

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

**Update prepared by**  
**Climate Prediction Center / NCEP**  
**February 26, 2007**

# Outline

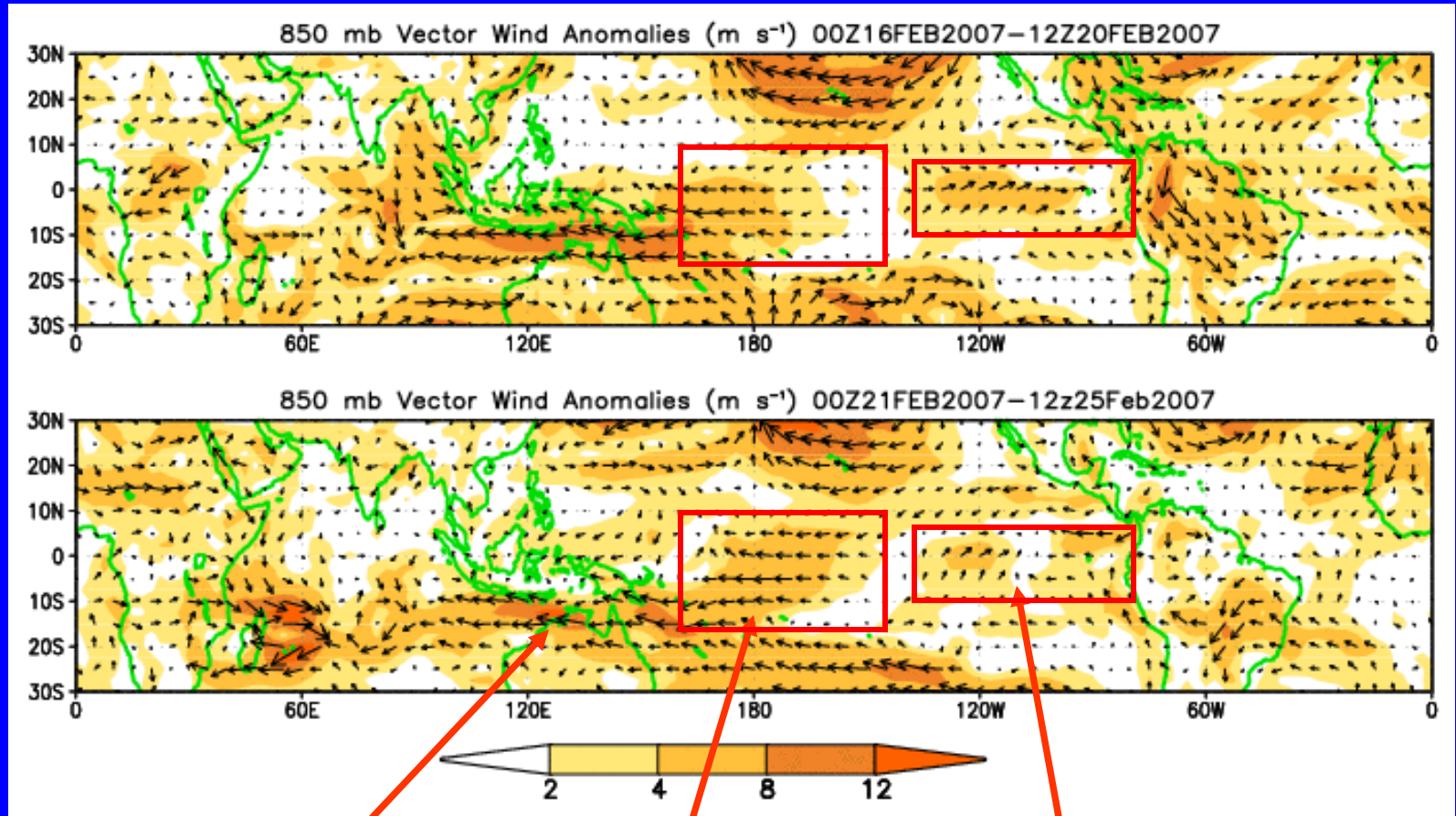
- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**

# Overview

- **The latest observations indicate that the MJO is weak.**
- **Tropical Cyclone Gamede will impact Madagascar and adjacent waters to the east.**
- **During week 1, an increased chance for below normal rainfall exists for sections of eastern Brazil and southern Africa while there is an increased chance for above average rainfall for the western Pacific Ocean northeast of Australia.**
- **Also during week 1, conditions will be favorable for tropical cyclogenesis for the region north of Australia.**
- **No definitive statements for potential benefits/hazards can be made during week 2.**

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

Note that shading denotes the magnitude of the anomalous wind vectors

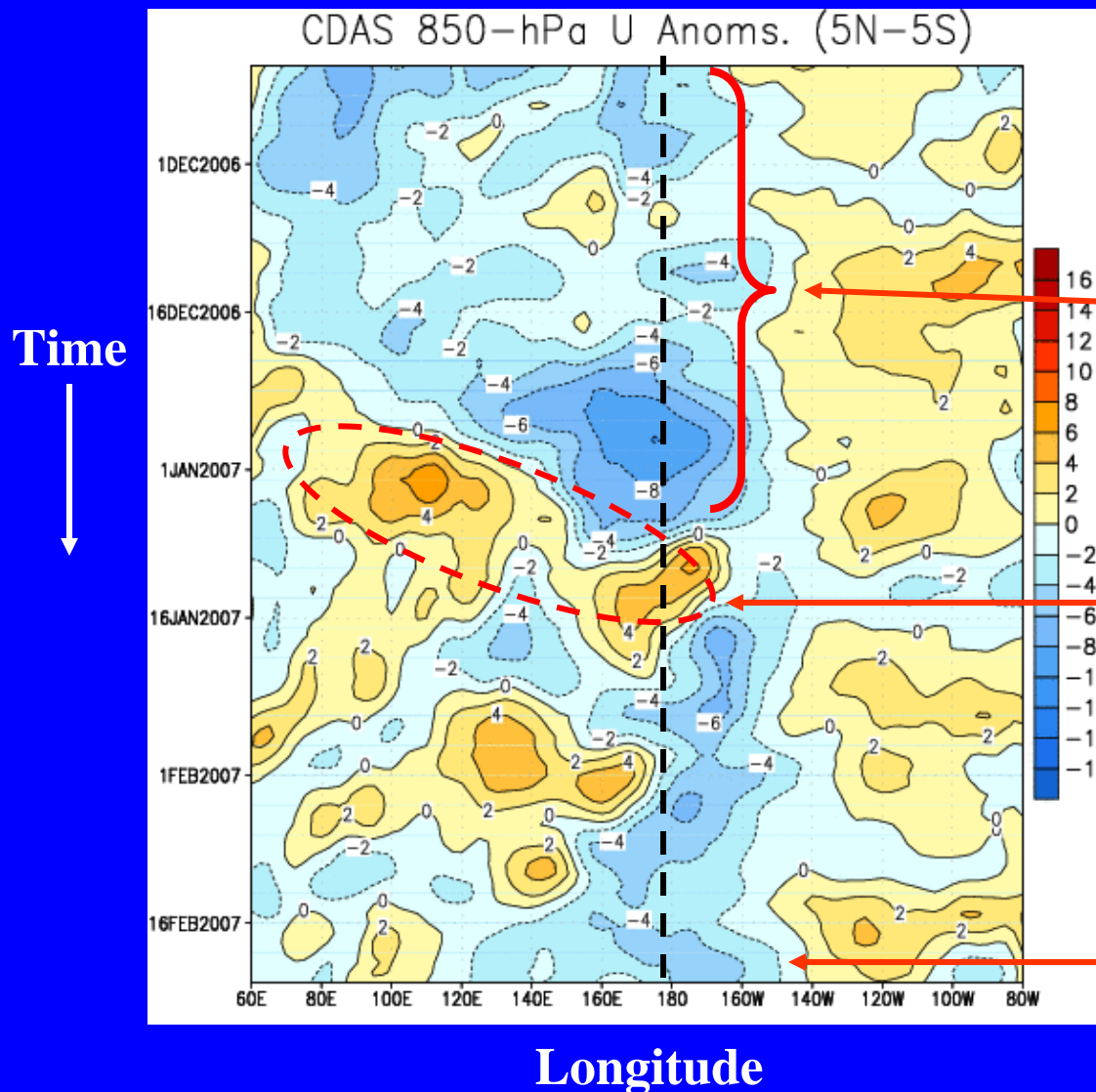


Anomalous easterlies have persisted south of the equator from the central Pacific to the eastern Indian Ocean.

Anomalous easterlies in the western Pacific have shifted to the east.

Anomalous westerlies have weakened slightly in the eastern Pacific.

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



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

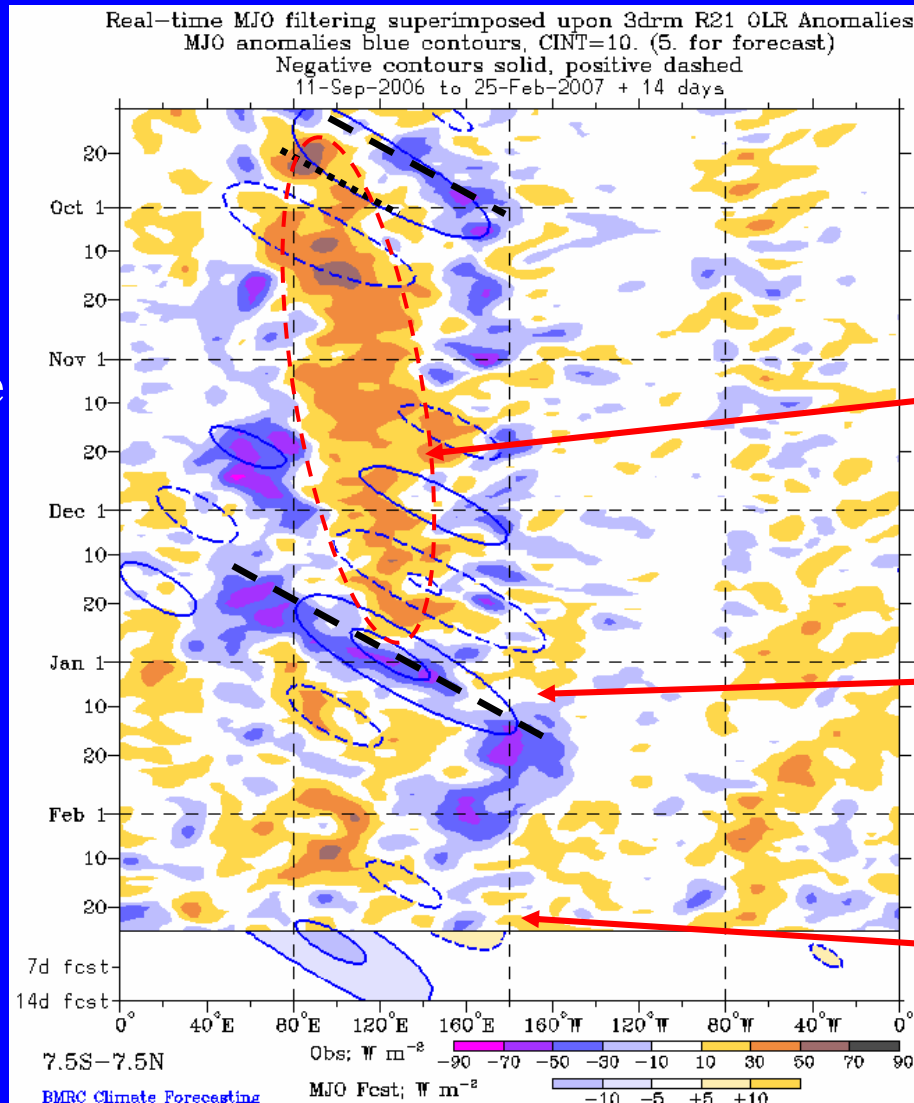
Easterly anomalies (blue shading) represent anomalous east-to-west flow.

An extended period of easterly anomalies persisted near and west of the Date Line (vertical dashed line) from mid-November through early January.

Westerly anomalies were observed over the equatorial Indian Ocean and Indonesia in late December 2006, and over the central equatorial Pacific during early January 2007.

Persistent easterly anomalies near the Date Line have expanded.

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



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

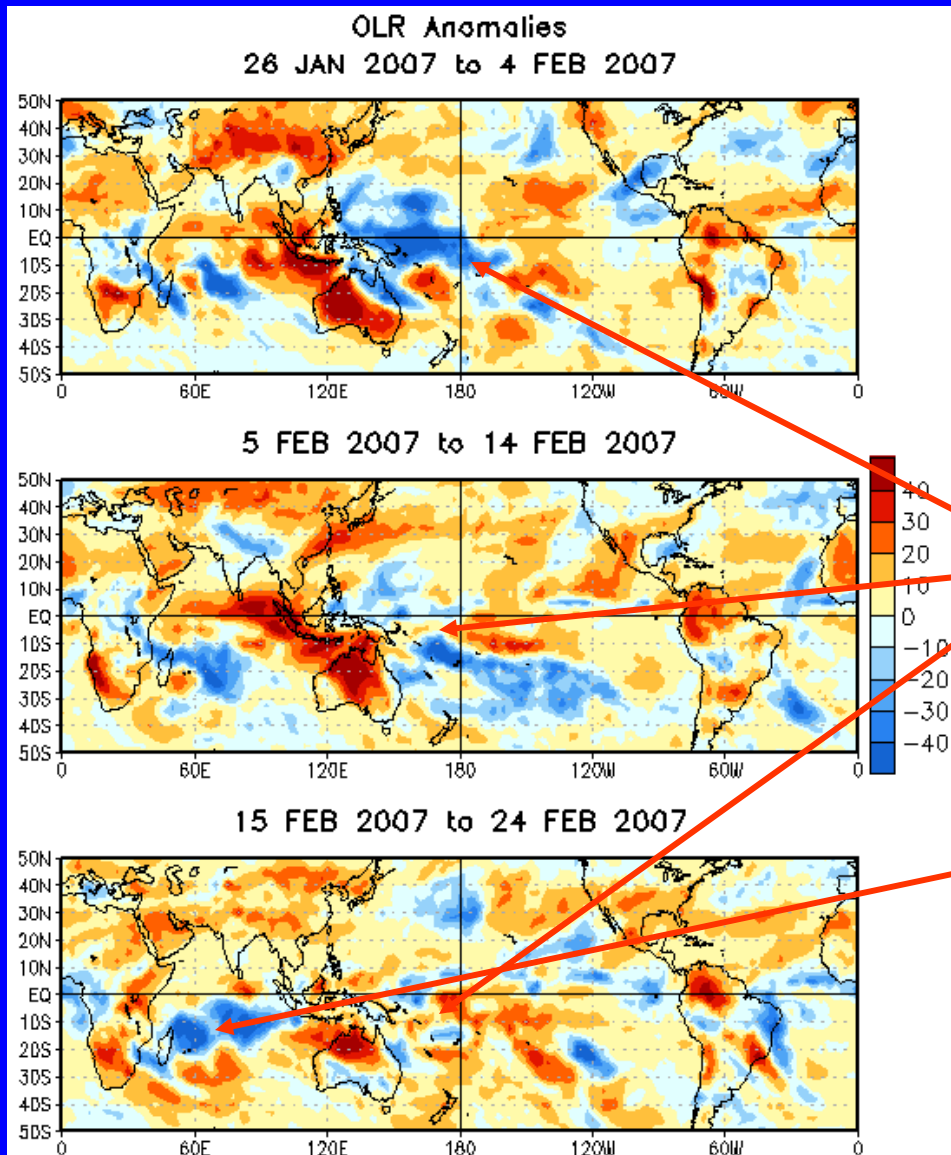
Wetter-than-average conditions, negative OLR anomalies (blue shading)

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 in late December and January, shifted eastward from the Indian Ocean across the Maritime Continent and western Pacific.

Recently, OLR anomalies are near average.

# Anomalous OLR: Last 30 days



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

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

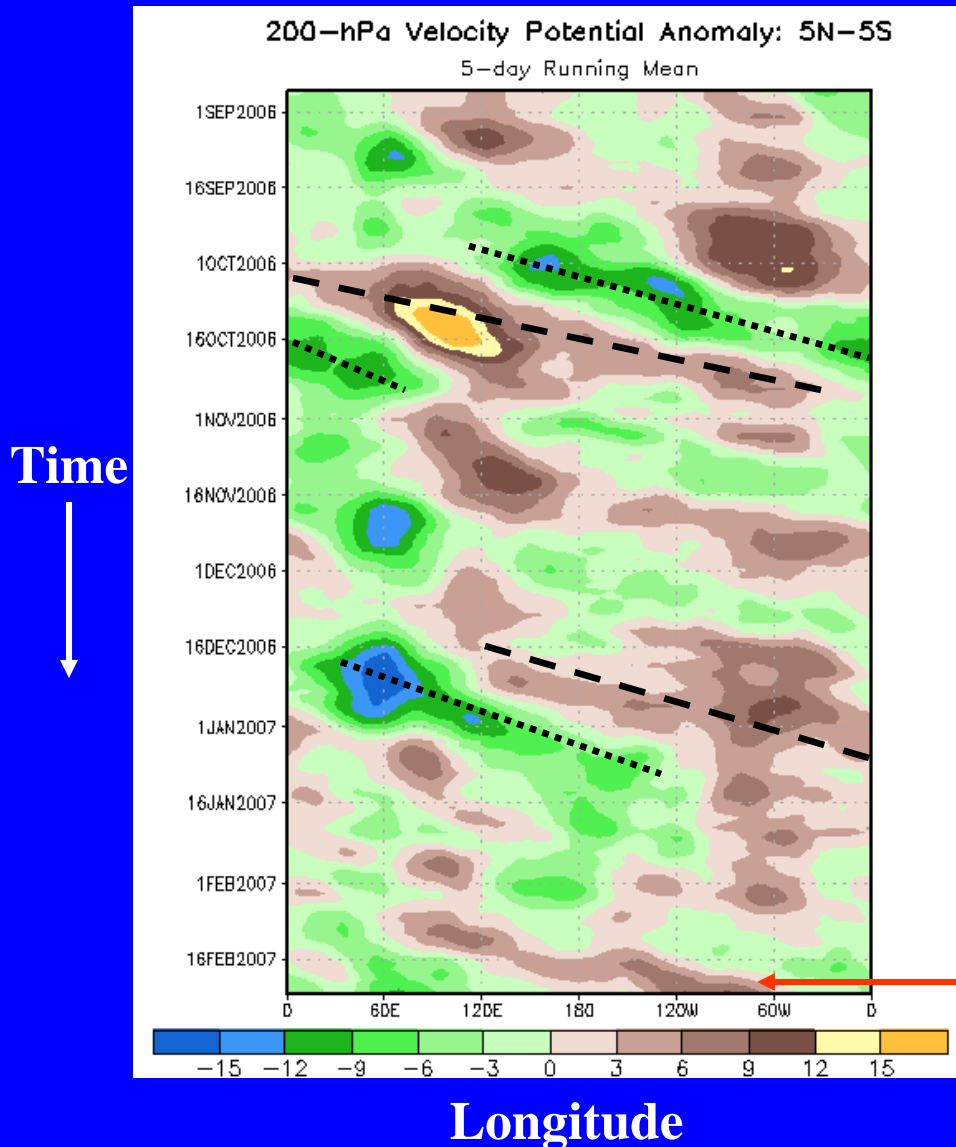
Throughout February the area of enhanced convection has dissipated in the western and central Pacific. Meanwhile, the region in the eastern Indian Ocean and western Maritime Continent has had suppressed convection.

Recently, enhanced convection has been observed in the central Indian Ocean, while northern Australia has remained dry.

# 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.



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

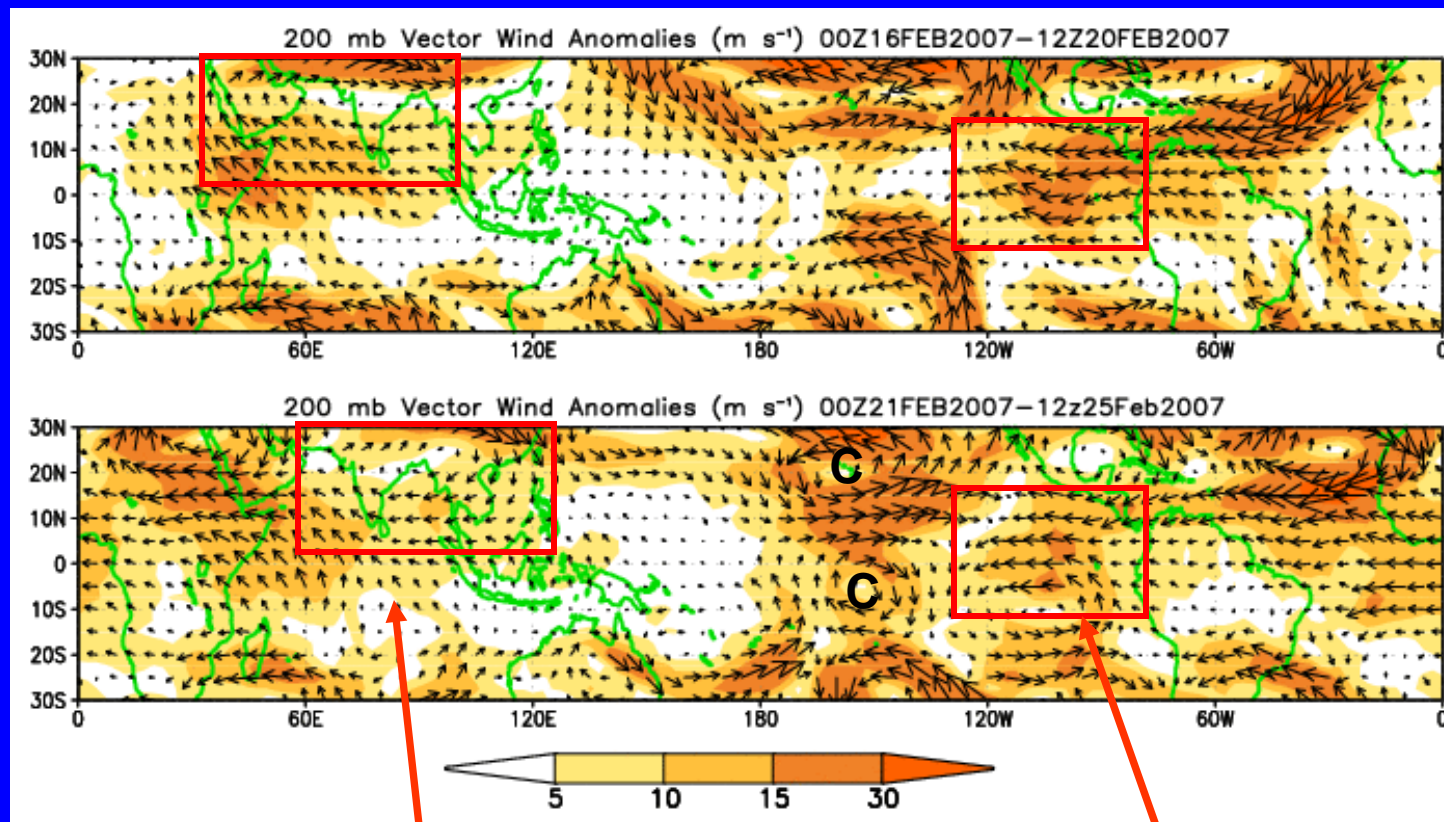
The MJO intensified in late December 2006, as negative OLR anomalies shifted eastward from the Maritime continent into the central tropical Pacific.

Recently, there has been an eastward shift of weak velocity potential anomalies.



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

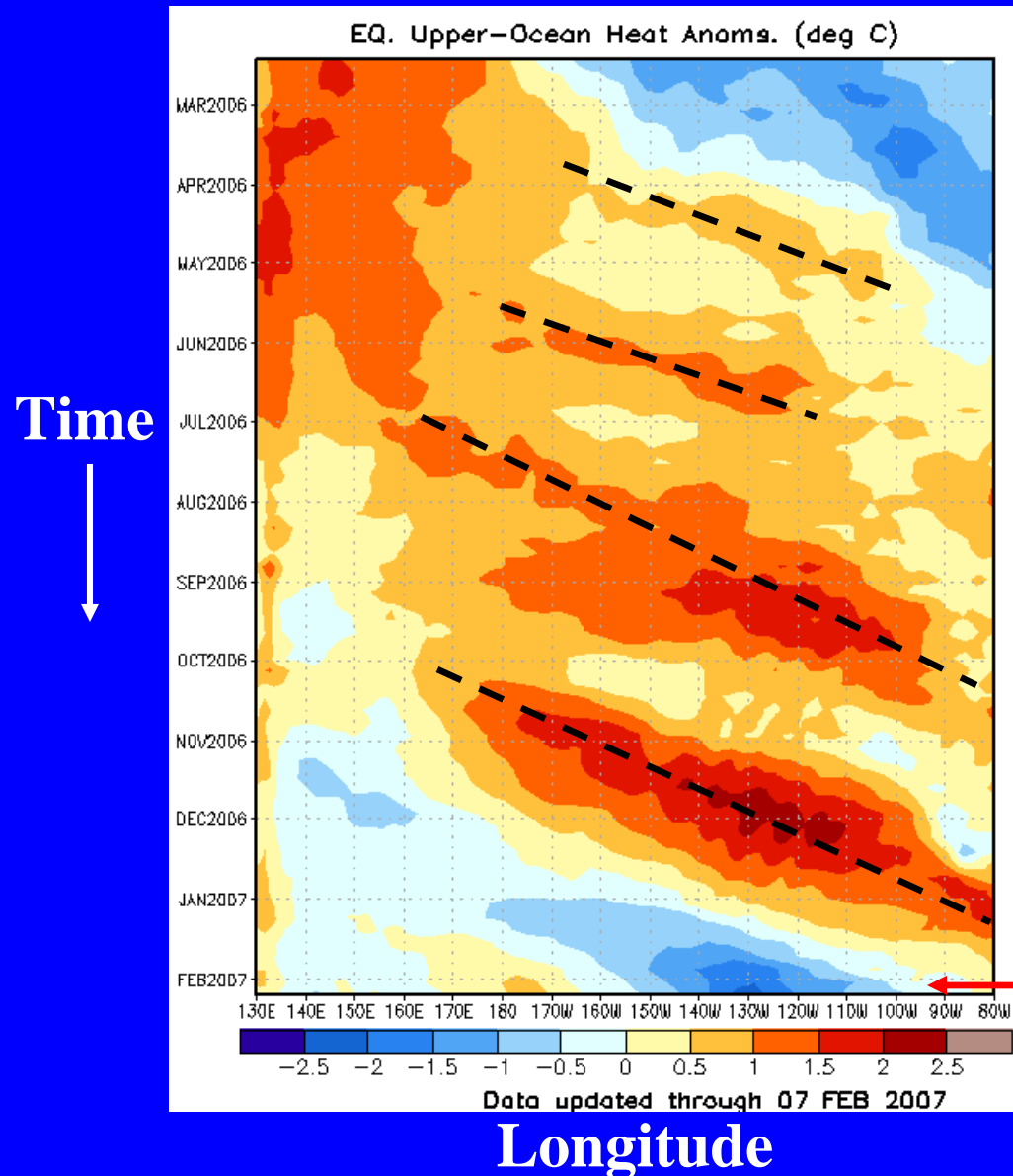
Note that shading denotes the magnitude of the anomalous wind vectors.



The anomalous upper-level anticyclone has shifted eastward.

Anomalous upper-level easterlies have persisted over the eastern Pacific.

# 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.

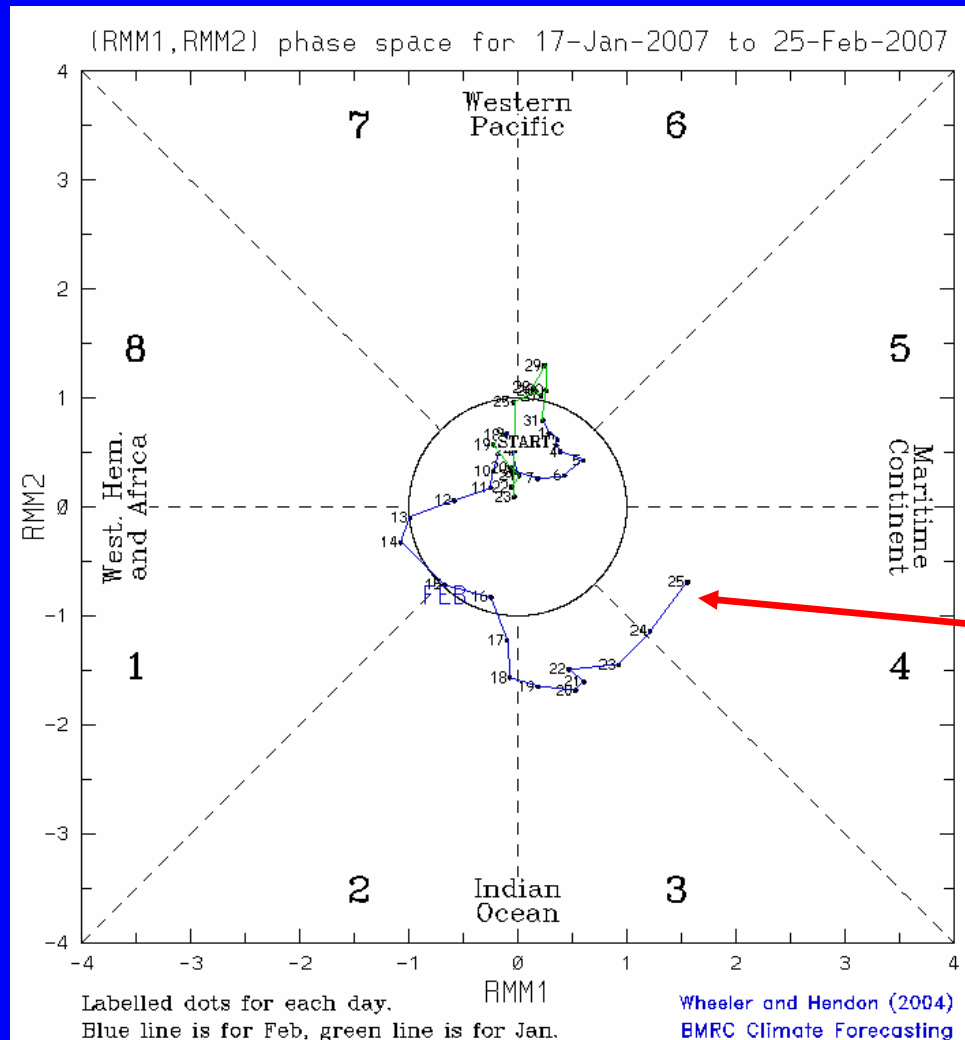
During this period eastward-propagating Kelvin waves (warm phases indicated by dashed lines) have caused considerable month-to-month variability in the upper-ocean heat content.

Recently, negative heat content anomalies have been propagating eastward to the eastern equatorial Pacific.

# MJO Index (Magnitude and Phase)

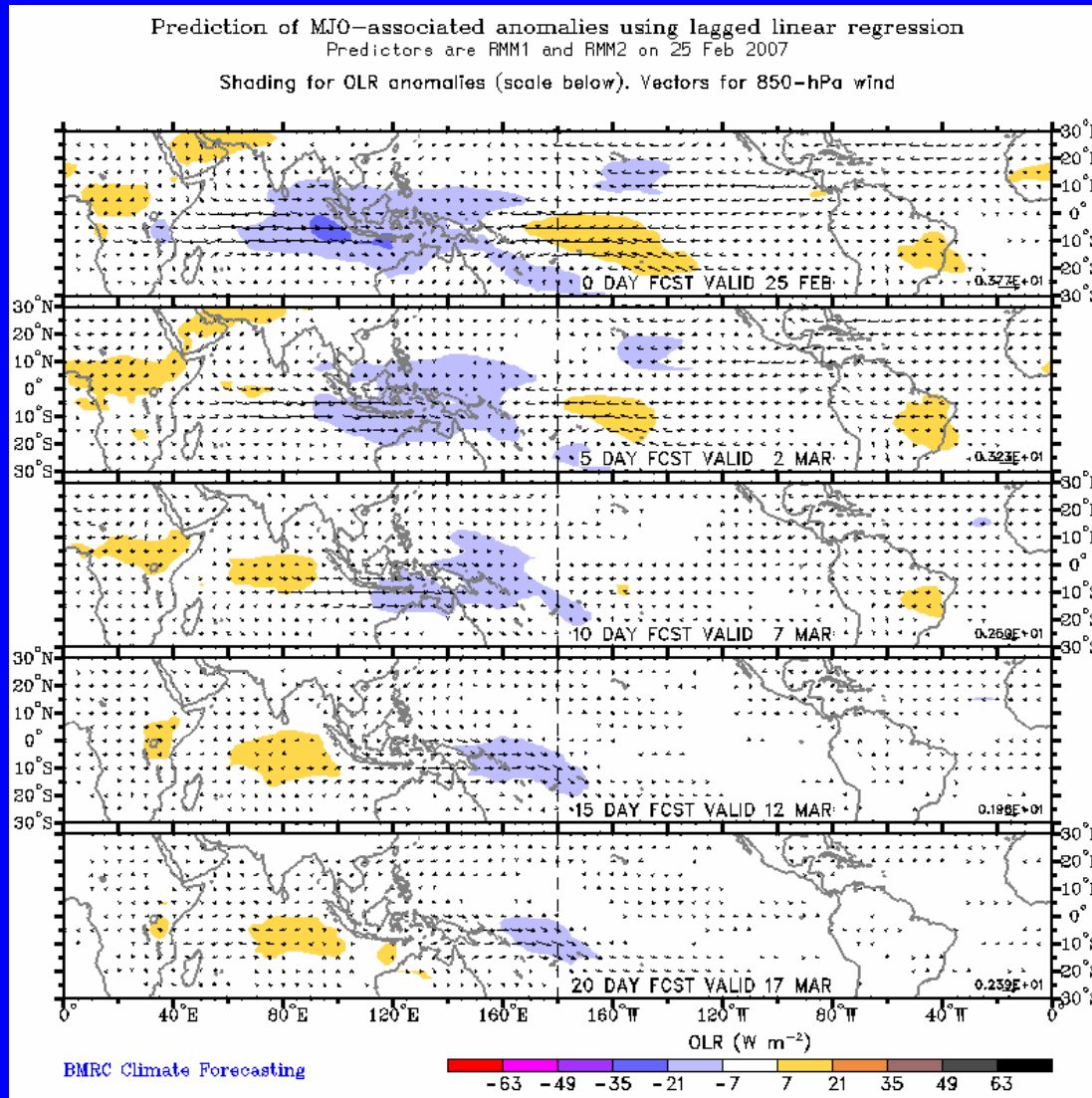
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850-hPa zonal wind, 200- hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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 index indicates weak MJO activity.

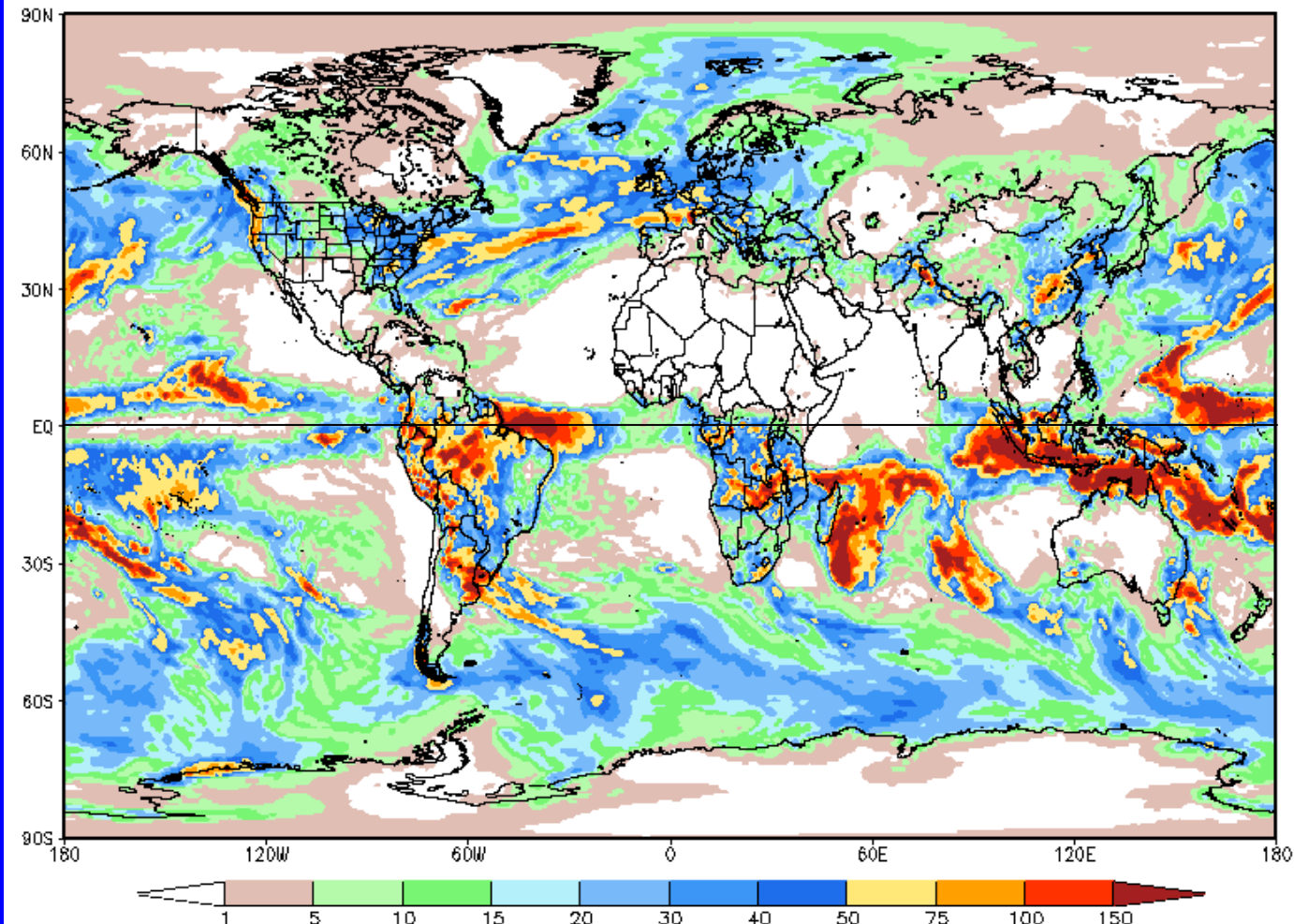
# Statistical OLR MJO Forecast



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

# Global Forecast System (GFS) Week 1 Precipitation Forecast

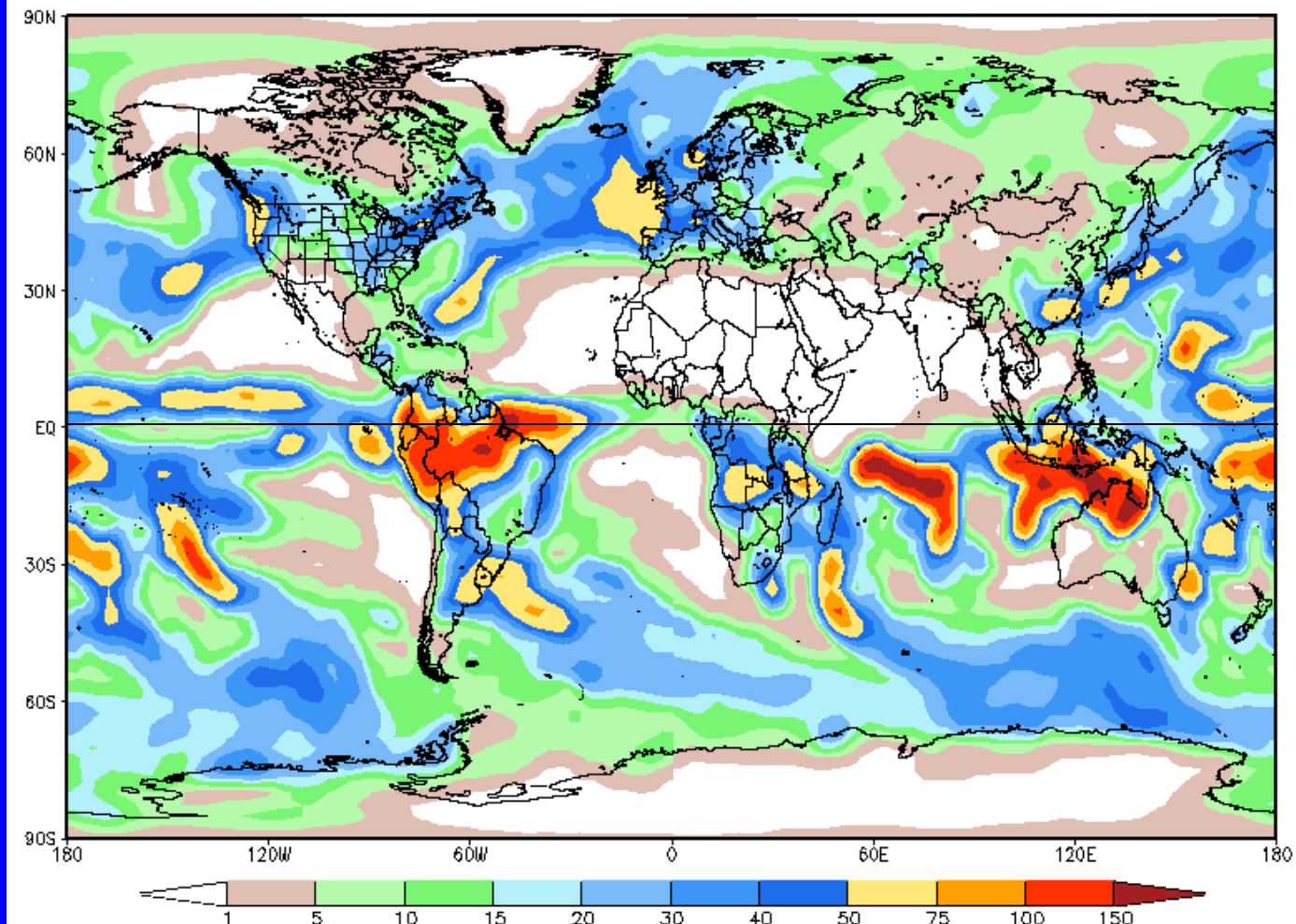
NOAA GFS 37.5 km Week 1 Total Precipitation (mm)  
Issued at Feb 26 2007 00Z for the period ending at Mar 5 2007 00Z



# Global Forecast System (GFS) Week 2

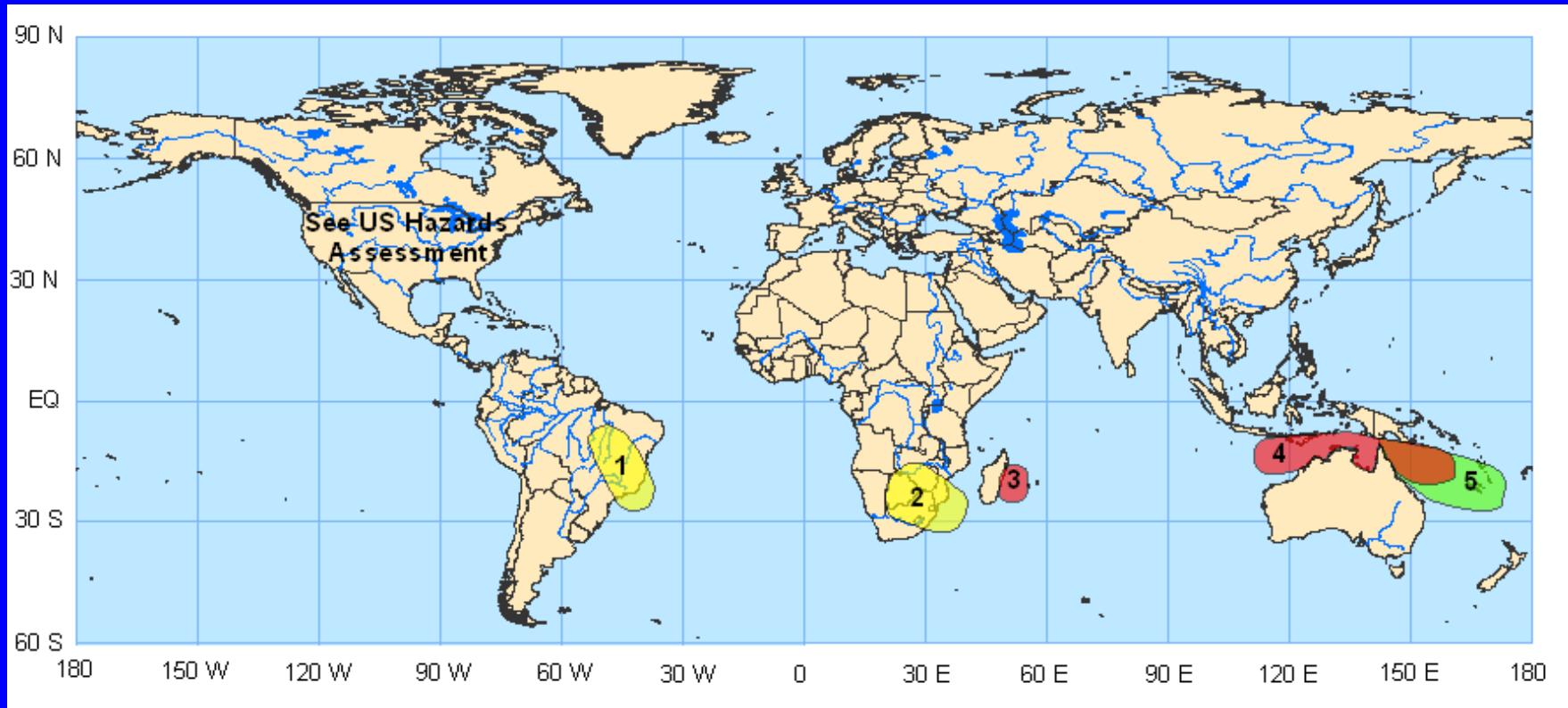
## Precipitation Forecast

NOAA GFS 100 km Week 2 Total Precipitation (mm)  
Issued Feb 26 2007 00Z for the period ending at Mar 11 2007 00Z



# Potential Benefits/Hazards – Week 1

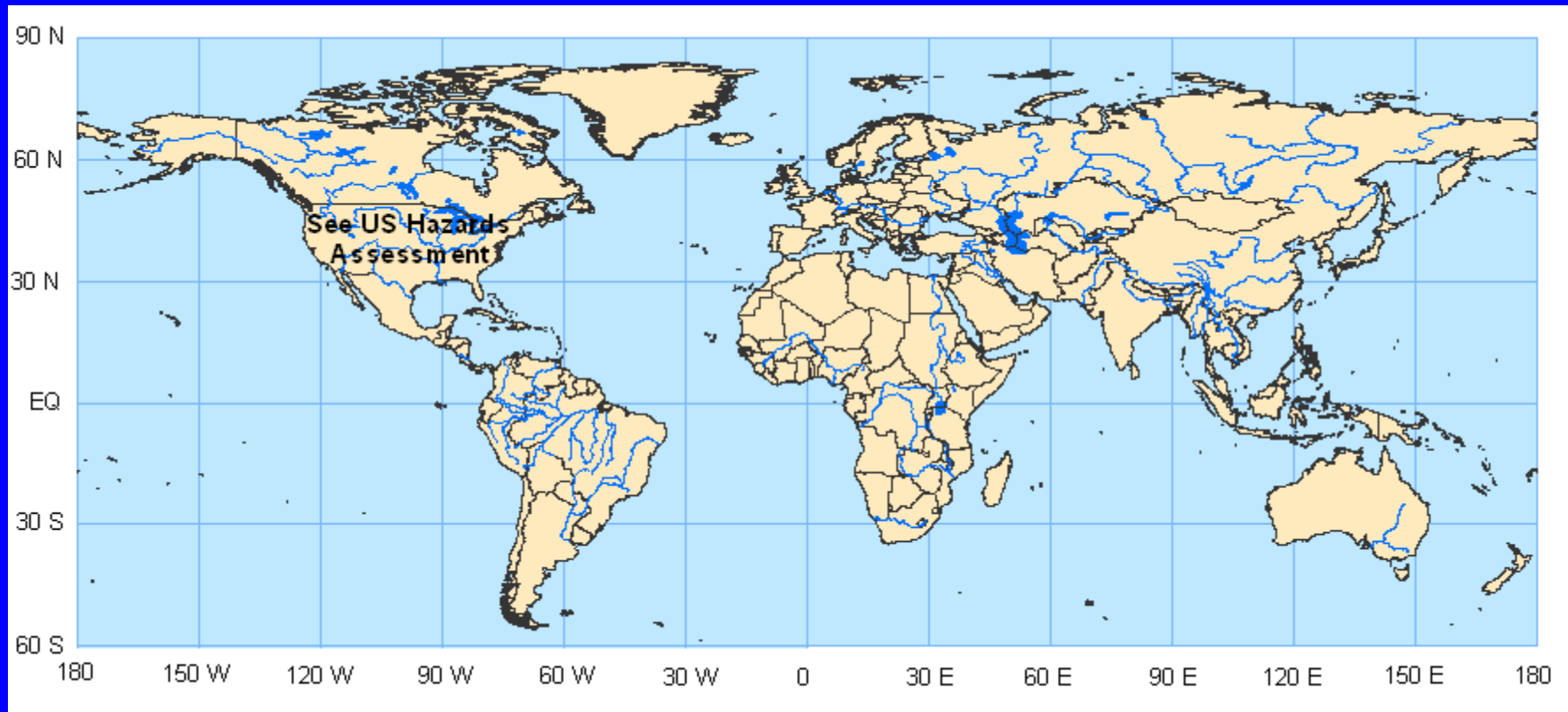
## Valid 27 February- 5 March 2007



1. An increased chance for below normal rainfall for sections of eastern Brazil.
2. An increased chance for below normal rainfall for sections of southern Africa.
3. Tropical Cyclone Gamede is expected to remain nearly stationary and impact Madagascar and adjacent waters.
4. Conditions will be favorable for tropical cyclogenesis for the region north of Australia.
5. An increased chance for above normal rainfall for the western Pacific Ocean north and northeast of Australia.

# Potential Benefits/Hazards – Week 2

## Valid 6 March- 12 March 2007



**No definitive statements for potential benefits/hazards can be made during the period**



# Summary

- **The latest observations indicate that the MJO is weak.**
- **Tropical Cyclone Gamede will impact Madagascar and adjacent waters to the east.**
- **During week 1, an increased chance for below normal rainfall exists for sections of eastern Brazil and southern Africa while there is an increased chance for above average rainfall for the western Pacific Ocean northeast of Australia.**
- **Also during week 1, conditions will be favorable for tropical cyclogenesis for the region north of Australia.**
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