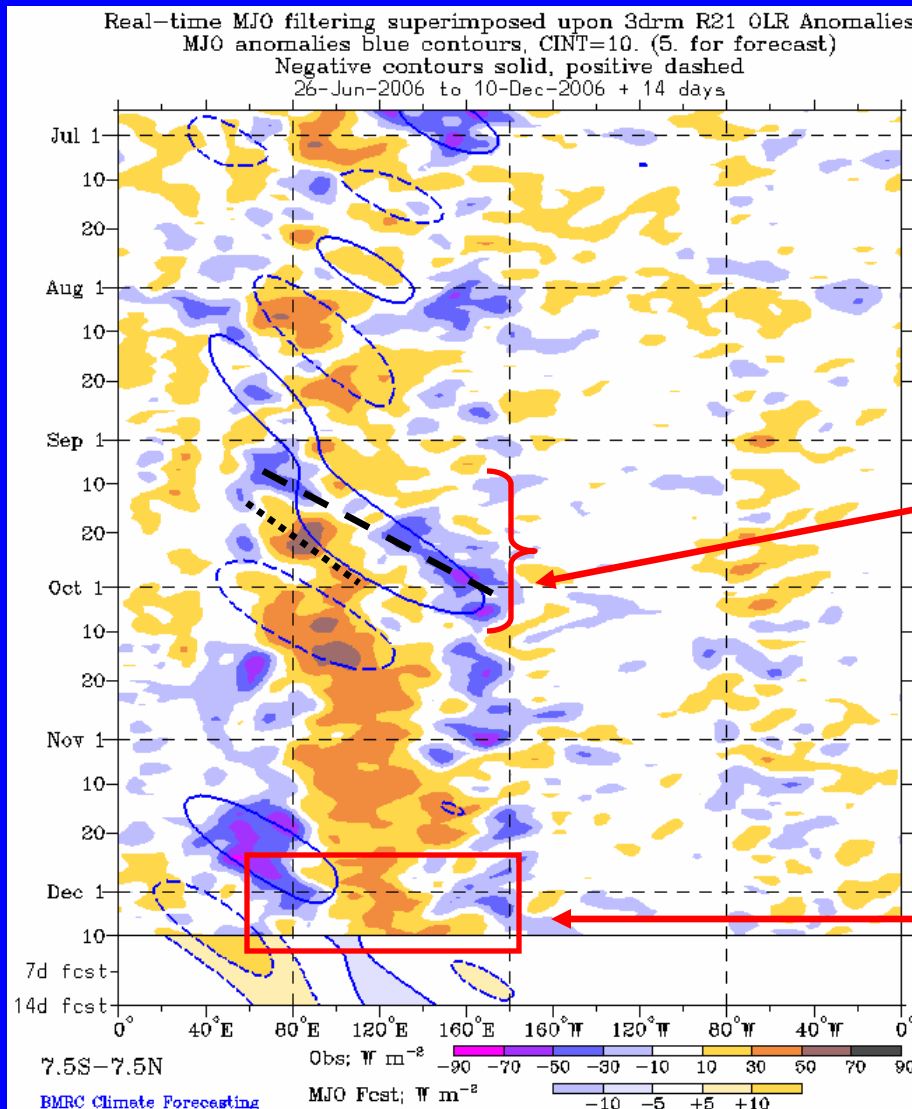
Weaker-than-average easterlies or westerlies (orange/red shading)

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.

Low-level winds are close to average across much of the Indian and Pacific Oceans.

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



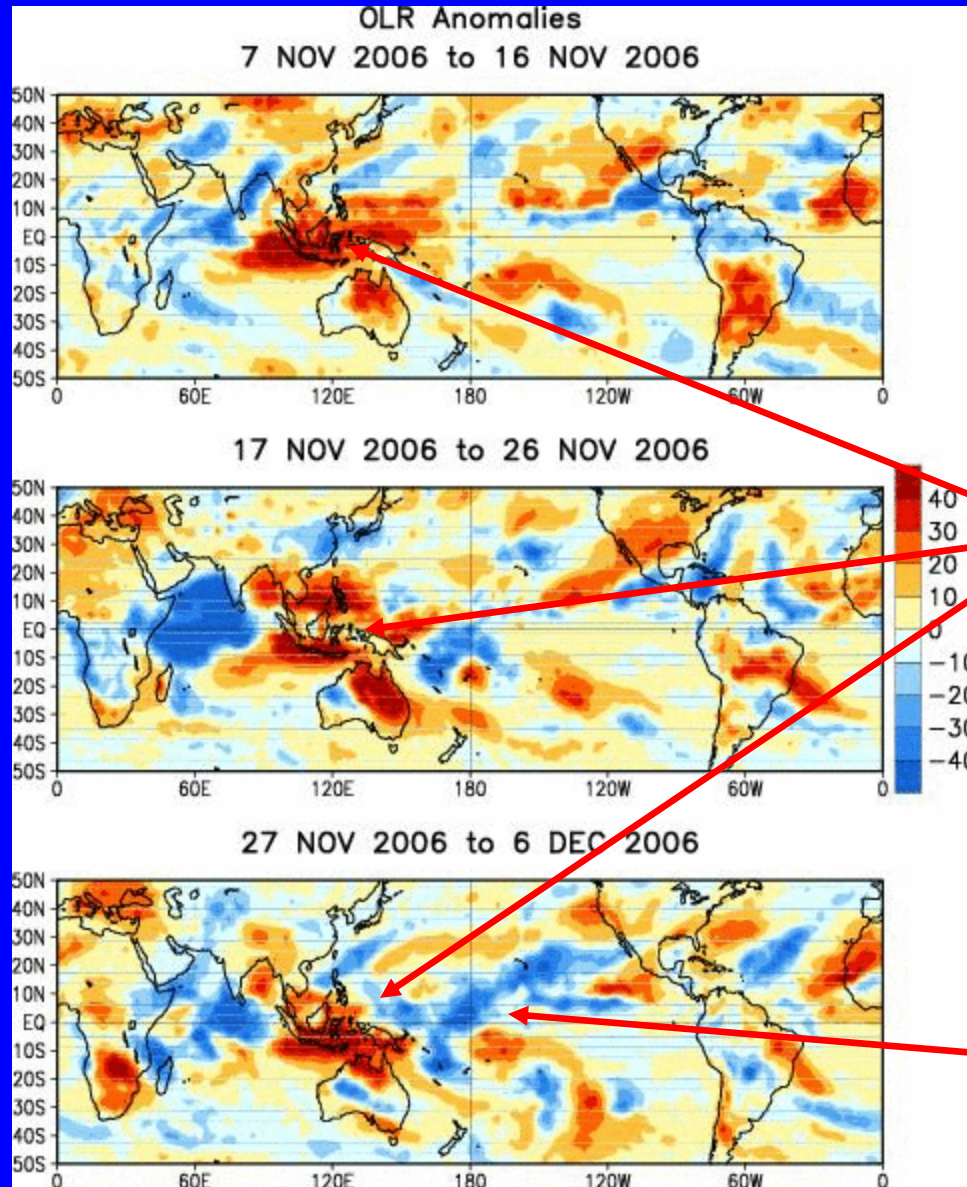
Drier-than-average conditions (/red shading)

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.

Enhanced convection in the Indian Ocean has weakened while suppressed convection continues across the Maritime Continent.

# Anomalous OLR: Last 30 days



Drier-than-average conditions (red shading)

Wetter-than-average conditions (blue shading)

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

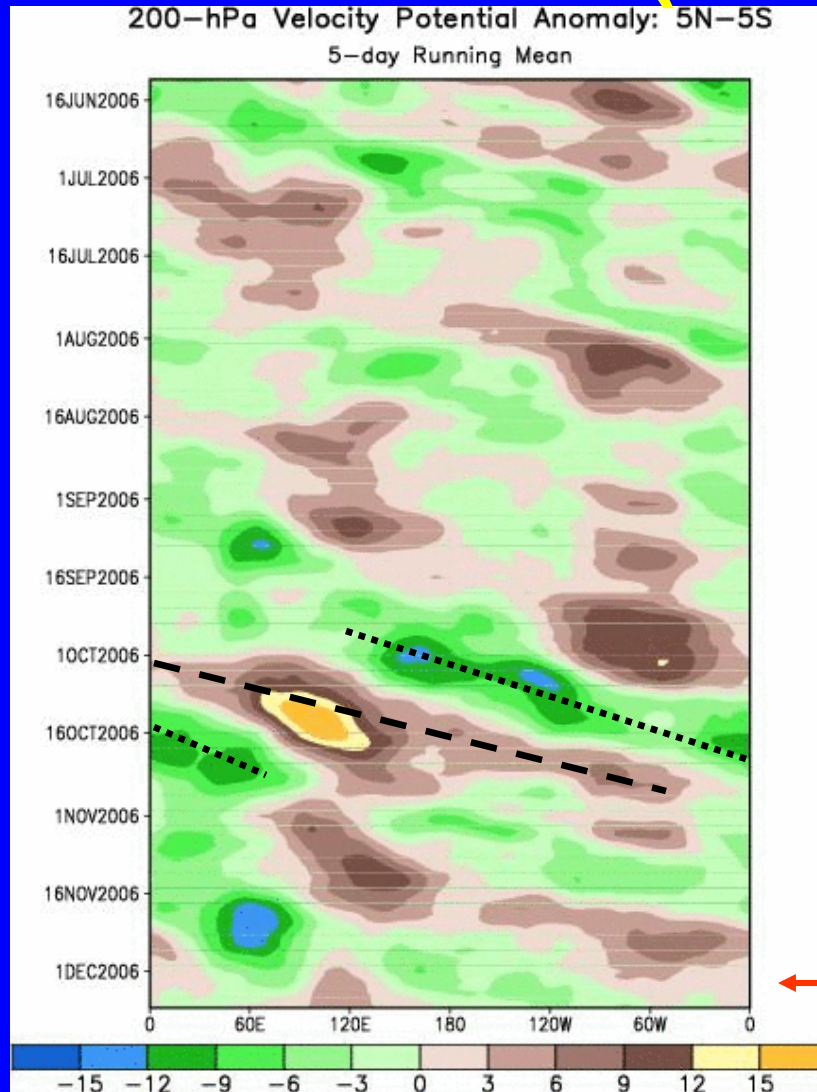
During the last ten days, convection has been observed across the western Pacific Ocean near the Date Line and extending northeast.

# 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.

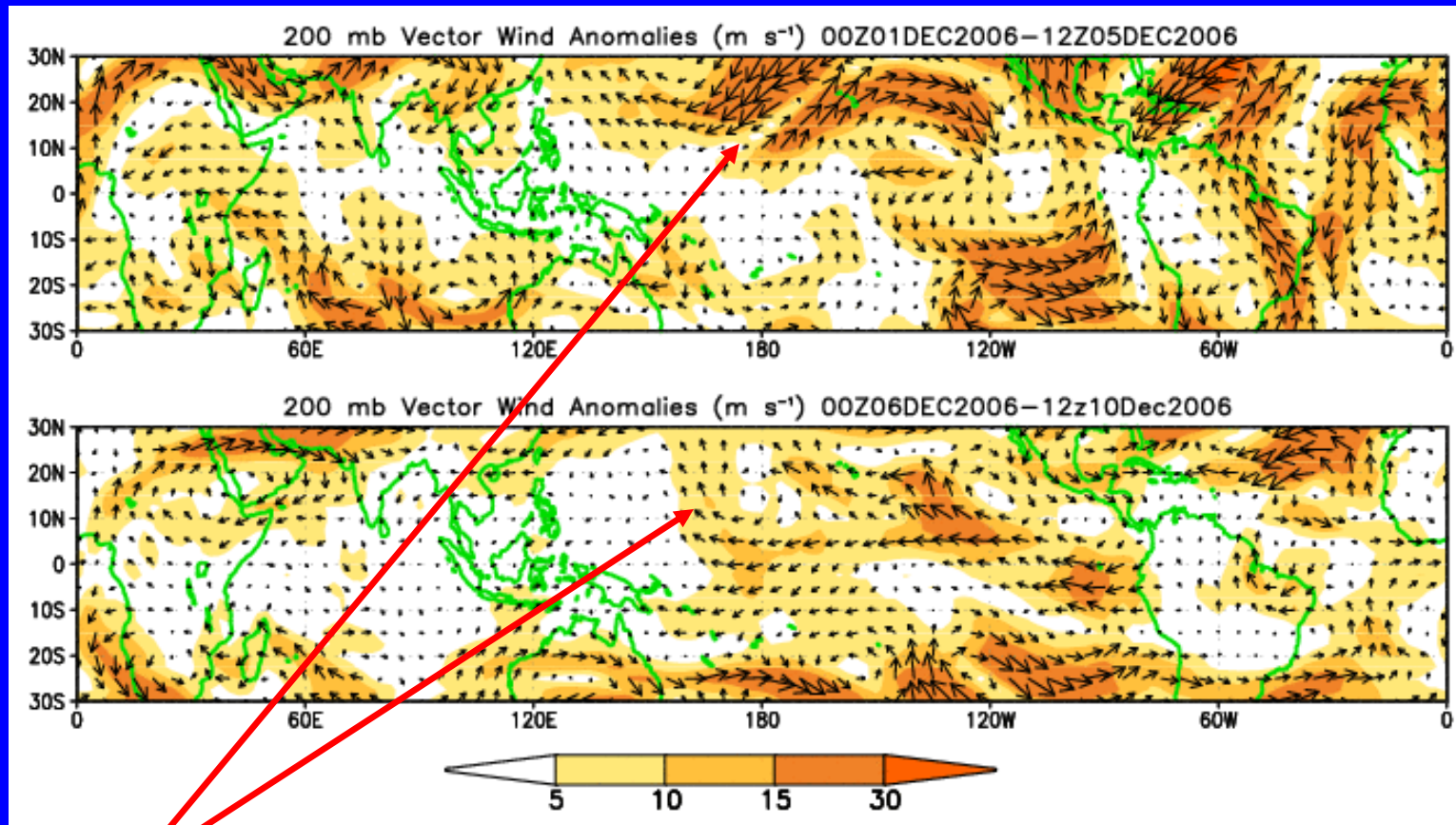
Moderate to strong MJO activity was observed from late-September to mid-October.

The MJO weakened considerably during late October and remains weak.



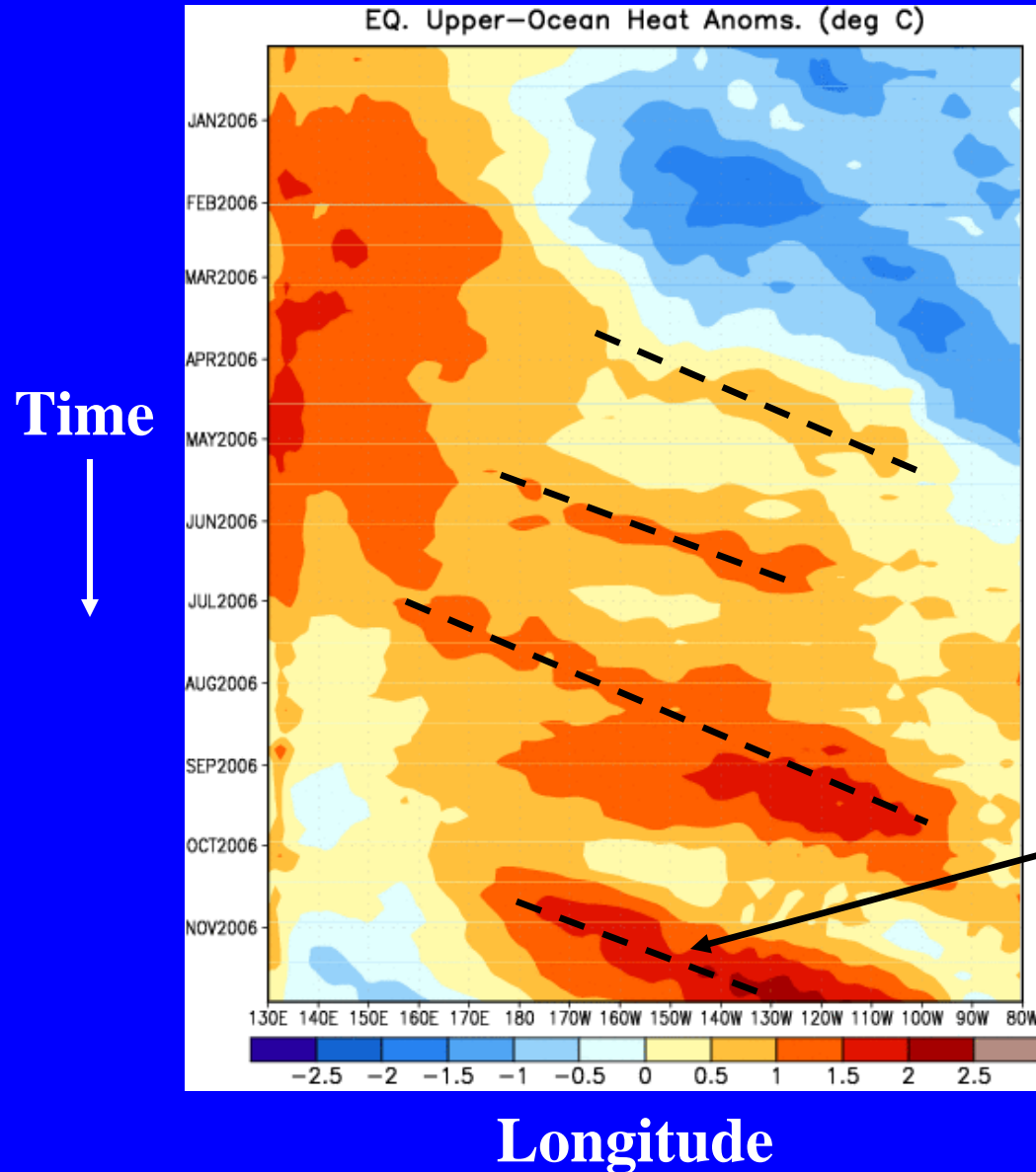
# 200-hPa Vector Winds and Anomalies ( $\text{m s}^{-1}$ )

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



Anomalous cyclonic circulation in the Pacific Ocean north of the equator has ended.

# Heat Content Evolution in the Eq. Pacific



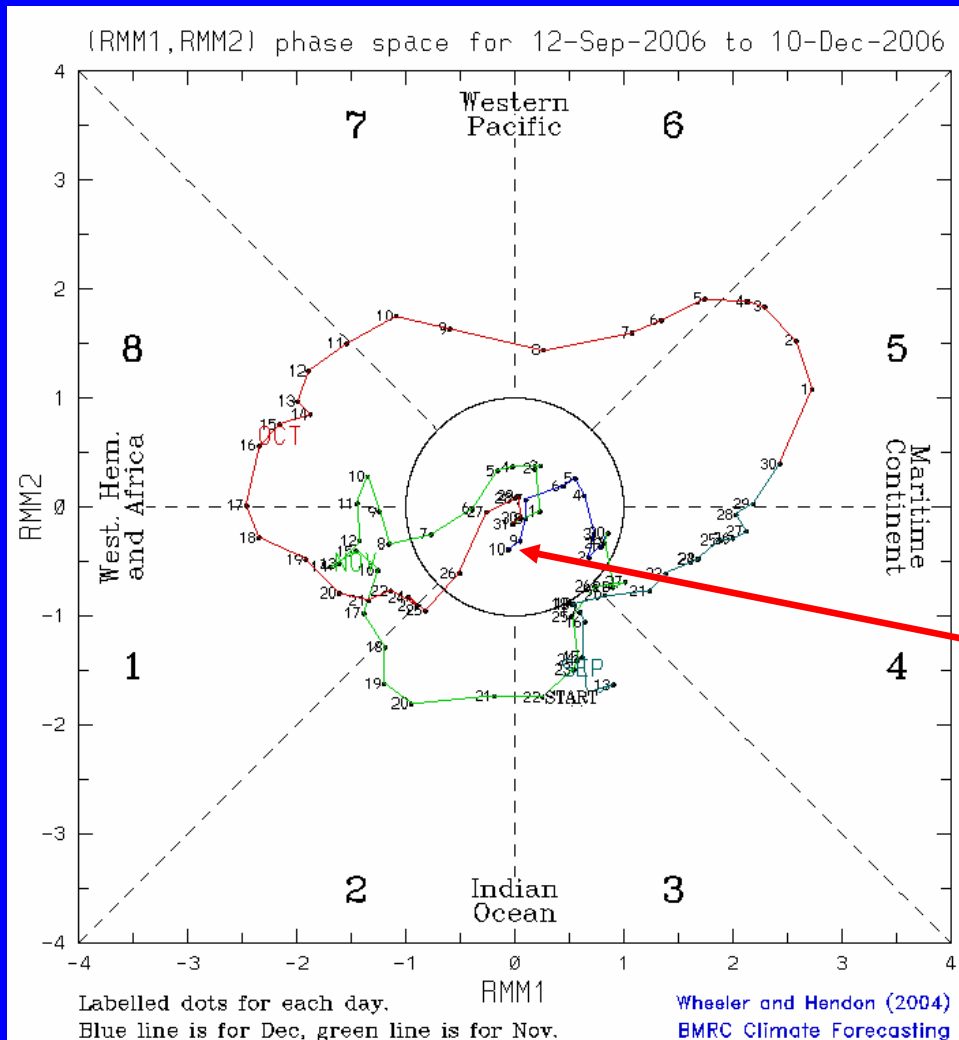
Starting in April, above normal upper oceanic water temperatures expanded from the western Pacific into the eastern Pacific in part due to Kelvin wave activity.

The latest downwelling Kelvin wave was initiated in early October and appears to be the strongest in over a year.

# 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).

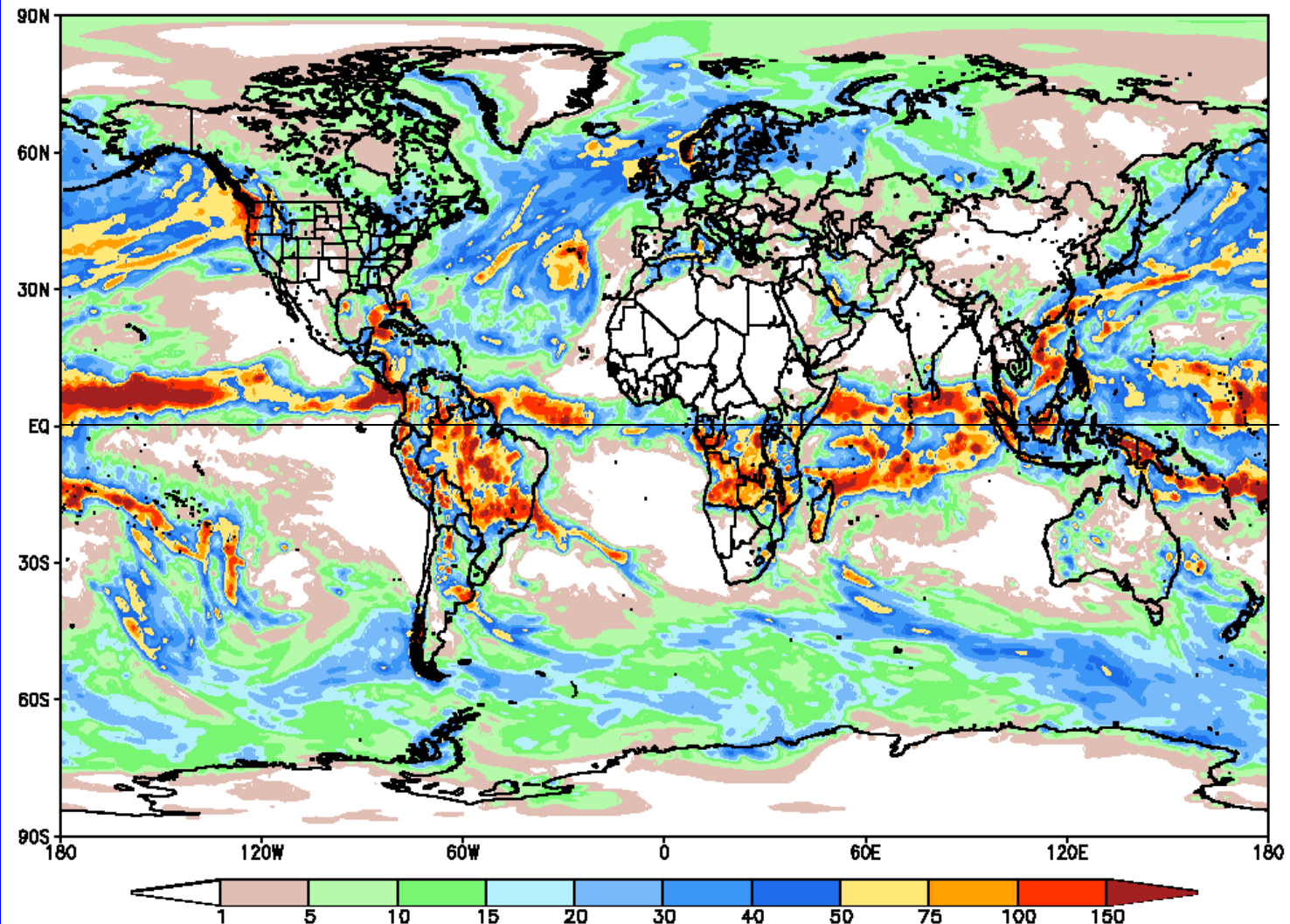
The axes represent the time series of the two leading modes of variability and are used to measure the amplitude while the triangular areas indicate the phase or location of the enhanced phase of the MJO. The farther away from the center of the circle the stronger the MJO. Different color lines indicate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



The MJO is currently weak.

# Global Forecast System (GFS) Week 1 Precipitation Forecast

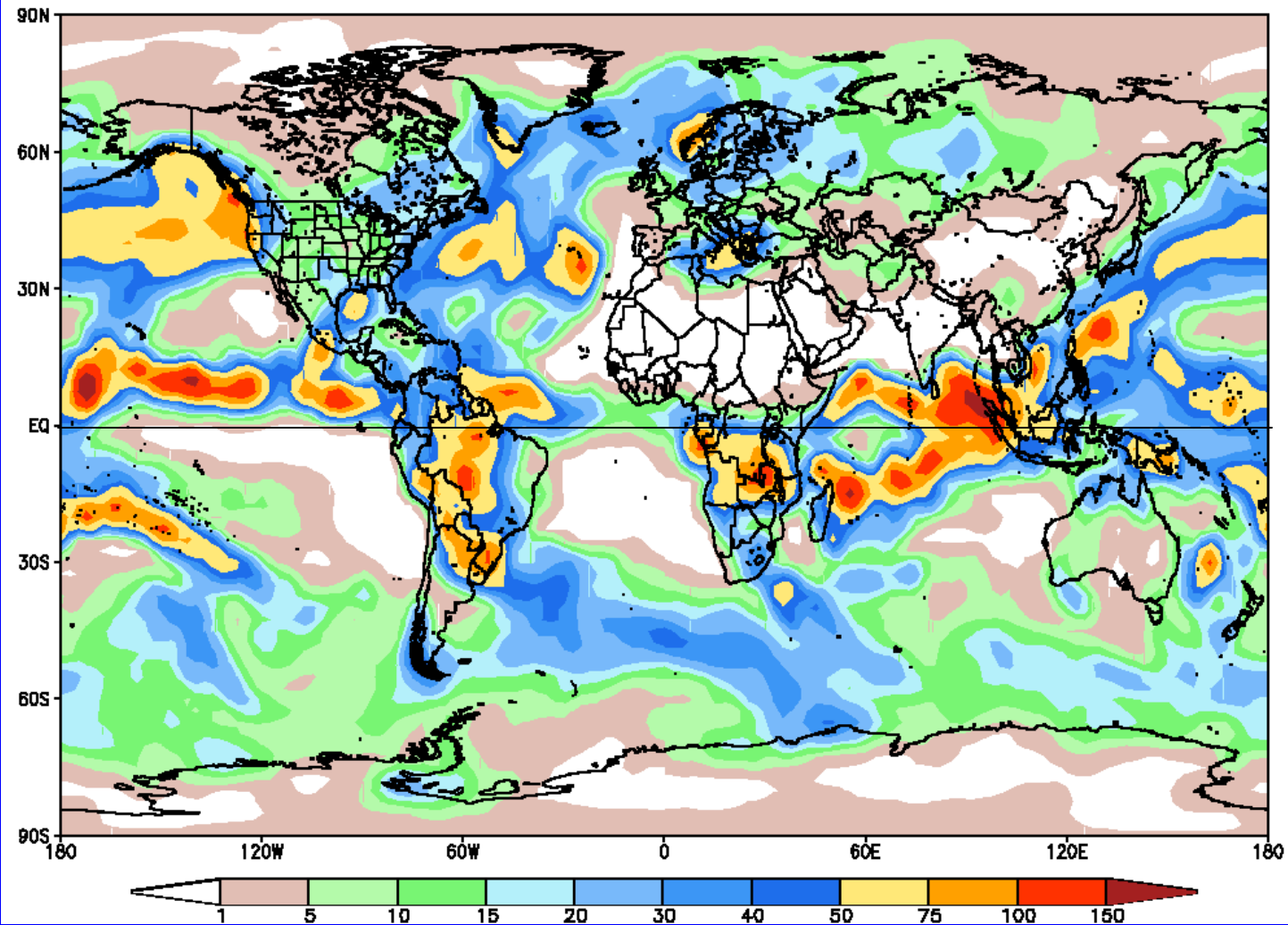
NOAA GFS 37.5 km Week 1 Total Precipitation (mm)  
Issued at Dec 11 2006 00Z for the period ending at Dec 18 2006 00Z



# Global Forecast System (GFS) Week 2

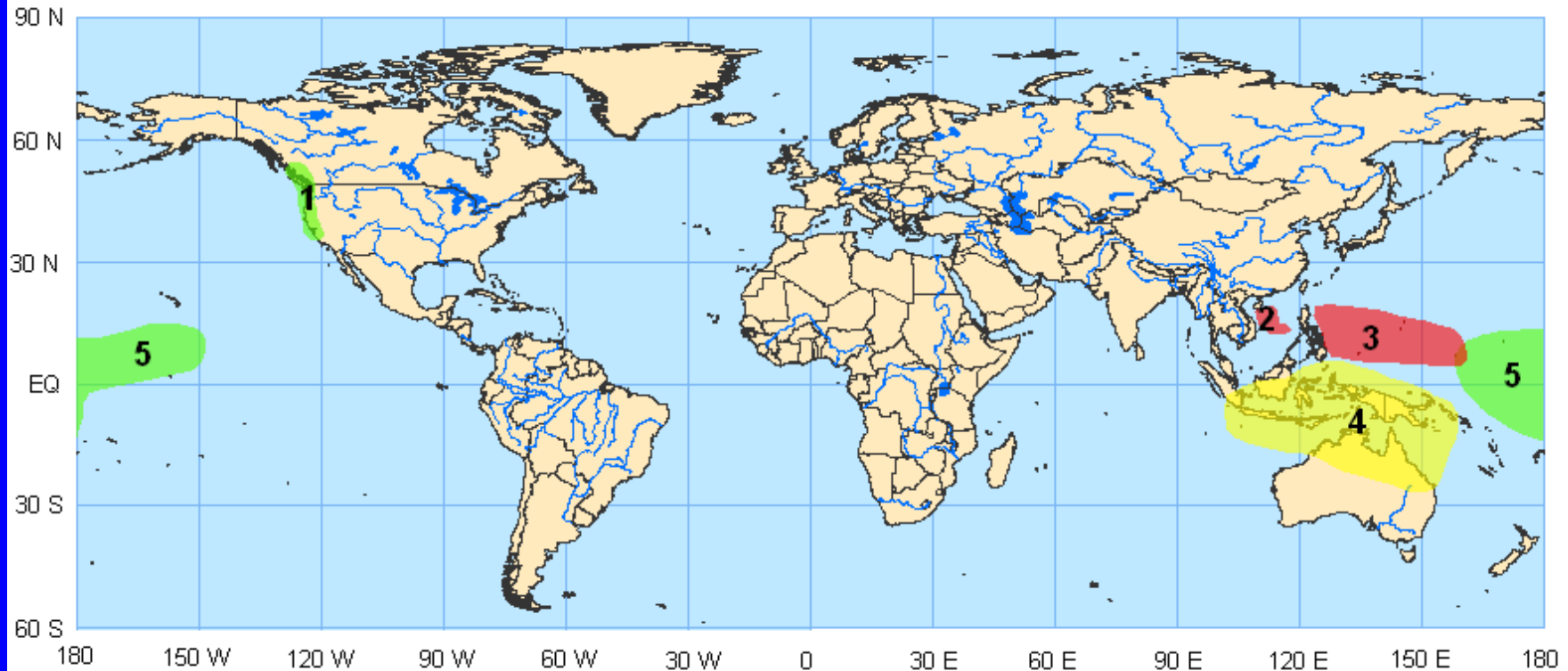
## Precipitation Forecast

NOAA GFS 100 km Week 2 Total Precipitation (mm)  
Issued Dec 11 2006 00Z for the period ending at Dec 24 2006 00Z



# Potential Benefits/Hazards – Week 1

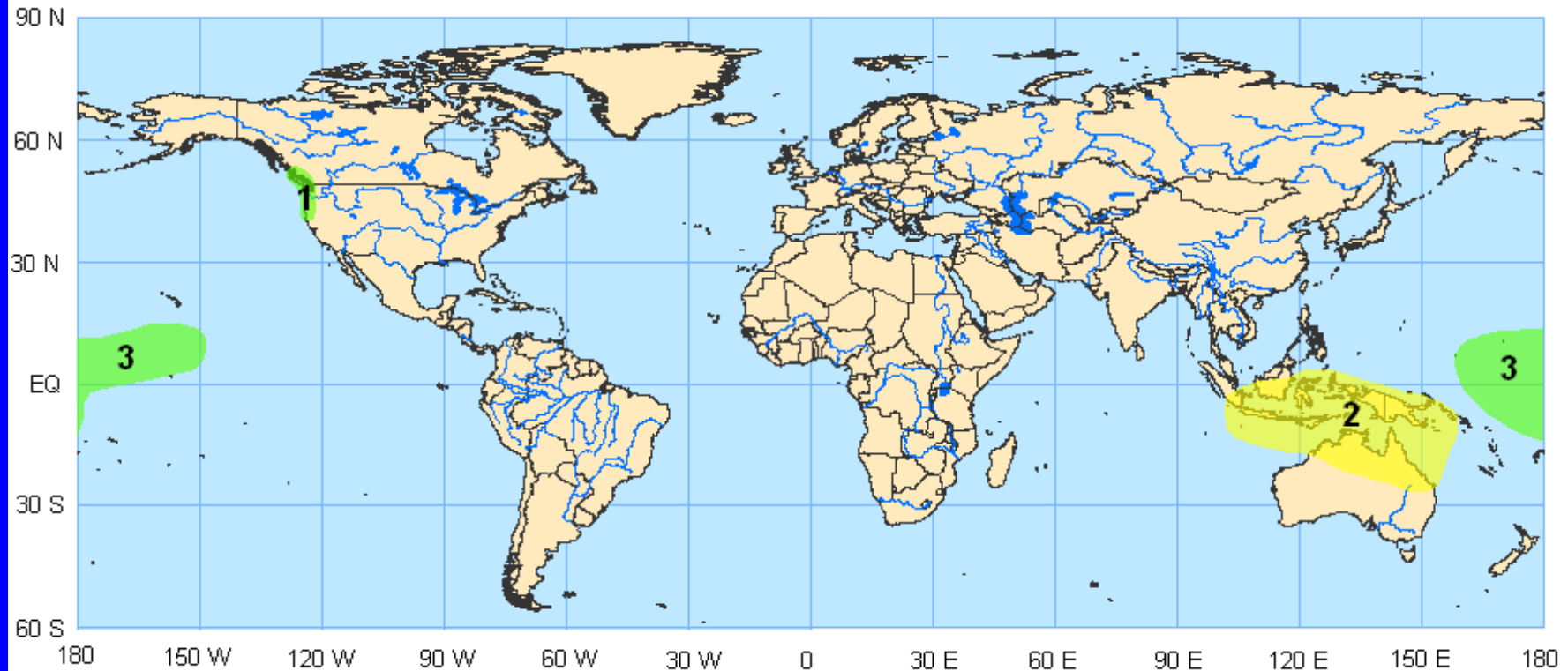
## Valid December 12 – December 18, 2006



1. Periods of heavy rainfall, strong winds, and heavy surf for sections of the US west coast and western Canada. Impacts in the northern areas are mainly expected early in the period while storminess in California is expected later in the week.
2. Typhoon Utor is expected to impact the South China Sea throughout most of the period.
3. Favorable conditions exist for tropical cyclogenesis in the western Pacific Ocean east of the Philippines.
4. An increased chance for below normal rainfall across the southern Maritime Continent and northern Australia.
5. An increased chance for above normal rainfall for sections of the western Pacific Ocean.

# Potential Benefits/Hazards – Week 2

## Valid December 19 –25, 2006



1. Periods of heavy rainfall, strong winds, and heavy surf for sections of the US northwest and western Canada.
2. An increased chance for below normal rainfall across the southern Maritime Continent and northern Australia.
3. An increased chance for above normal rainfall for sections of the western Pacific Ocean.

# Summary

- The latest observations indicate that the MJO remains weak.
- 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, it is expected that the US west coast and western Canada will experience periods of heavy rainfall and strong winds. Favorable conditions for tropical cyclogenesis remain in the western Pacific Ocean.
- Typhoon Utor is expected to impact the South China Sea throughout the period.
- Wet (dry) conditions are expected to persist for sections of the western Pacific Ocean (Maritime Continent) during week 2. In addition, the threat for periods of heavy rainfall and strong winds remain for the coasts of the US Pacific Northwest and western Canada.