

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

**Update prepared by  
Climate Prediction Center / NCEP  
March 12, 2007**

# Outline

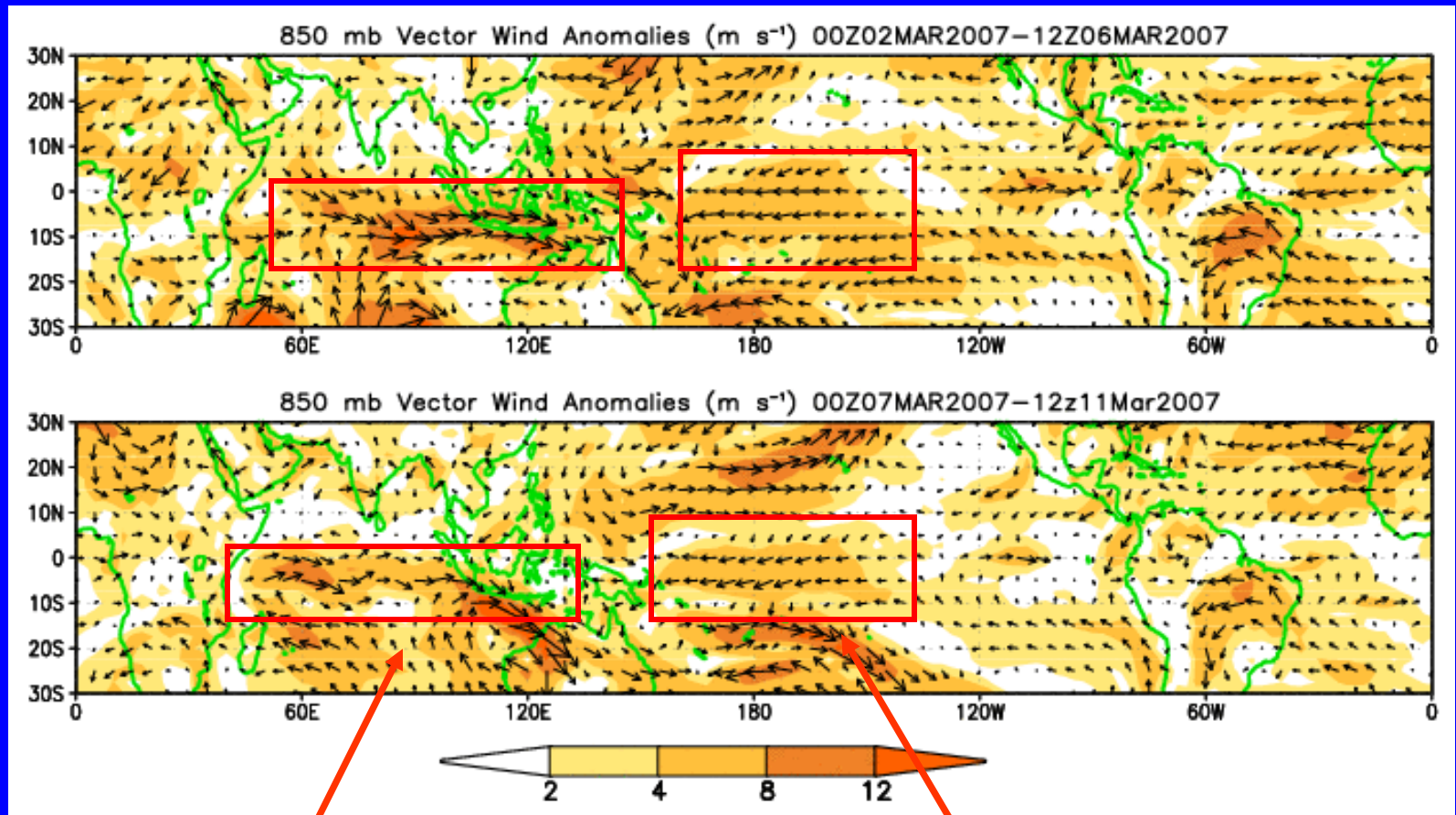
- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**

# Overview

- **The MJO has weakened considerably during the past week.**
- **Tropical Cyclone Indlada will impact the western Indian Ocean east of Madagascar.**
- **Throughout the period, there exists an increased chance for above normal rainfall for sections of the southern Maritime continent and northern Australia.**
- **The dry conditions across sections of Brazil and southeast Africa are expected to continue during week 1.**
- **Conditions are expected to be favorable for tropical cyclogenesis for the western Indian Ocean during week 1 and the waters northwest and north of Australia for weeks 1 and 2.**

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

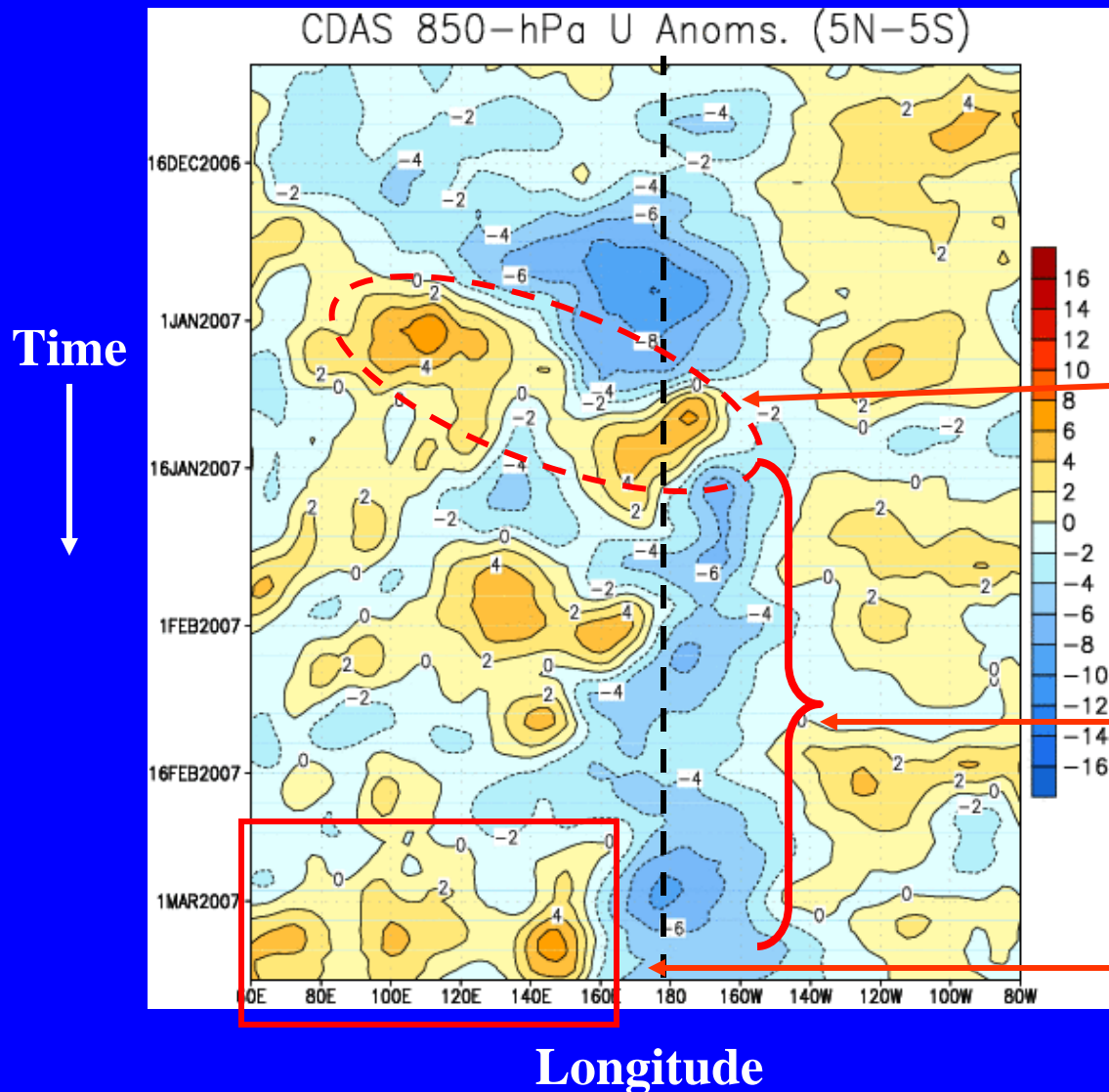
Note that shading denotes the magnitude of the anomalous wind vectors



Anomalous westerlies across the Maritime continent and Indian Ocean have weakened and shifted to the west.

Anomalous easterlies along and just south of the equator remain in the western 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.

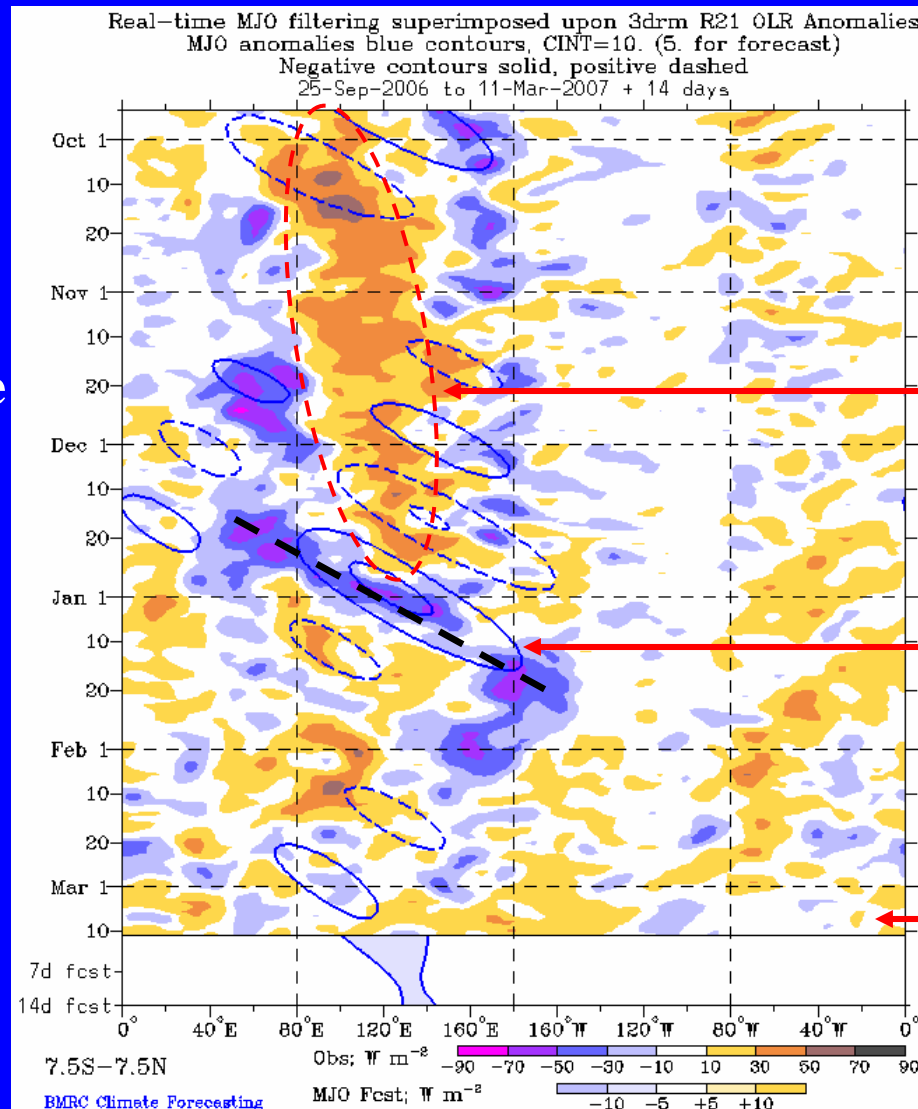
Easterly anomalies (blue shading) represent anomalous east-to-west flow.

Westerly anomalies associated with the MJO shifted from the equatorial Indian Ocean to the central equatorial Pacific during early January 2007.

Easterly anomalies have persisted near the Date Line since mid-January.

Recently, westerly anomalies have become widespread across the Indian Ocean and Indonesia.

# 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)

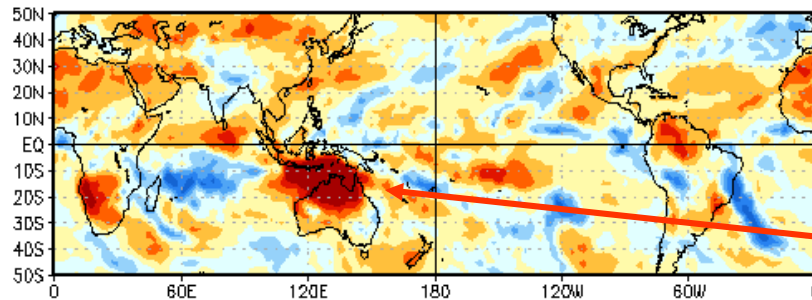
Strong suppressed convection was evident across the Maritime Continent (100E-150E) from late September to mid-December.

Enhanced convection, associated with the MJO in late December and January, shifted eastward from the Indian Ocean across the Maritime Continent and western Pacific.

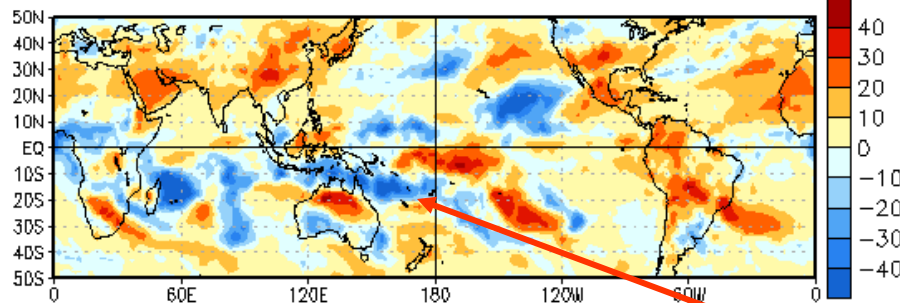
Currently, OLR anomalies along the equator remain small. Weak suppressed convection is evident across sections of the western Pacific Ocean.

# Anomalous OLR: Last 30 days

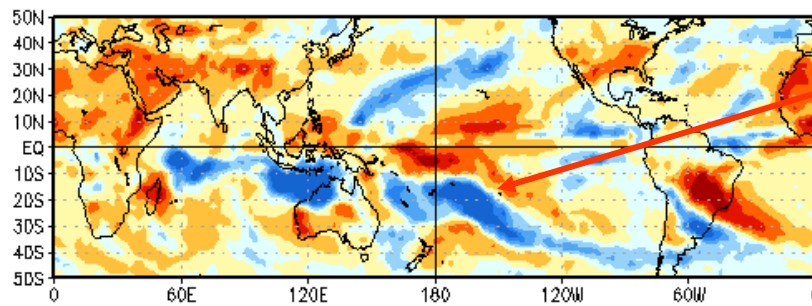
OLR Anomalies  
10 FEB 2007 to 19 FEB 2007



20 FEB 2007 to 1 MAR 2007



2 MAR 2007 to 11 MAR 2007



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

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

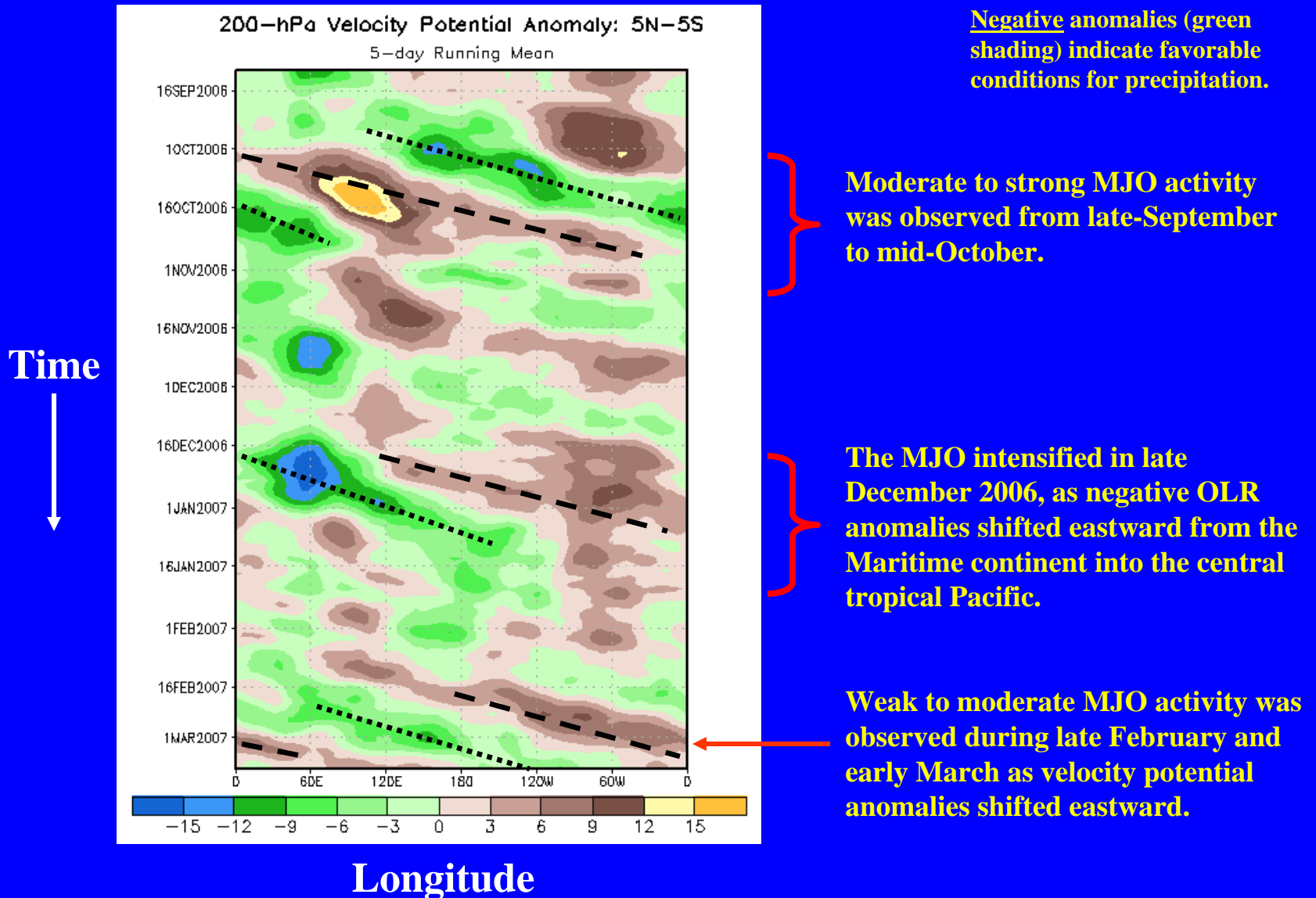
**During mid February, dry conditions prevailed across sections of the eastern Indian Ocean, Maritime continent, and Australia.**

**During late February and early March, enhanced convection developed across the southern Maritime continent, northern Australia and adjacent waters and extended eastward to include the South Pacific Convergence Zone.**

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

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

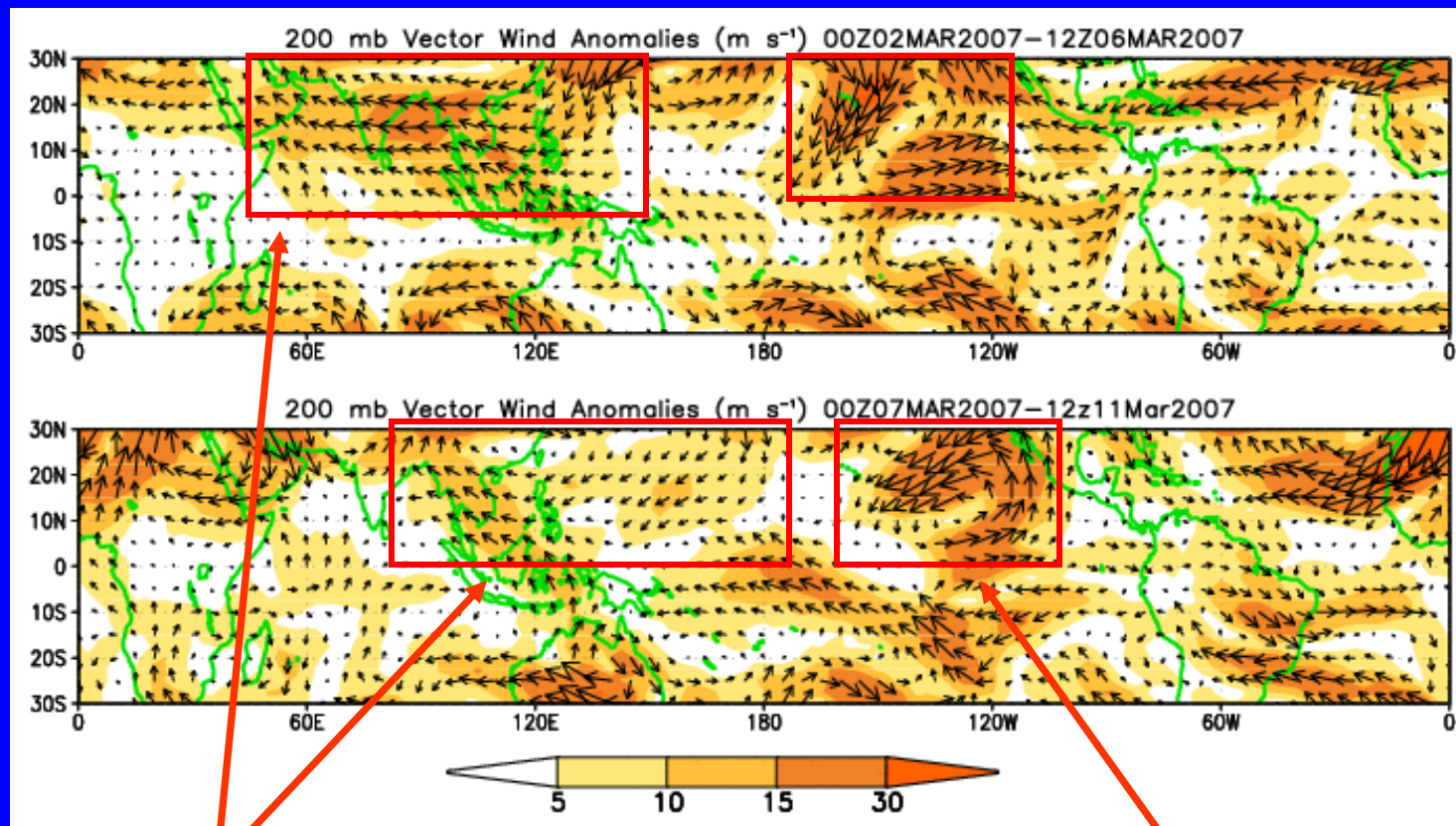
Negative anomalies (green shading) indicate favorable conditions for precipitation.





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

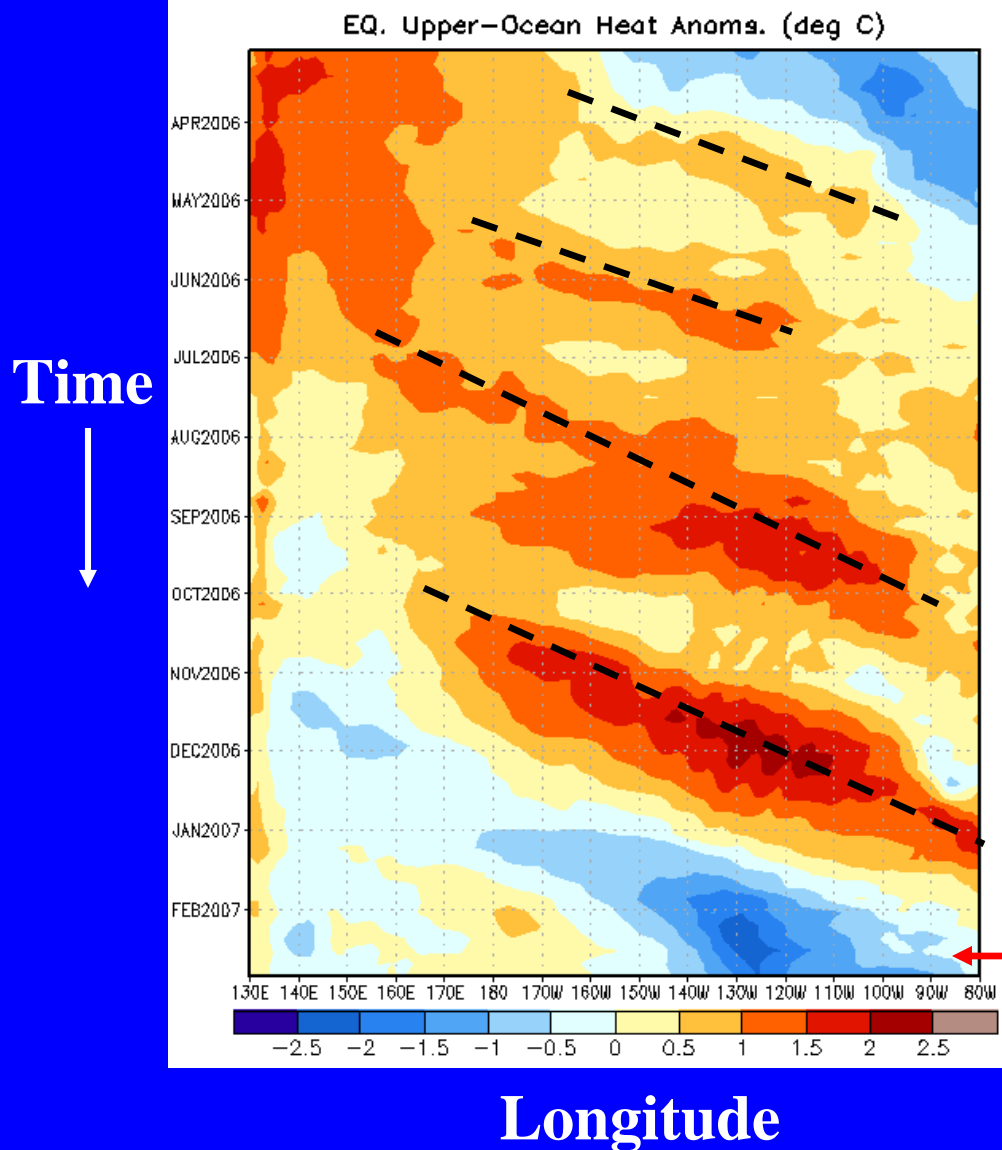
Note that shading denotes the magnitude of the anomalous wind vectors.



**Anomalous anti-cyclonic circulation in the Eastern Hemisphere has shifted east and weakened.**

**Anomalous upper-level cyclonic circulation centered near Hawaii persists but has weakened and shifted slightly eastward.**

# 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.

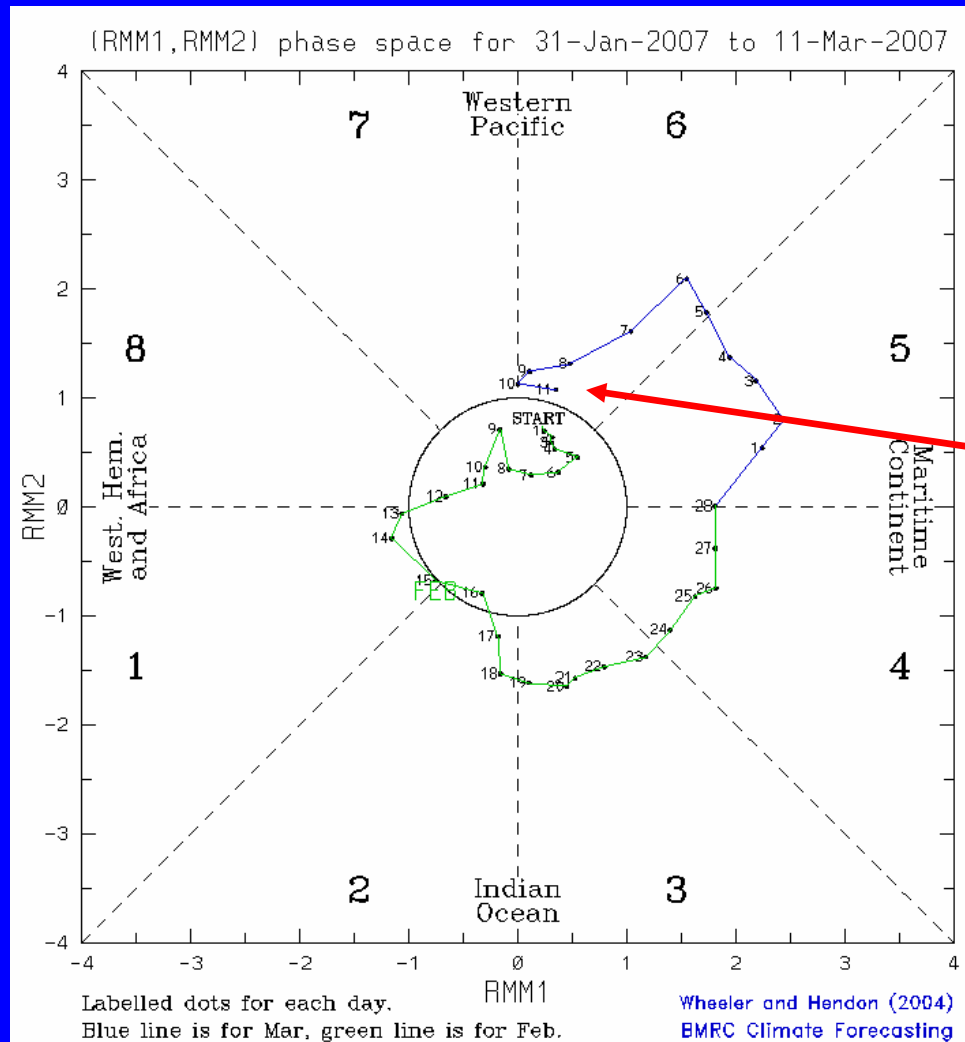
During this period eastward-propagating Kelvin waves (warm phases indicated by dashed lines) have caused considerable month-to-month variability in the upper-ocean heat content.

Recently, negative heat content anomalies are evident across the eastern equatorial Pacific.

# MJO Index (Magnitude and Phase)

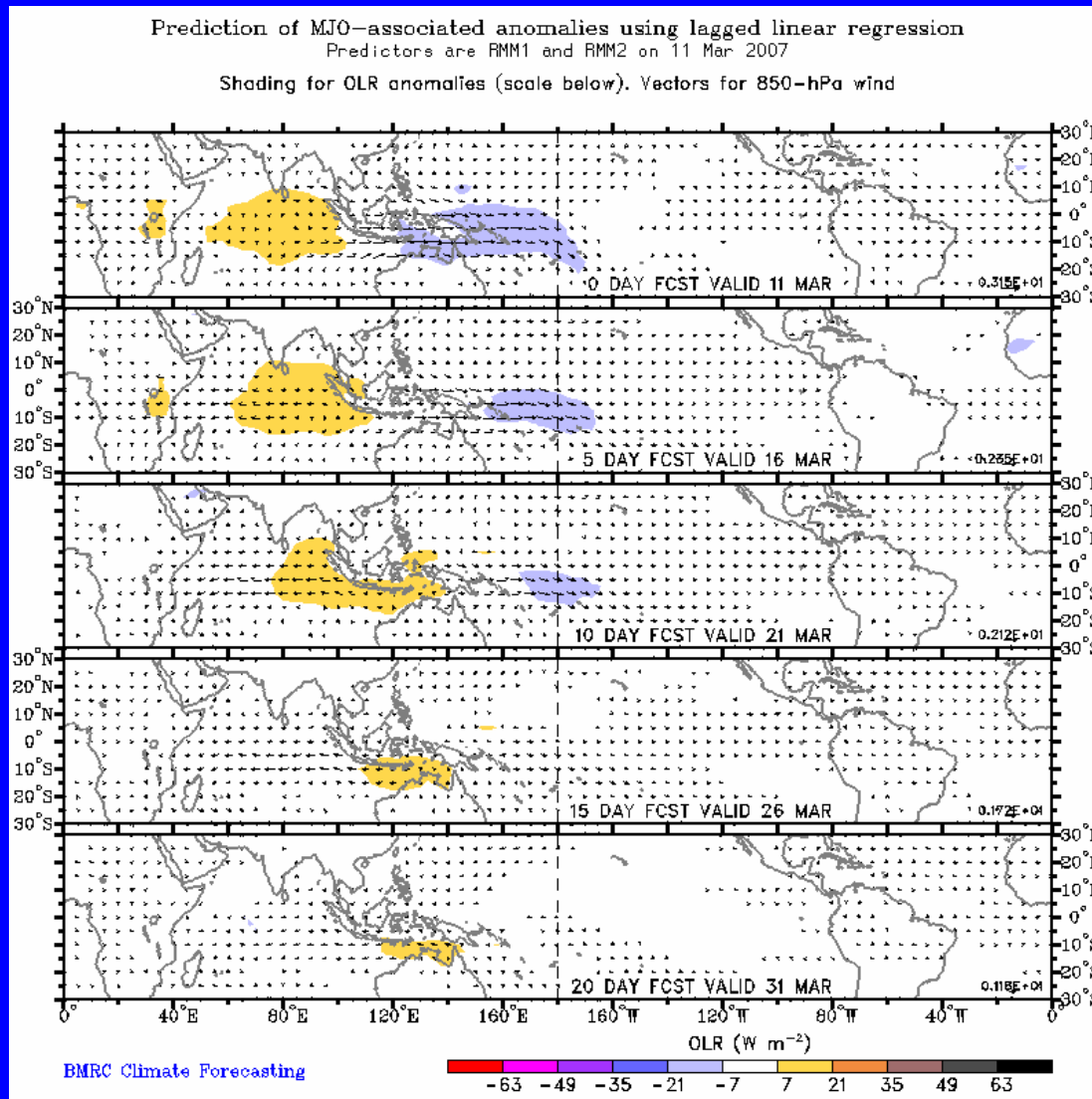
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850-hPa zonal wind, 200- hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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 a weakening MJO.

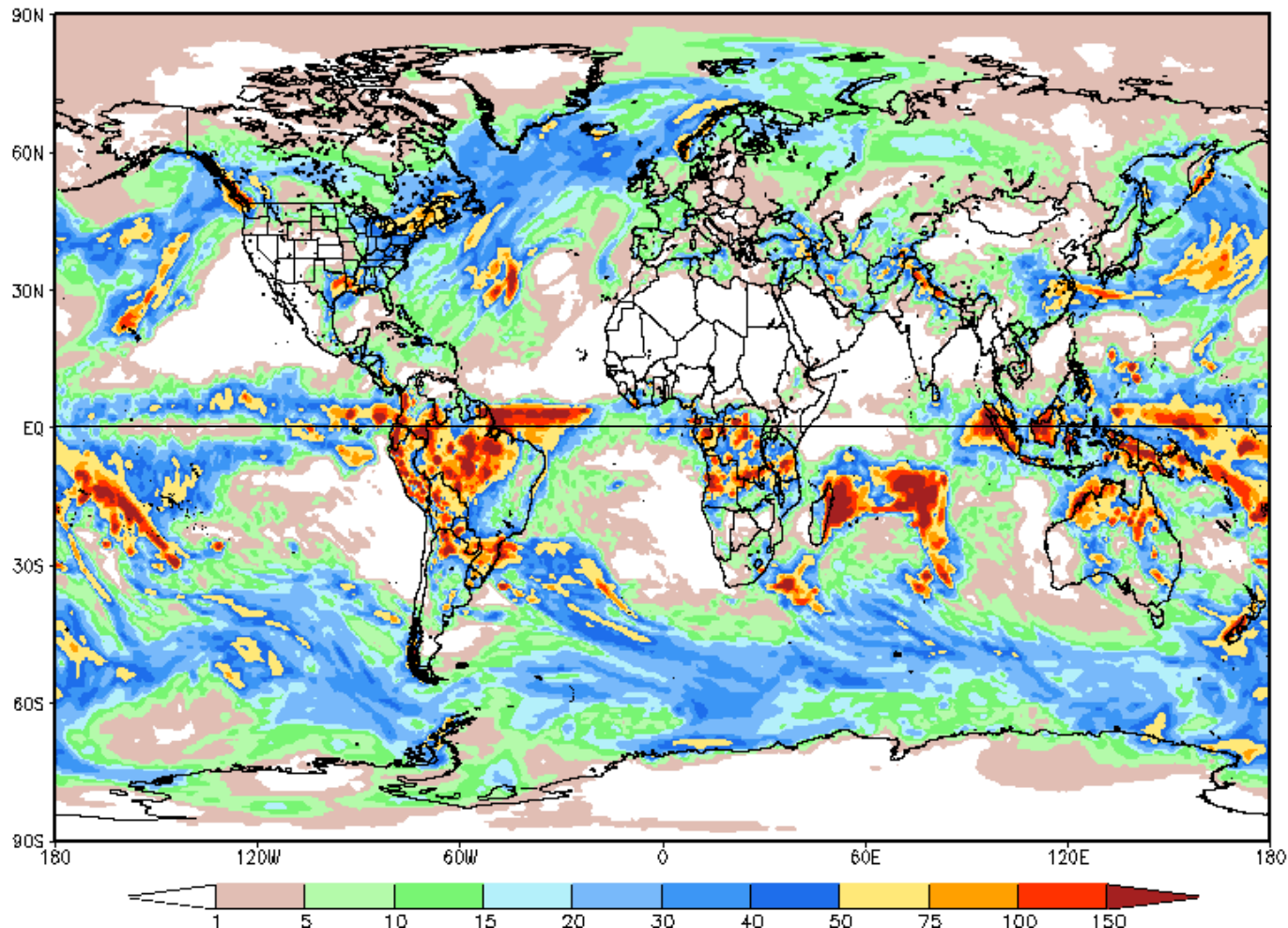
# Statistical OLR MJO Forecast



The forecast indicates weak enhanced convection for the western Pacific Ocean and drier than normal conditions for the Indian Ocean during the next 5-10 days.

# Global Forecast System (GFS) Week 1 Precipitation Forecast

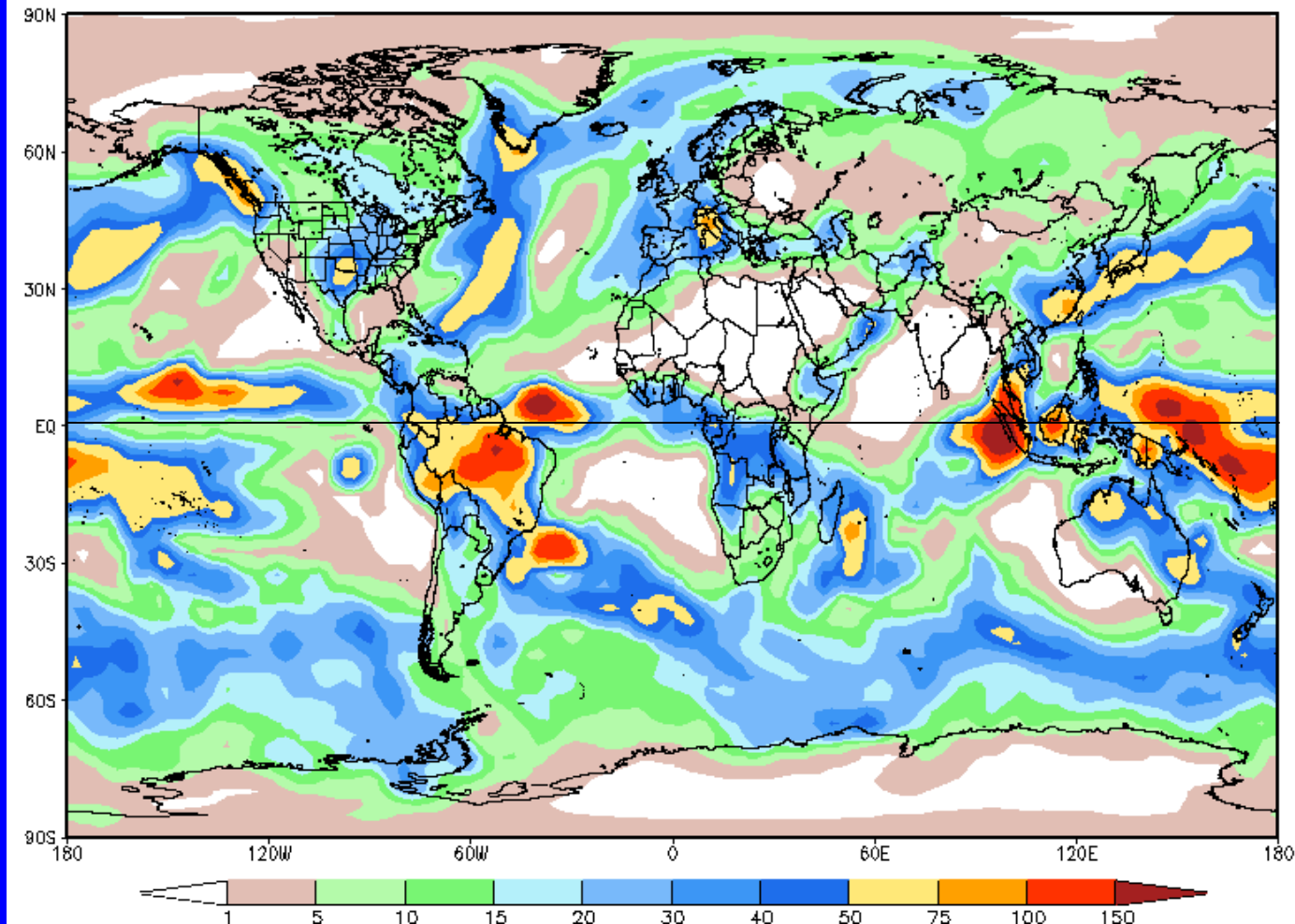
NOAA GFS 37.5 km Week 1 Total Precipitation (mm)  
Issued at Mar 12 2007 00Z for the period ending at Mar 19 2007 00Z



# Global Forecast System (GFS) Week 2

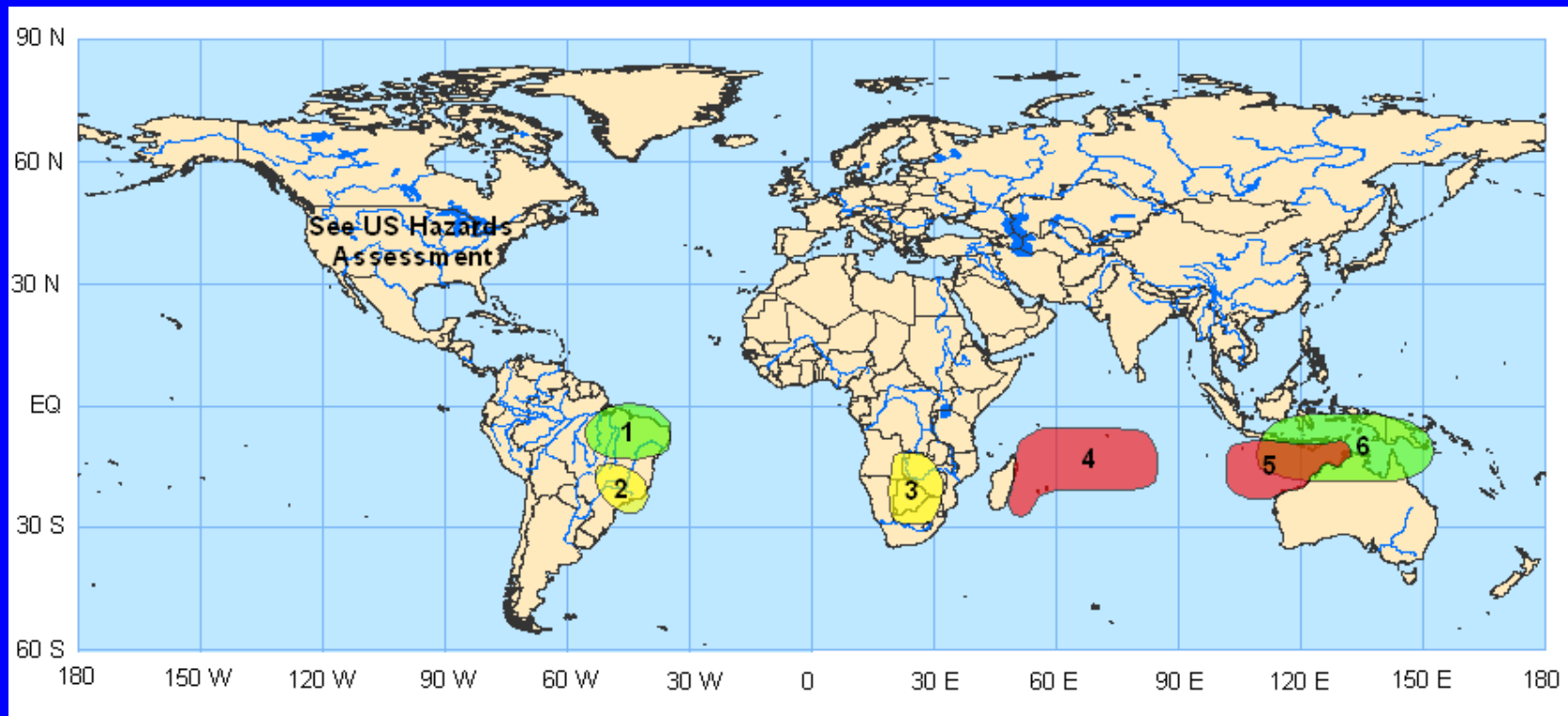
## Precipitation Forecast

NOAA GFS 100 km Week 2 Total Precipitation (mm)  
Issued Mar 12 2007 00Z for the period ending at Mar 25 2007 00Z



# Potential Benefits/Hazards – Week 1

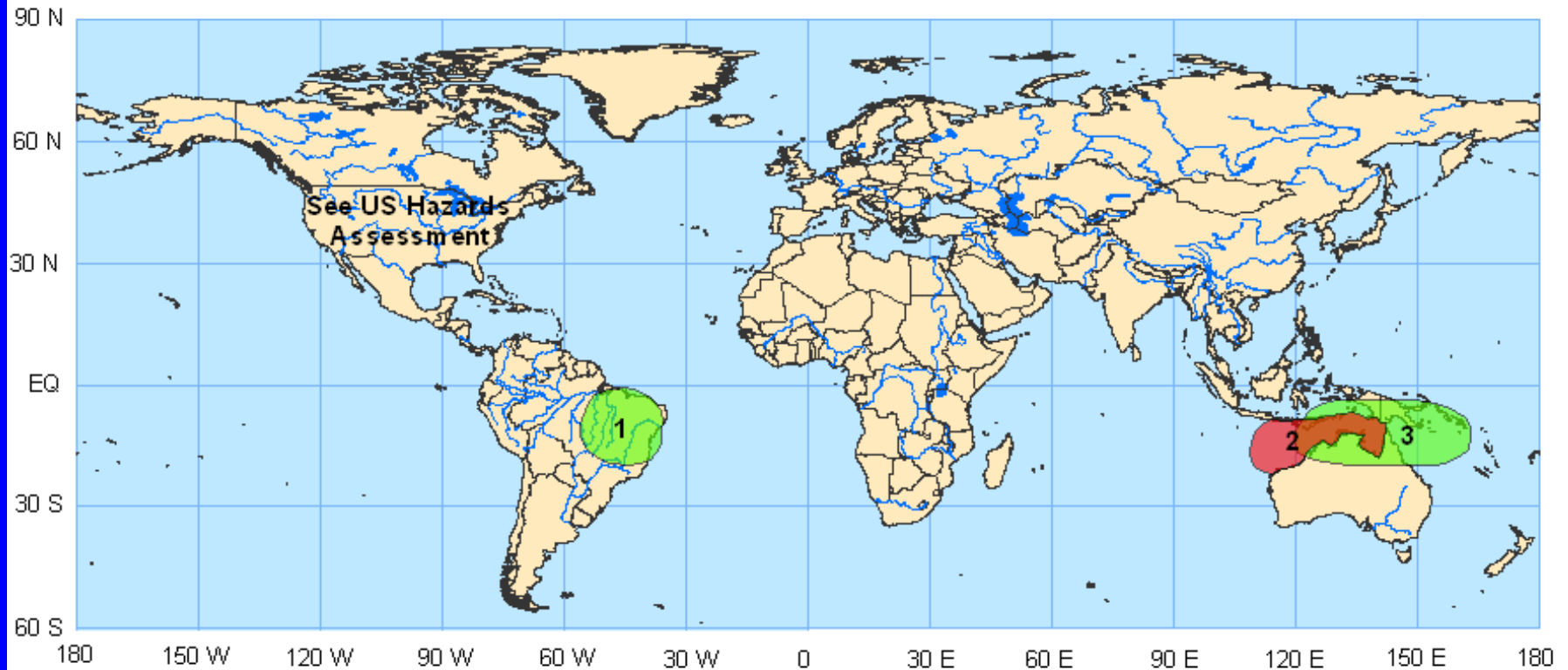
Valid: 13-19 March 2007



- 1. An increased chance of above normal rainfall in northeast Brazil.**
- 2. An increased chance of below normal rainfall in sections of eastern Brazil.**
- 3. An increased chance of below normal rainfall in sections of southern Africa.**
- 4. Conditions are expected to be favorable for tropical cyclogenesis in the western Indian Ocean. Tropical Cyclone Indlada will impact the Indian Ocean just east of Madagascar.**
- 5. Conditions are expected to be favorable for tropical cyclogenesis in the eastern Indian Ocean.**
- 6. An increased chance of above normal rainfall across the southern Maritime continent and northern Australia.**

# Potential Benefits/Hazards – Week 2

Valid: 20-26 March 2007



1. An increased chance of above normal rainfall in northeast Brazil.
2. Conditions are expected to be favorable for tropical cyclogenesis in the eastern Indian Ocean and areas north of Australia.
3. An increased chance of above normal rainfall across sections of the Maritime continent and northern Australia.



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