

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

**Update prepared by**  
**Climate Prediction Center / NCEP**  
**January 22, 2007**

# Outline

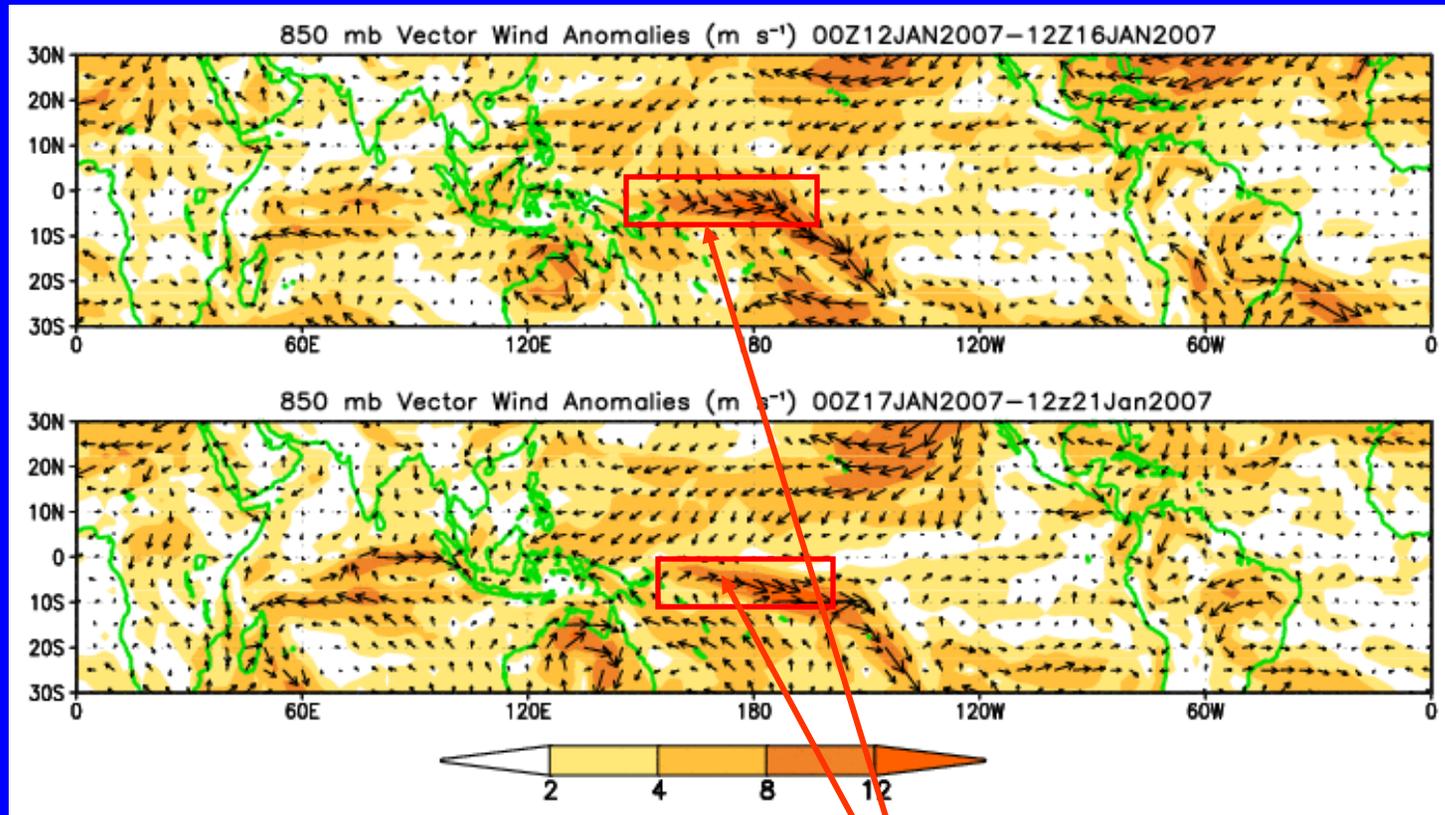
- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**

# Overview

- **The latest observations indicate that the MJO has become incoherent.**
- **During weeks 1 and 2, there is an increased chance for above-normal rainfall over the central tropical Pacific Ocean, the equatorial eastern Indian Ocean, and the western Maritime Continent.**
- **Favorable conditions for tropical cyclogenesis are expected over the central South Pacific Ocean during weeks 1 and 2.**

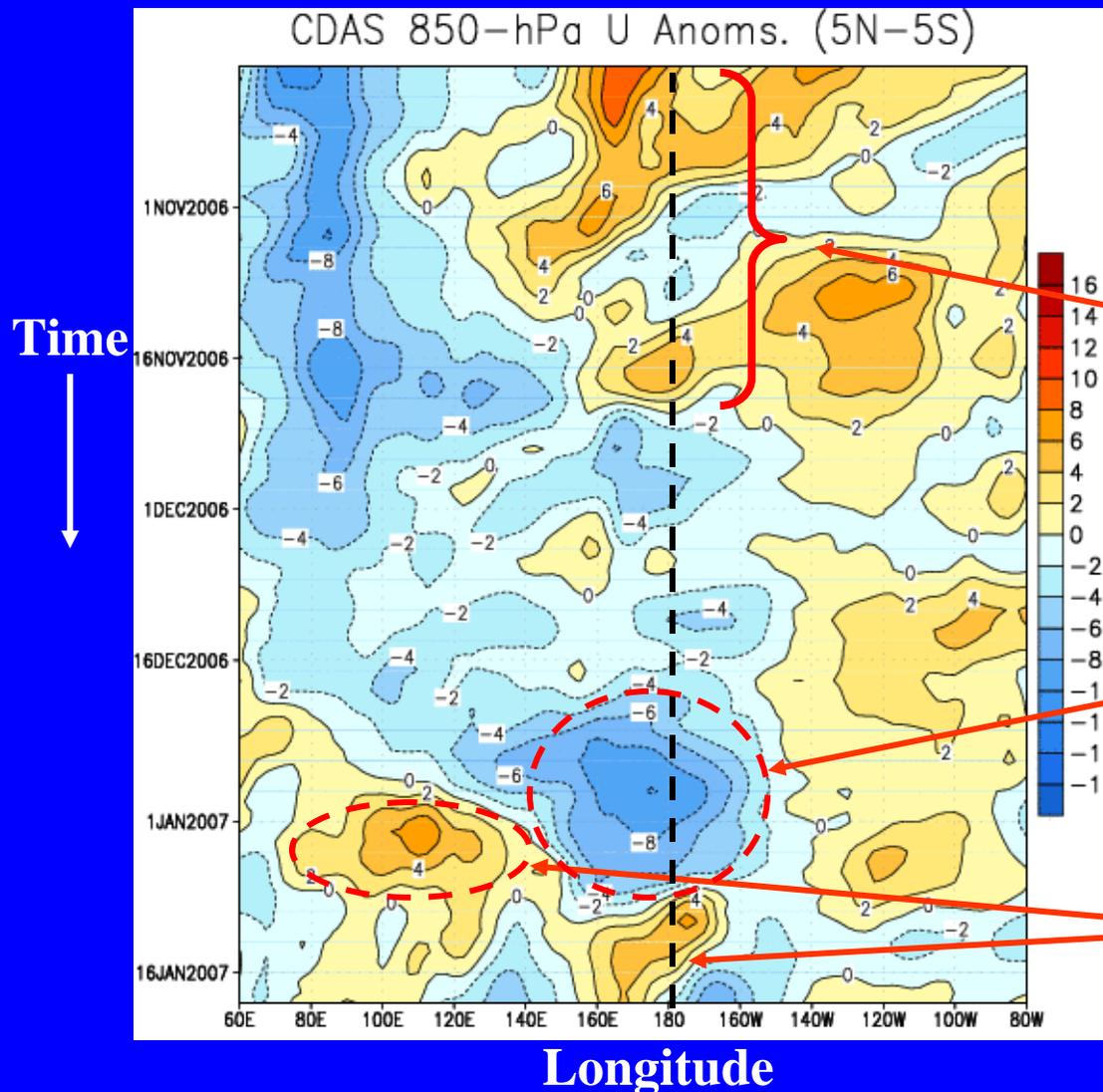
# 850-hPa Vector Wind Anomalies ( $\text{m s}^{-1}$ )

Note that shading denotes the magnitude of the anomalous wind vectors



Westerly anomalies persisted along 5°S in the central tropical Pacific (160°E-160°W).

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



Westerly anomalies (orange/red shading) represent anomalous west-to-east flow.

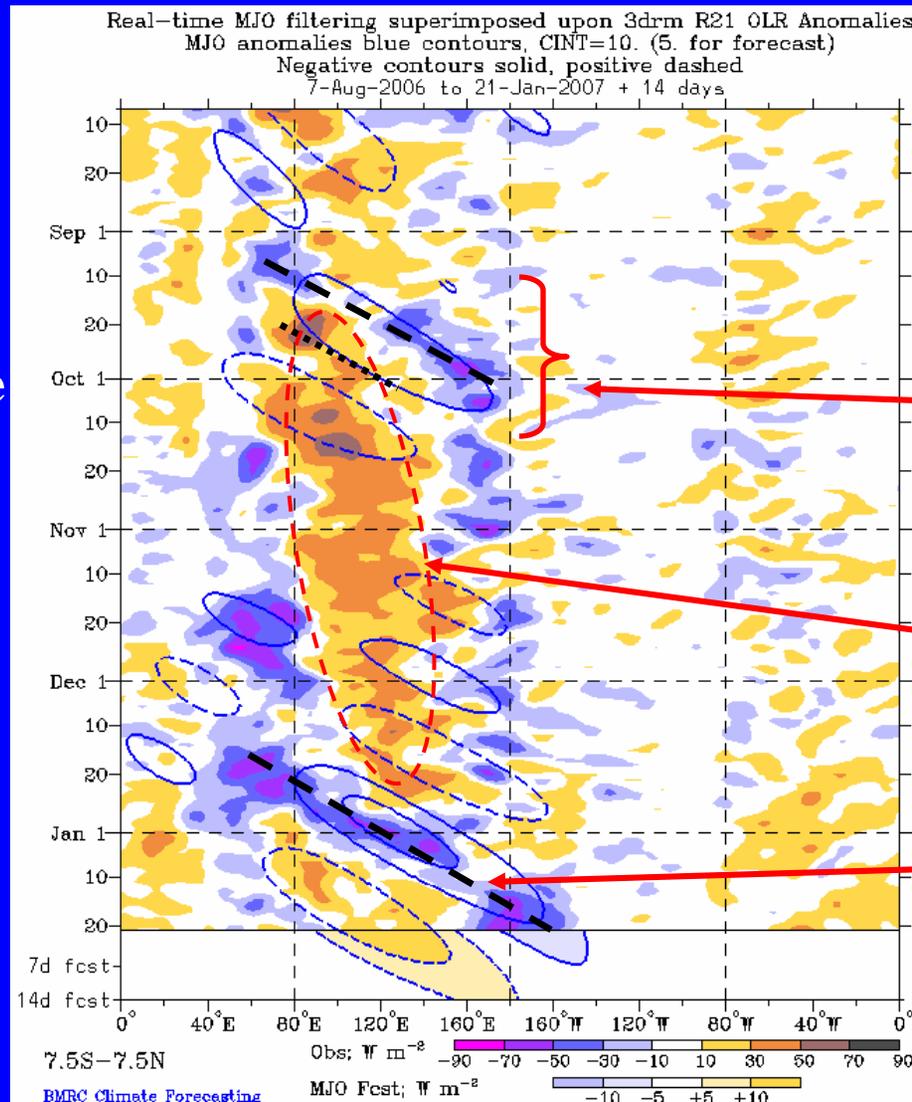
Easterly anomalies (blue shading) represent anomalous east-to-west flow.

Periods of westerly anomalies were frequent near and west of the Date Line (vertical dashed line) during October, and early November 2006.

Strong easterly anomalies, observed near the Date Line in late December 2006, weakened in early January 2007.

Westerly anomalies developed over the equatorial Indian Ocean and Indonesia in late December 2006, and over the central equatorial Pacific during the last 10 days.

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



Drier-than-average conditions, positive OLR anomalies (/red shading)

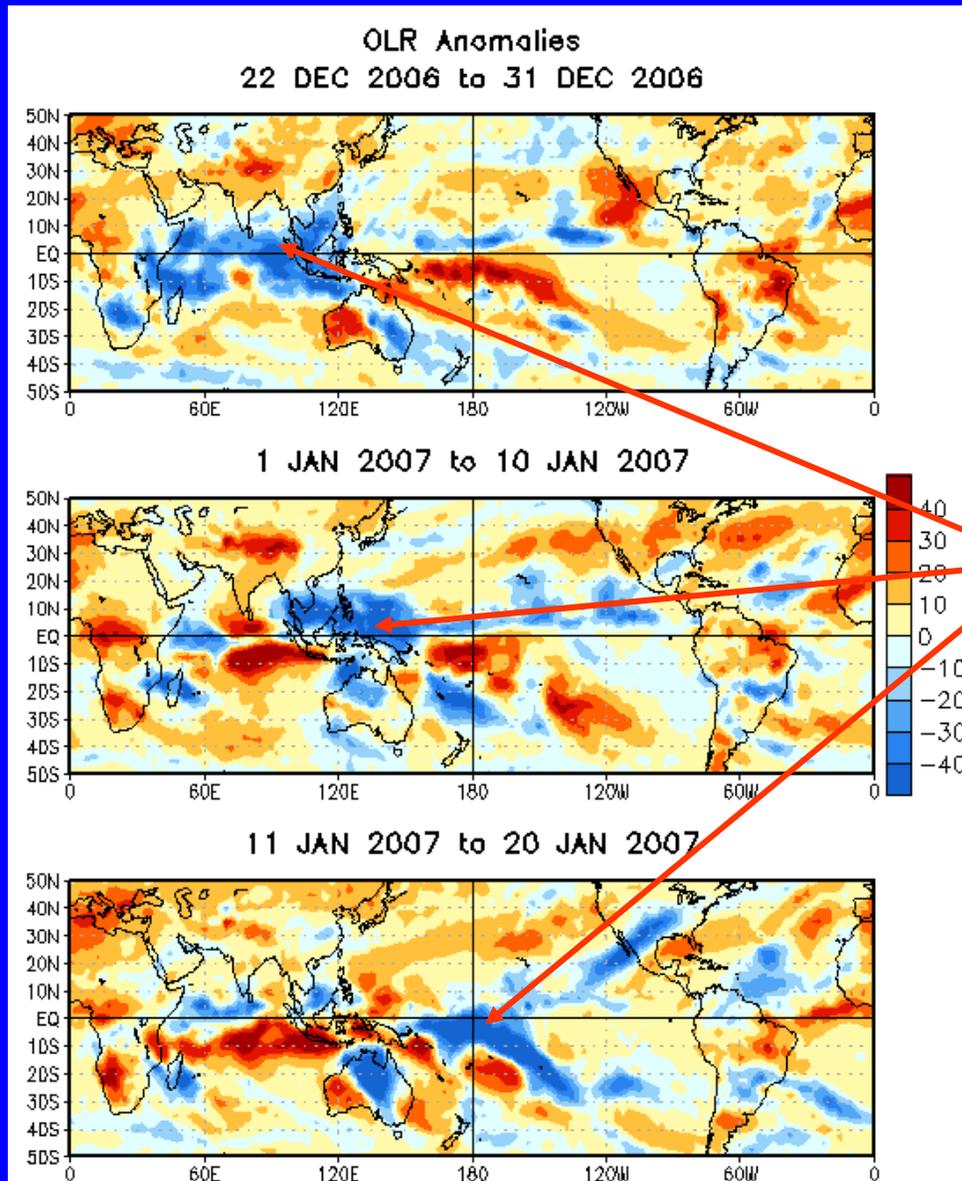
Wetter-than-average conditions, negative OLR anomalies (blue shading)

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

Strong suppressed convection was evident across the Maritime Continent (100E-150E) from late September to mid-December.

Enhanced convection, associated with the recent MJO event, shifted eastward from the Indian Ocean to the Maritime Continent and western Pacific between late December 2006 and early January 2007.

# Anomalous OLR: Last 30 days



**Drier-than-average conditions, positive OLR anomalies (red shading)**

**Wetter-than-average conditions, negative OLR anomalies (blue shading)**

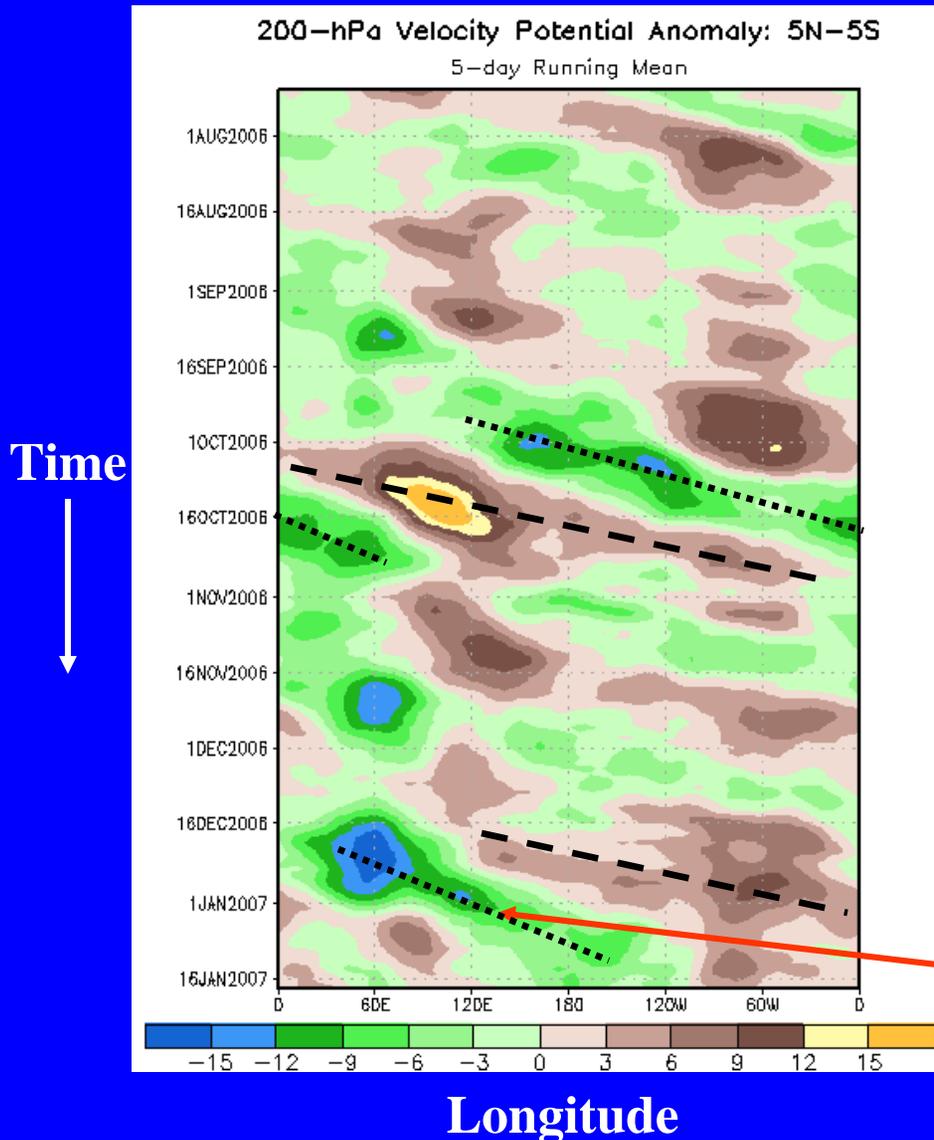
**Dry conditions prevailed across sections of the Maritime Continent and Australia during the first two-thirds of December.**

**An extensive area of enhanced convection developed in the Indian Ocean in mid-December, expanded eastward to include the Maritime Continent by late December/ early January, and shifted eastward to the central tropical Pacific during the last 10 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.



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

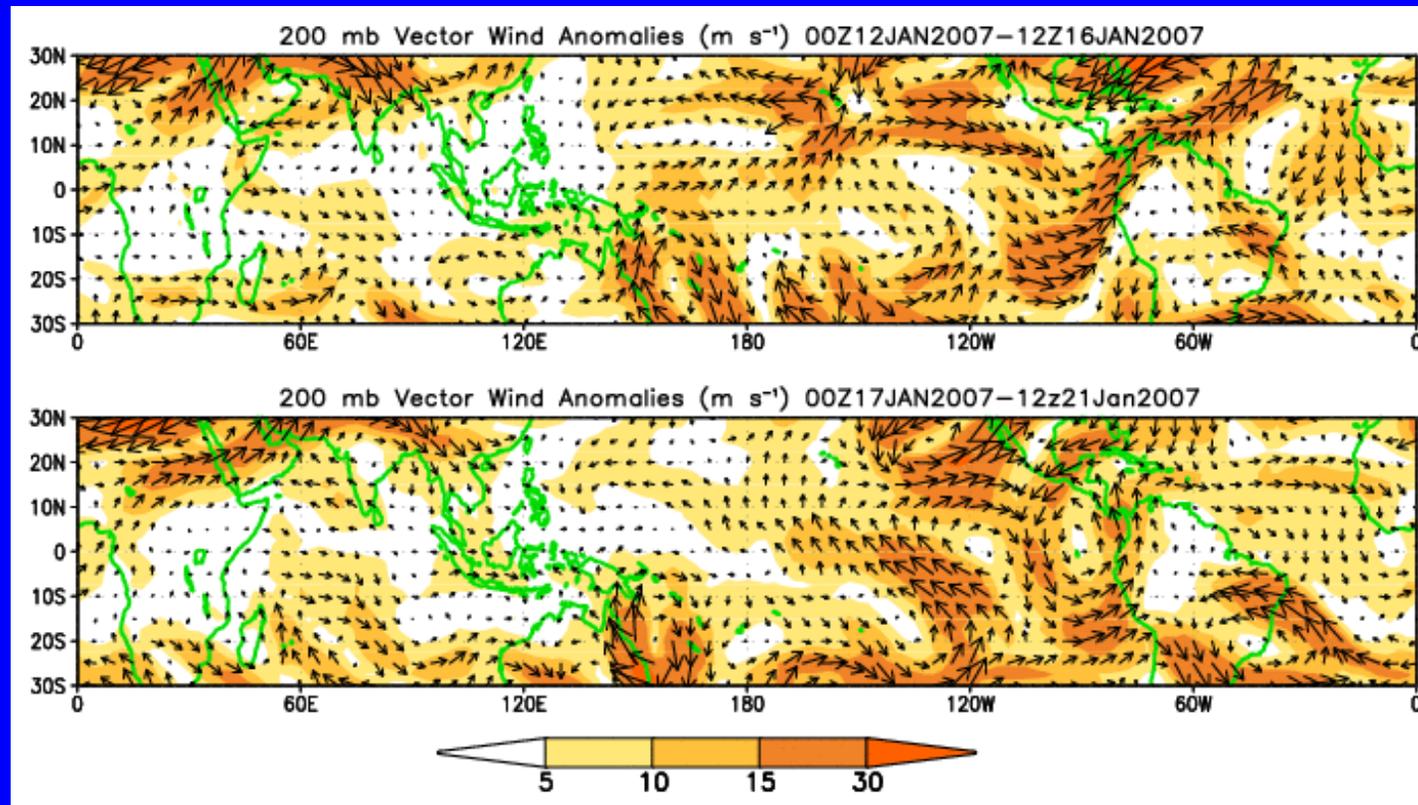
Moderate to strong MJO activity was observed from late-September to mid-October.

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

The MJO intensified in late December 2006, but weakened in early January 2007, as negative OLR anomalies shifted eastward from the Maritime continent into the central tropical Pacific.

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

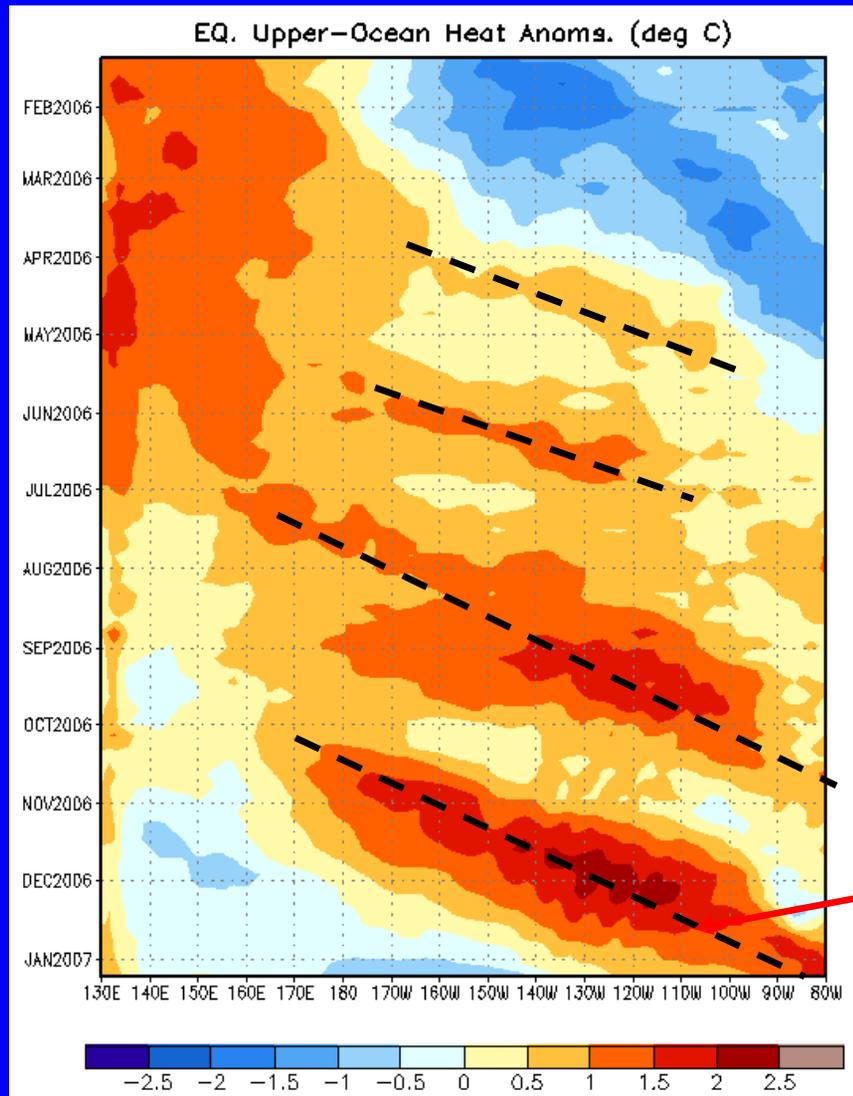
Note that shading denotes the magnitude of the anomalous wind vectors.



The pattern of 200-hPa wind anomalies has varied considerably from week to week.

# 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.

During this period eastward-propagating Kelvin waves (warm phases indicated by dashed lines) have caused considerable month-to-month variability in the upper-ocean heat content.

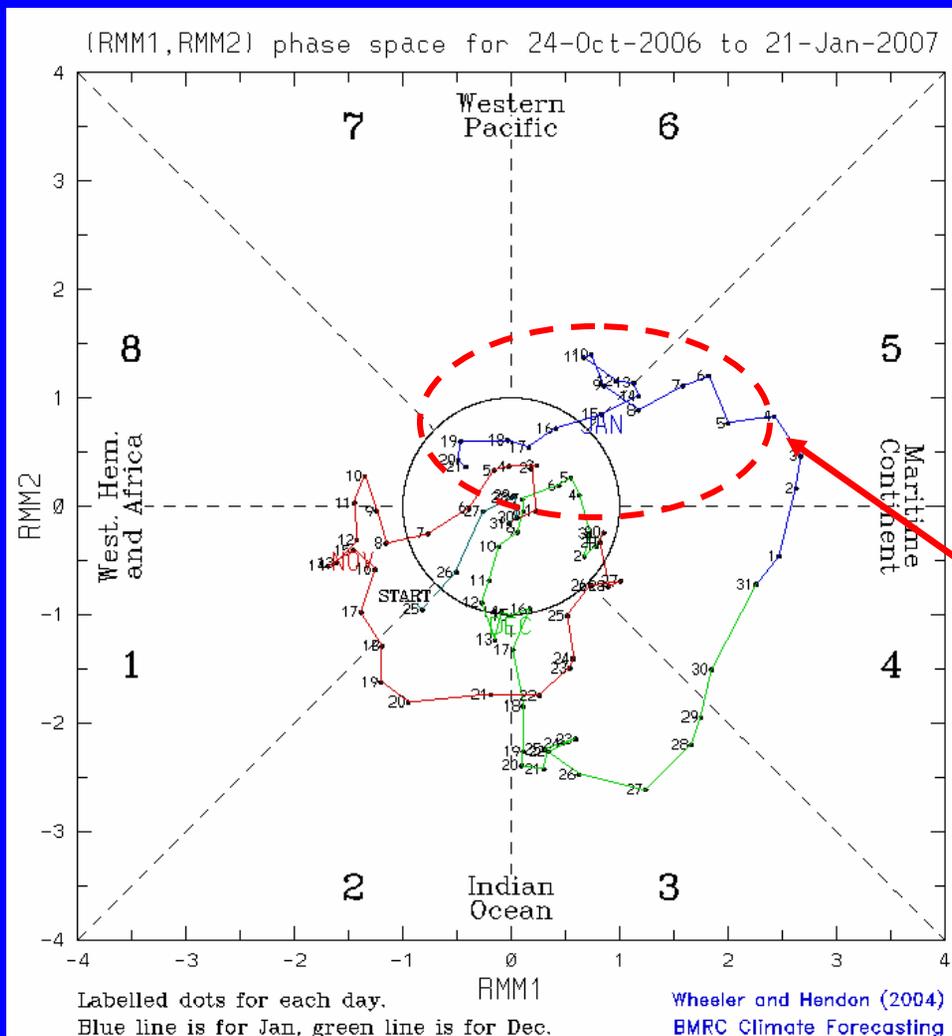
The latest Kelvin wave was initiated in early October and appears to be the strongest in over a year. Anomalously warm waters have reached the coast of South America.

# MJO Index (Magnitude and Phase)

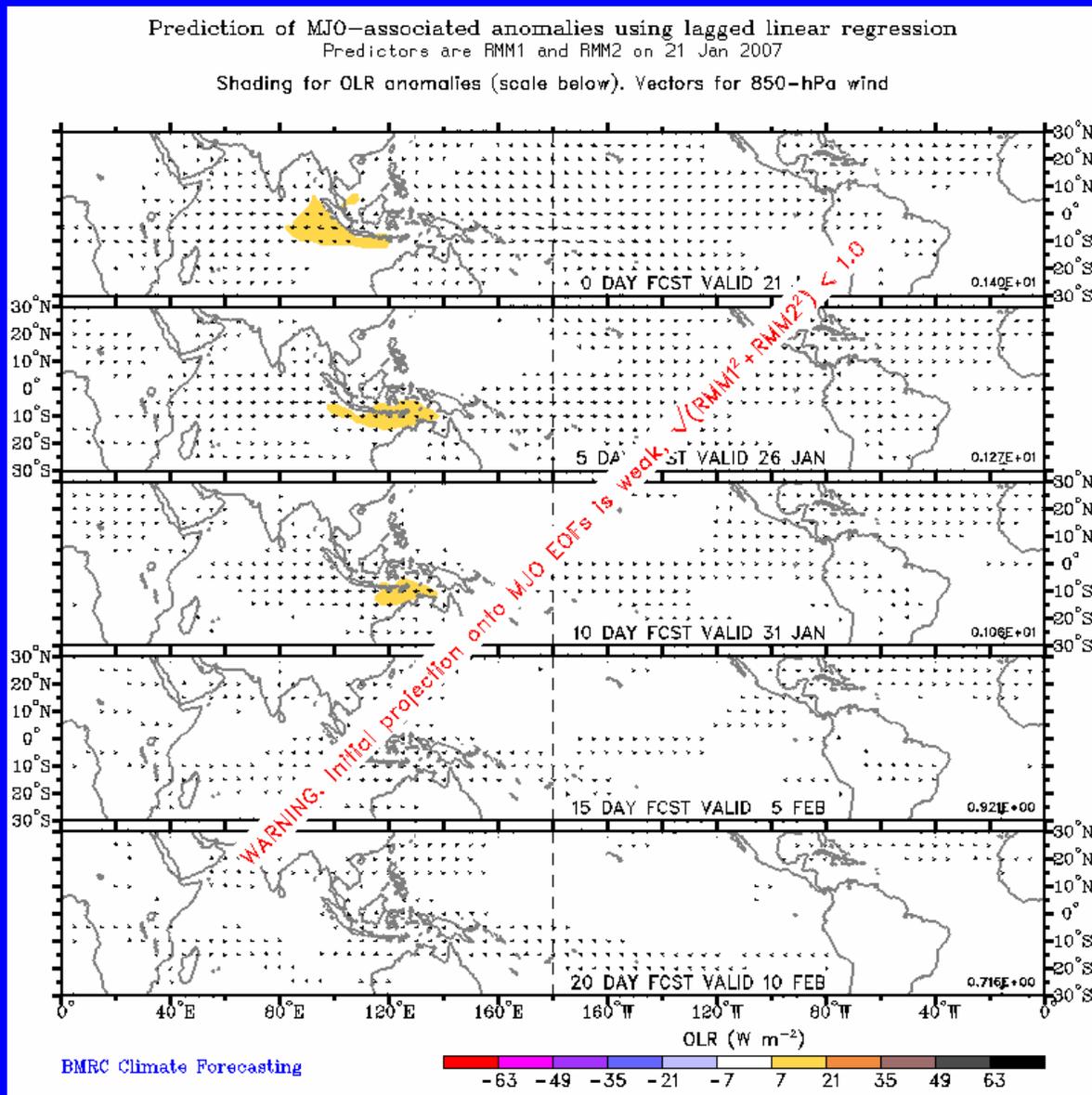
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850-hPa zonal wind, 200- hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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 began to weaken in early January 2007, and during the last week the MJO has become incoherent.



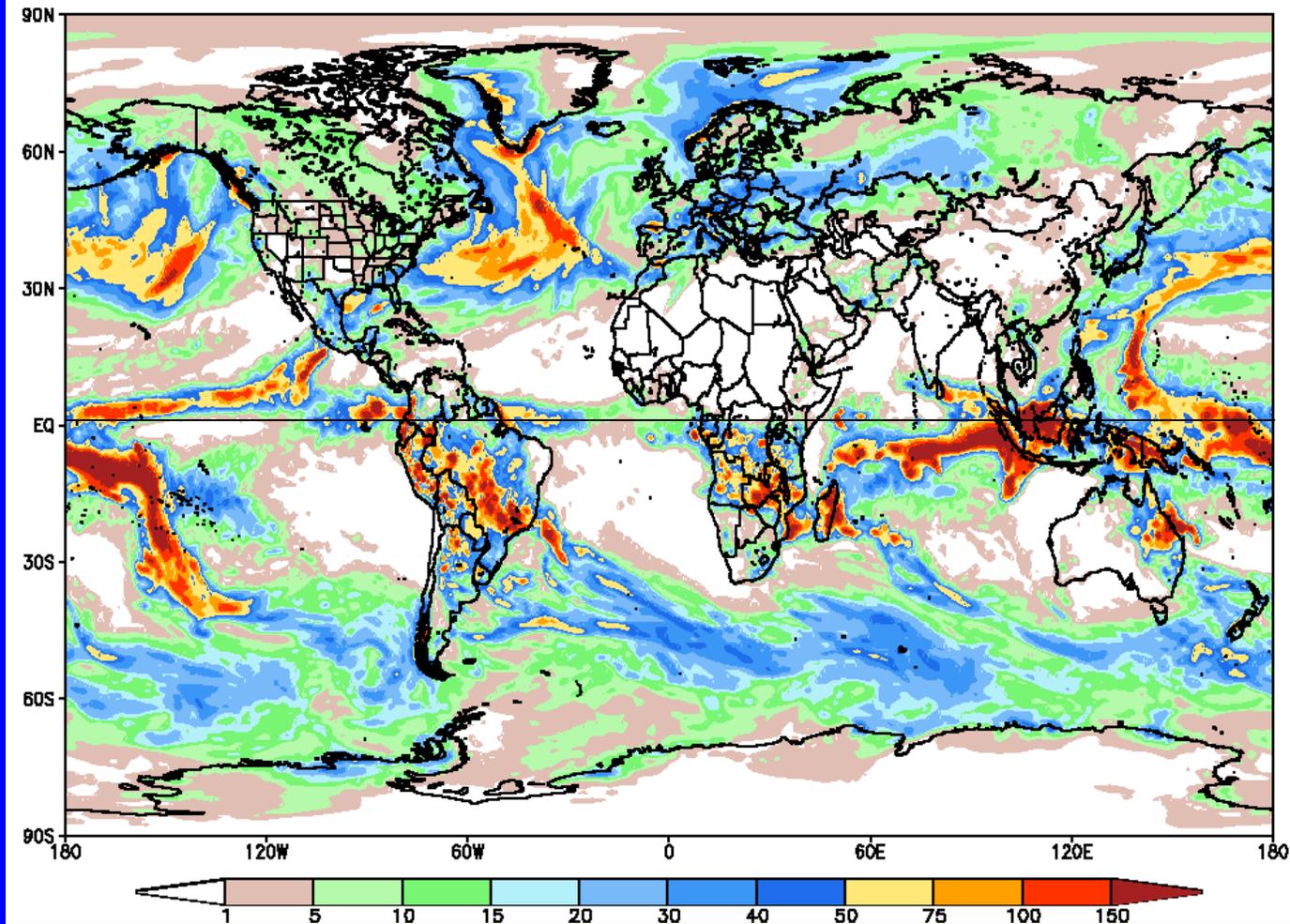
# Statistical OLR MJO Forecast



The amplitude of the MJO is too weak to make a forecast.

# Global Forecast System (GFS) Week 1 Precipitation Forecast

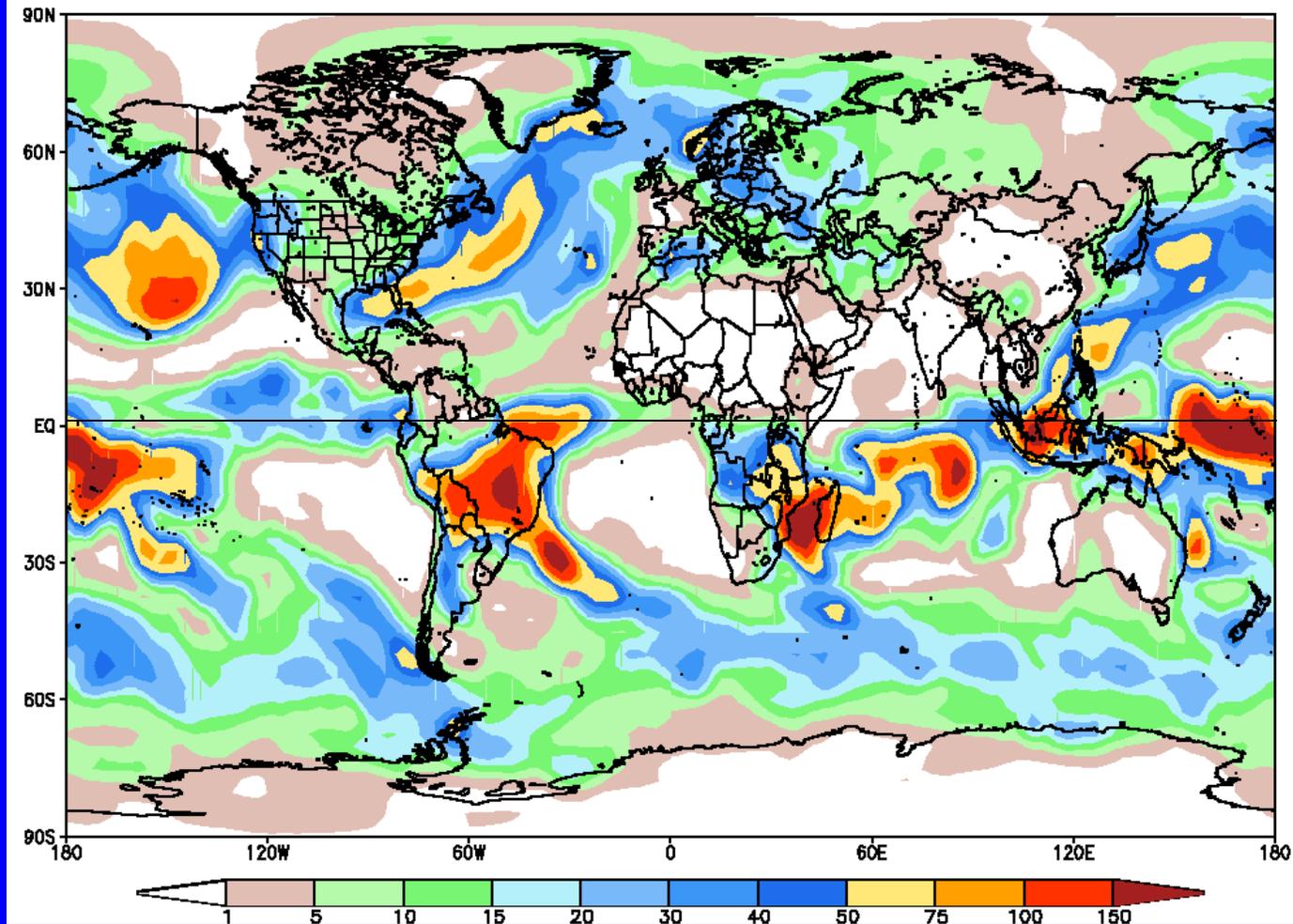
NOAA GFS 37.5 km Week 1 Total Precipitation (mm)  
Issued at Jan 22 2007 00Z for the period ending at Jan 29 2007 00Z



# Global Forecast System (GFS) Week 2

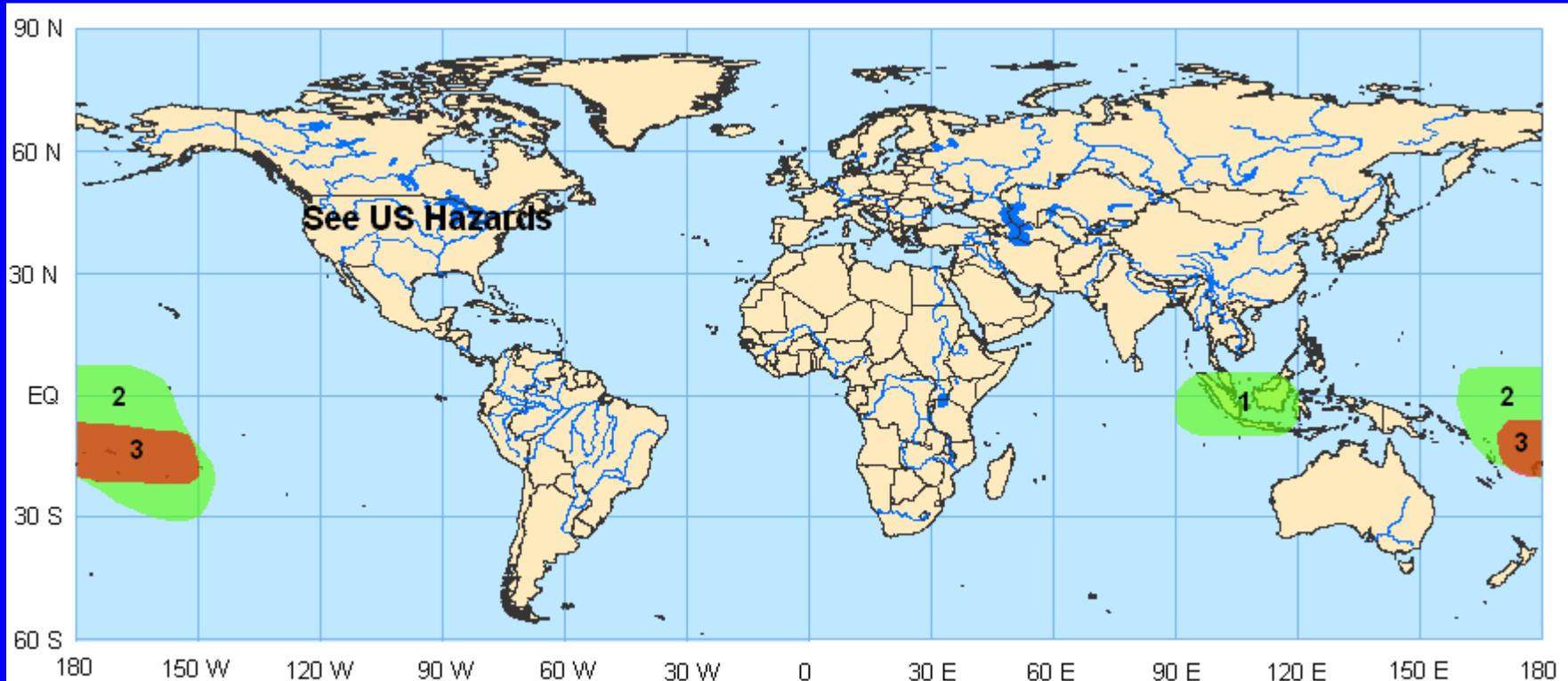
## Precipitation Forecast

NOAA GFS 100 km Week 2 Total Precipitation (mm)  
Issued Jan 22 2007 00Z for the period ending at Feb 4 2007 00Z



# Potential Benefits/Hazards – Week 1

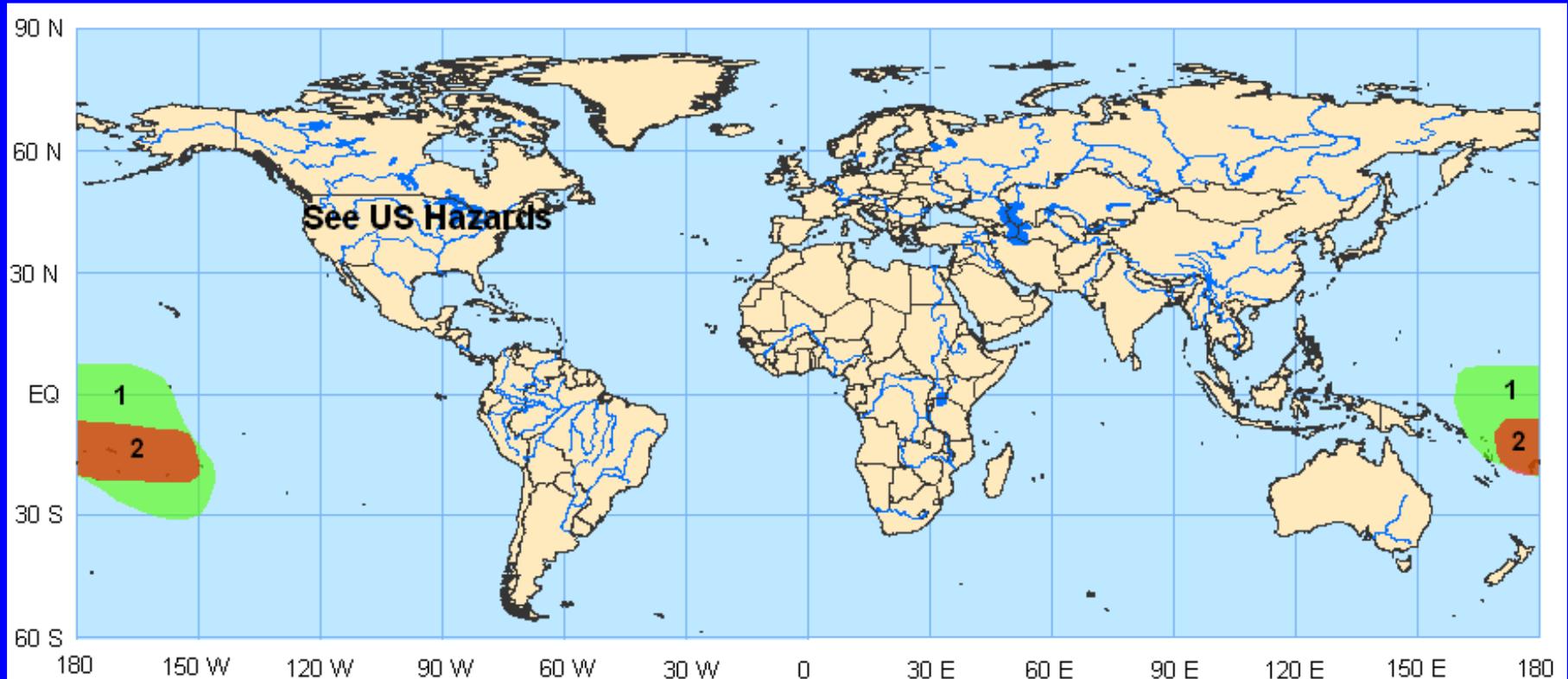
## Valid 23-29 January 2007



- 1. An increased chance for above normal rainfall for the eastern Indian Ocean and western Maritime Continent.**
- 2. An increased chance for above normal rainfall for the central tropical Pacific Ocean.**
- 3. Favorable conditions exist for tropical cyclogenesis in the central South Pacific.**

# Potential Benefits/Hazards – Week 2

## Valid 30 January – 5 February 2007



- 1. An increased chance for above normal rainfall for the central tropical Pacific Ocean.**
- 2. Favorable conditions exist for tropical cyclogenesis in the central South Pacific.**

# Summary

- **The latest observations indicate that the MJO has become incoherent.**
- **During weeks 1 and 2, there is an increased chance for above-normal rainfall over the central tropical Pacific Ocean, the equatorial eastern Indian Ocean, and the western Maritime Continent.**
- **Favorable conditions for tropical cyclogenesis are expected over the central South Pacific Ocean during weeks 1 and 2.**