

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

**Update prepared by
Climate Prediction Center / NCEP
February 19, 2007**

Outline

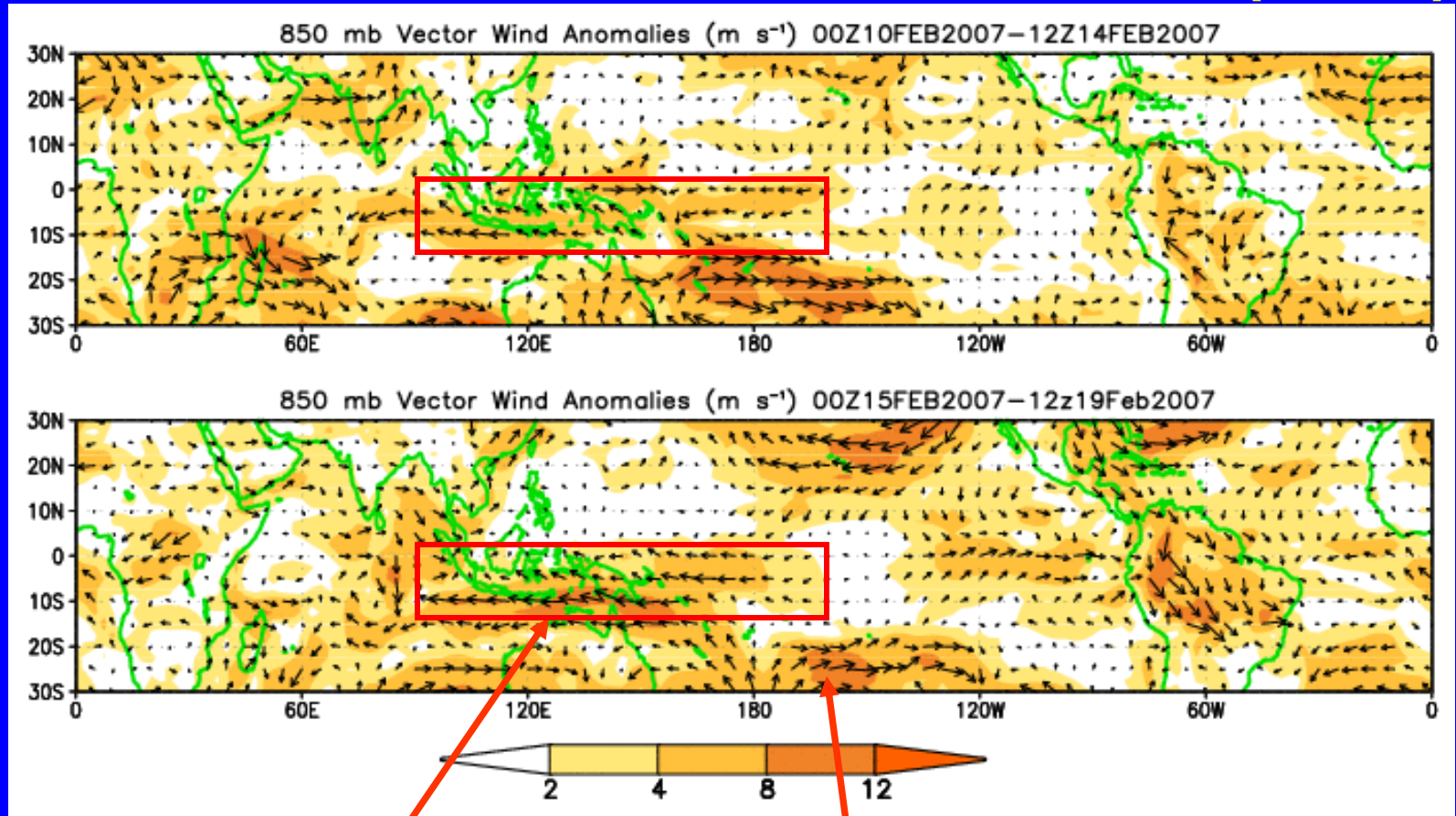
- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**

Overview

- **The latest observations indicate that the MJO is weak.**
- **Tropical Cyclone Favio will impact Mozambique during week 1.**
- **During both weeks 1 and 2, there is an increased chance for above-normal rainfall extending from south-east Africa to the central Indian Ocean. Conditions will remain favorable for tropical cyclogenesis in the Indian Ocean.**
- **Additional impacts for week 1 include an increased chance of below-normal rainfall for southern parts of the Maritime Continent and northern Australia. Also, there is an increased chance of above-normal rainfall for northeastern Brazil.**

850-hPa Vector Wind Anomalies (m s^{-1})

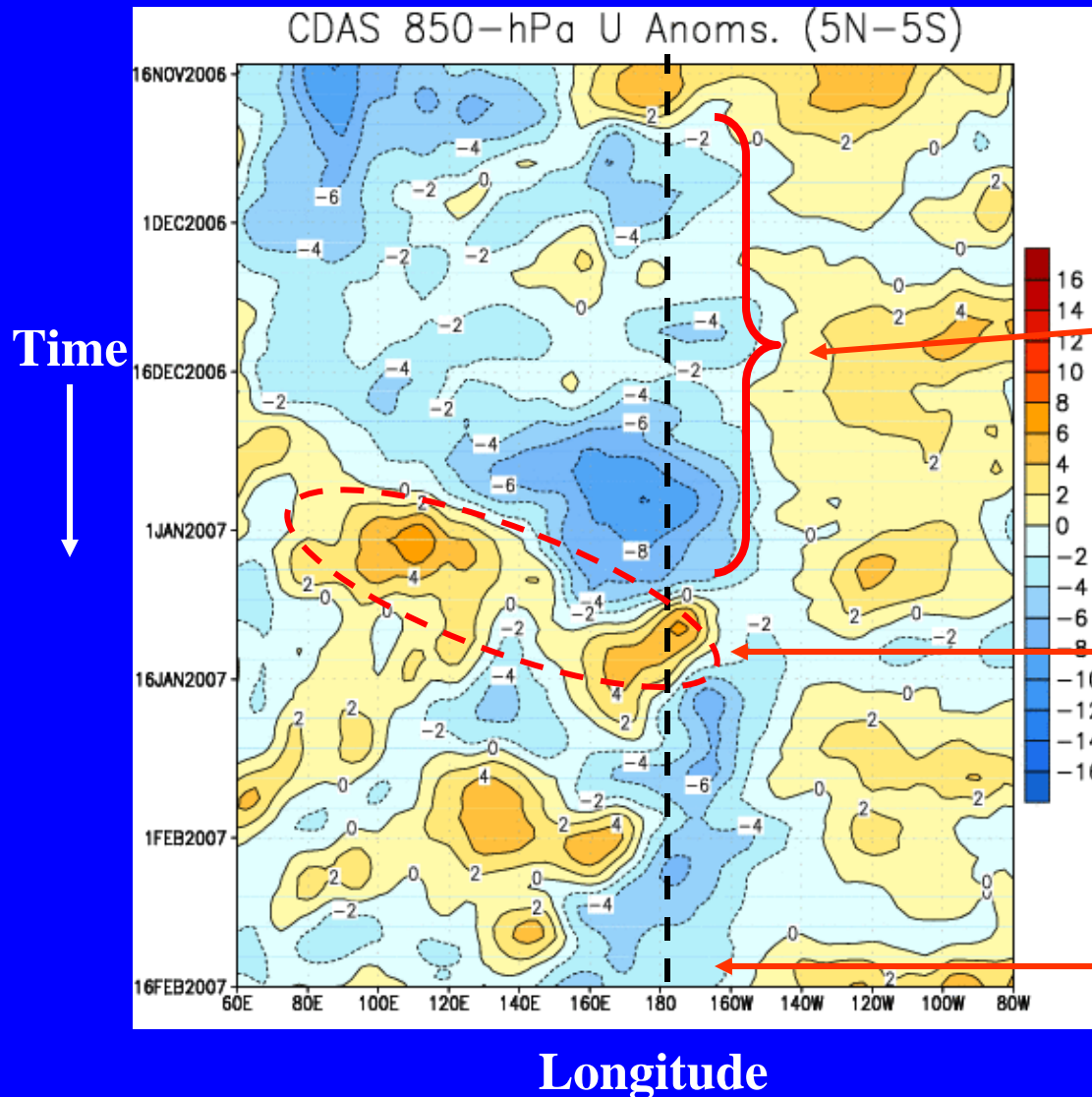
Note that shading denotes the magnitude of the anomalous wind vectors



Anomalous easterlies have emerged throughout the equatorial region extending from the eastern Indian Ocean to the central Pacific Ocean.

Enhanced westerly anomalies persist south of the equator in the Pacific Ocean.

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



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

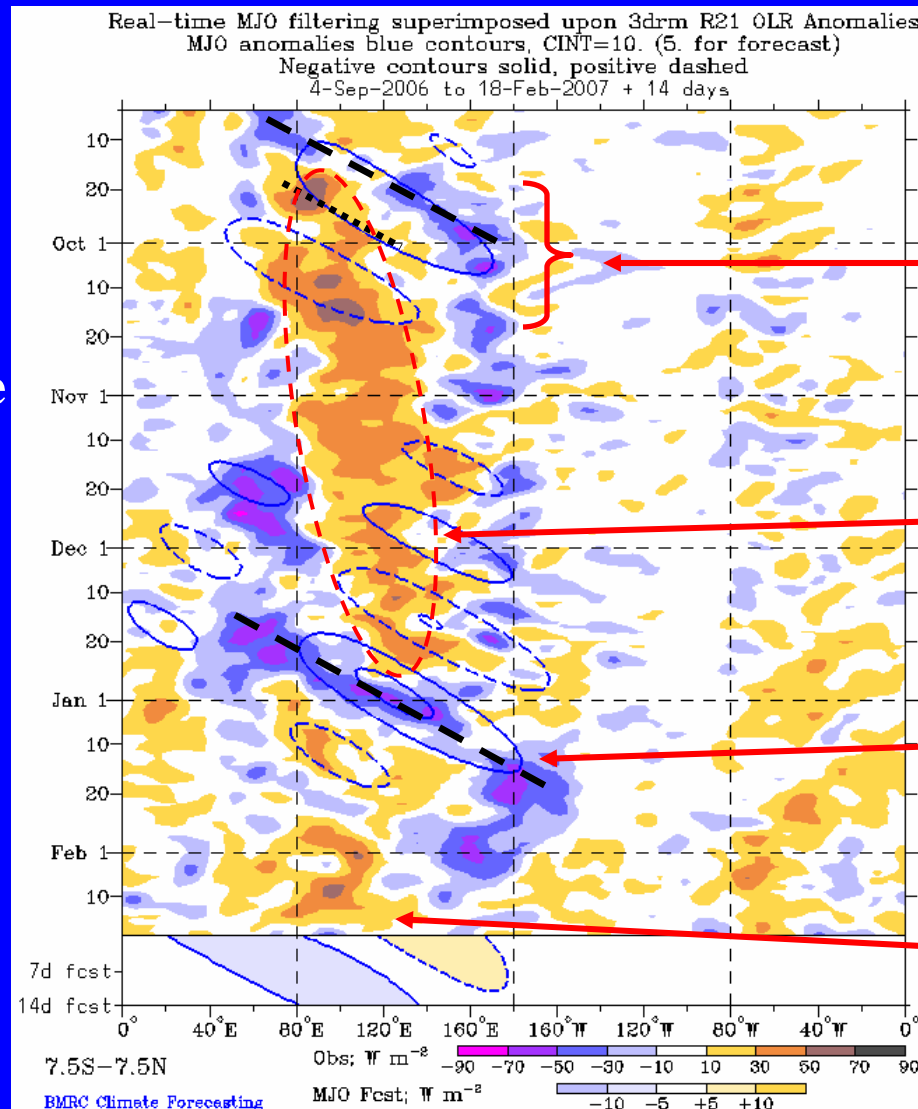
Easterly anomalies (blue shading) represent anomalous east-to-west flow.

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.

Easterly anomalies are persisting near the Date Line.

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)

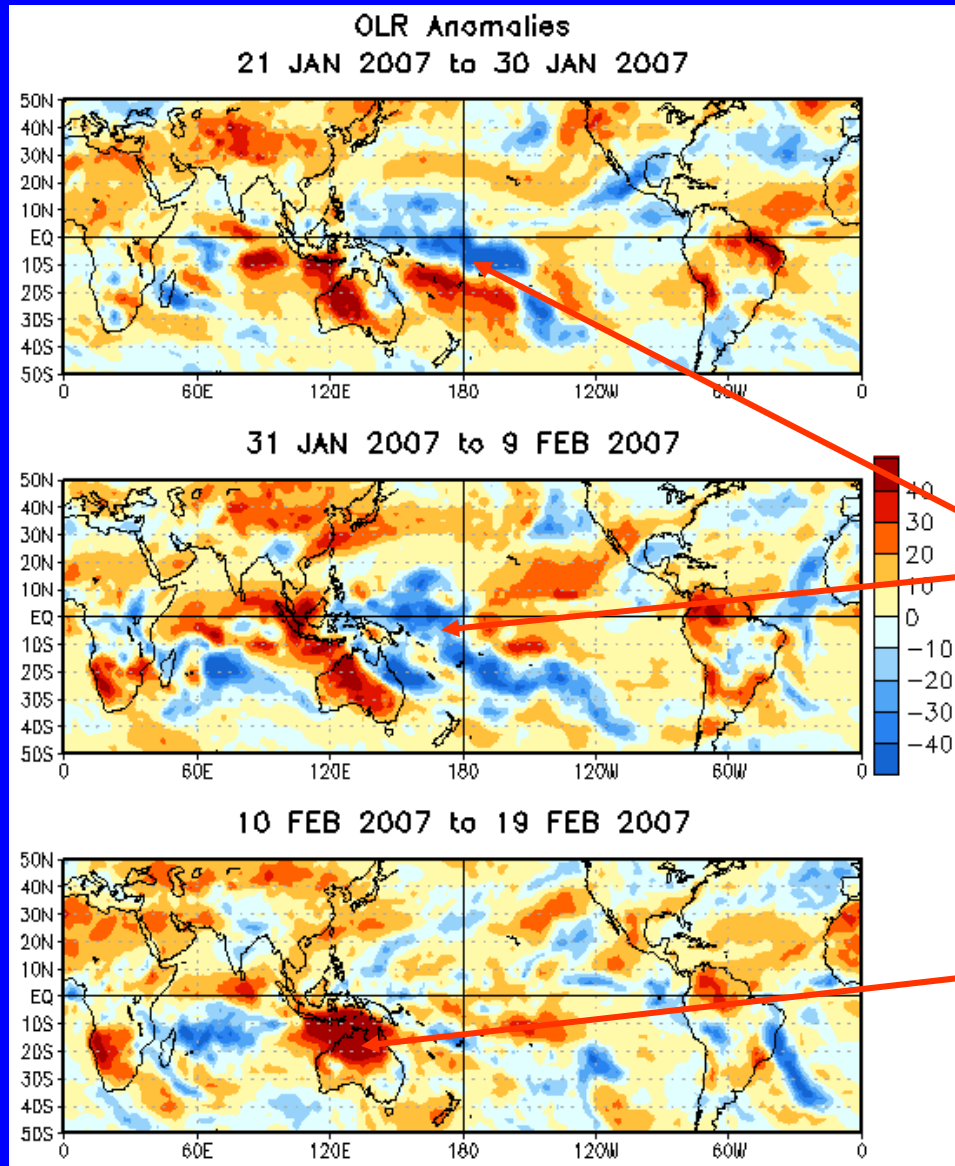
Negative OLR anomalies associated with the MJO propagated eastward beginning in early September.

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

Recently, suppressed convection has persisted near the Maritime Continent and Indian Ocean.

Anomalous OLR: Last 30 days



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

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

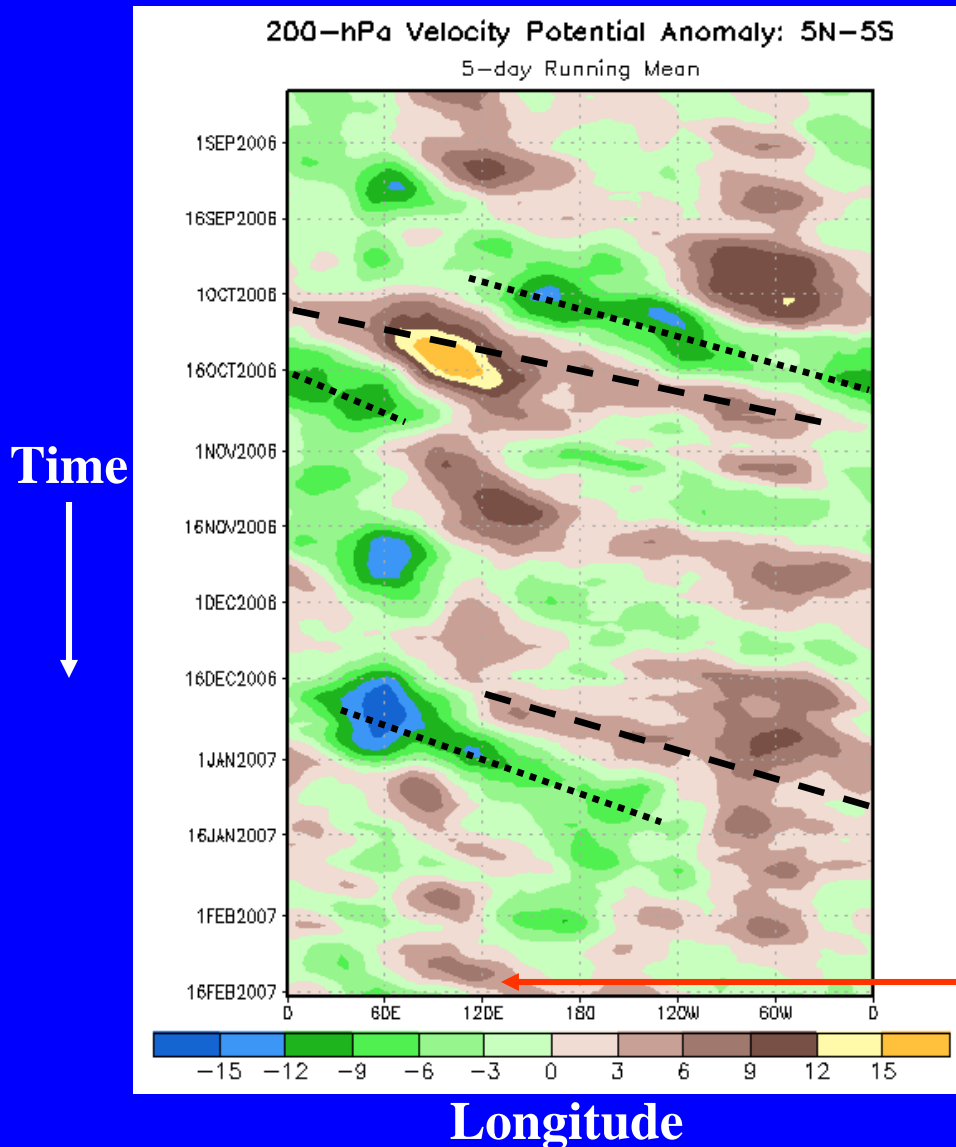
During the later half of January and early February, an area of enhanced convection persisted near and west of the Date Line. The region in the eastern Indian Ocean and western Maritime Continent have had suppressed convection.

The area of suppressed convection is now centered over northern Australia and southern portions of the Maritime Continent. Enhanced convection is located in the central Indian Ocean, south of the equator.

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.

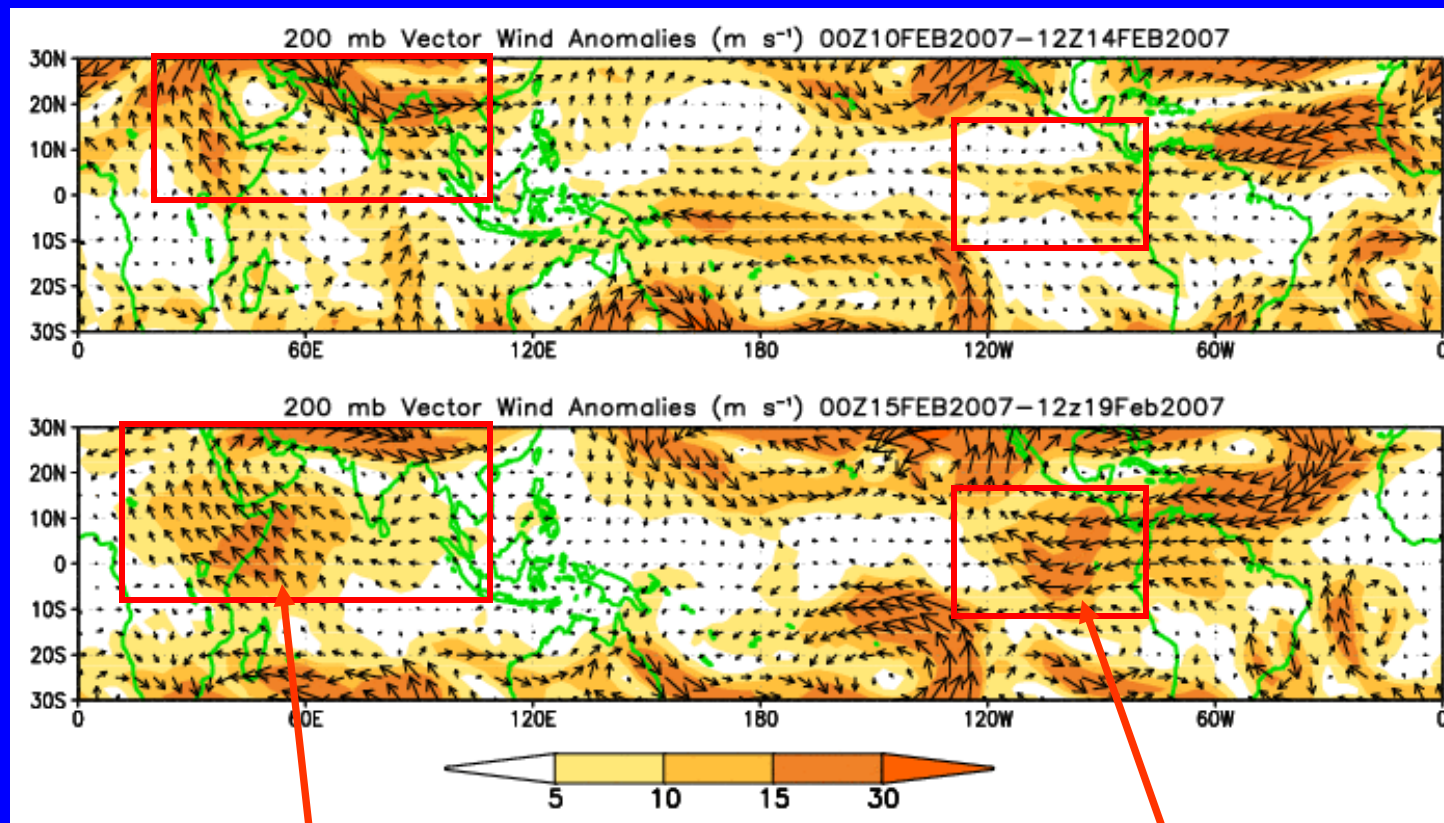
Moderate to strong MJO activity was observed from late-September to mid-October.

The MJO 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 near the Indian Ocean and Maritime Continent.

200-hPa Vector Winds and Anomalies (m s^{-1})

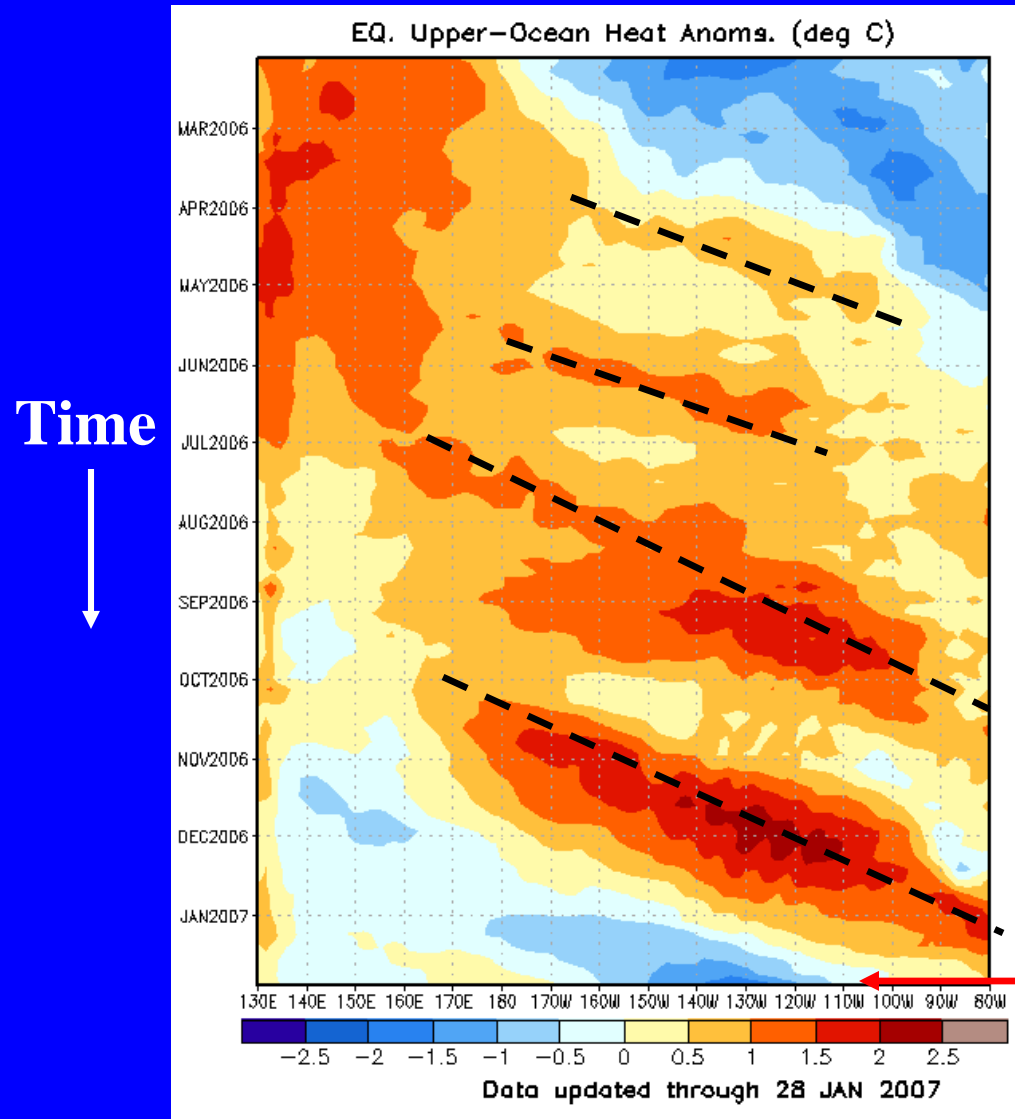
Note that shading denotes the magnitude of the anomalous wind vectors.



The anomalous upper-level anticyclone has shifted eastward.

Anomalous upper-level easterlies have strengthened 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.

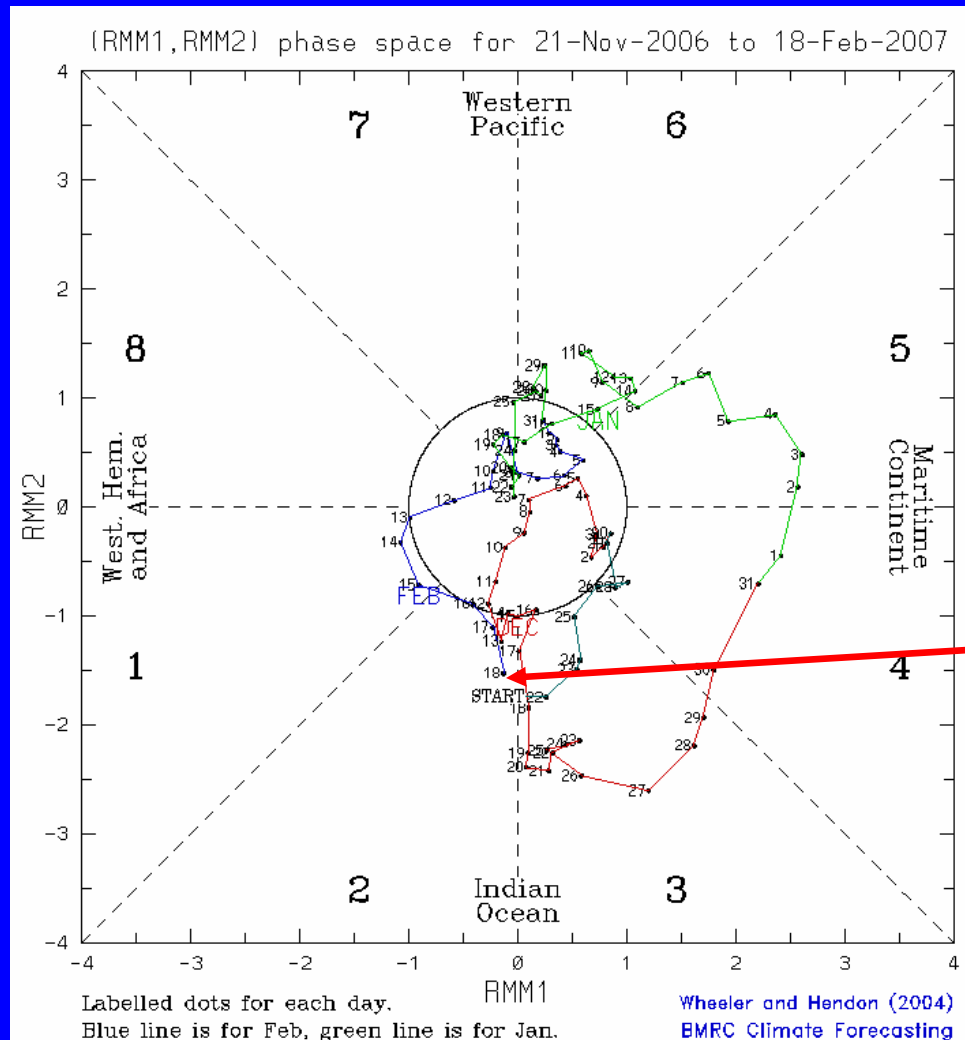
During this period eastward-propagating Kelvin waves (warm phases indicated by dashed lines) have caused considerable month-to-month variability in the upper-ocean heat content.

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.

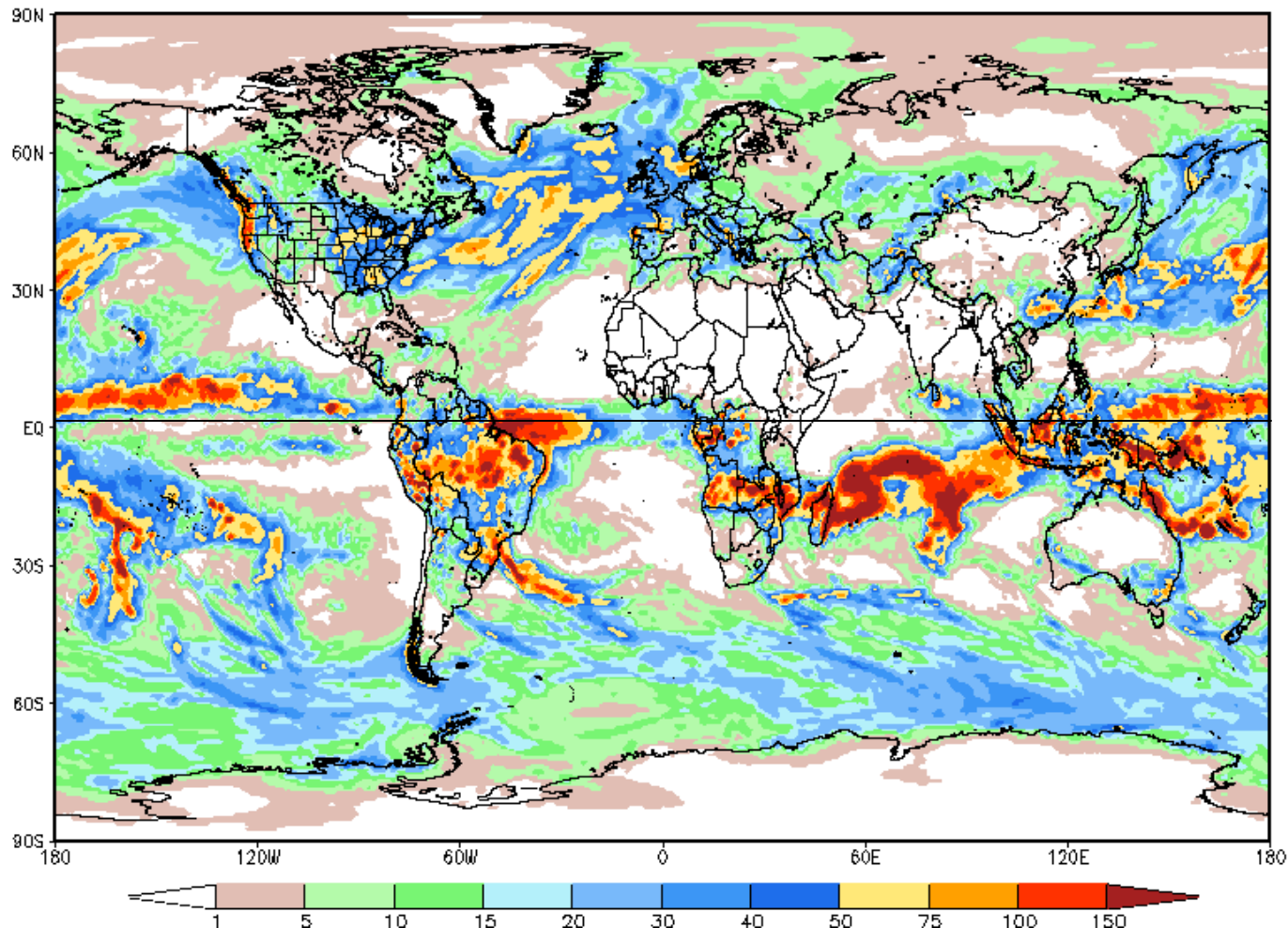


The MJO index indicates weak MJO activity.

Global Forecast System (GFS) Week 1

Precipitation Forecast

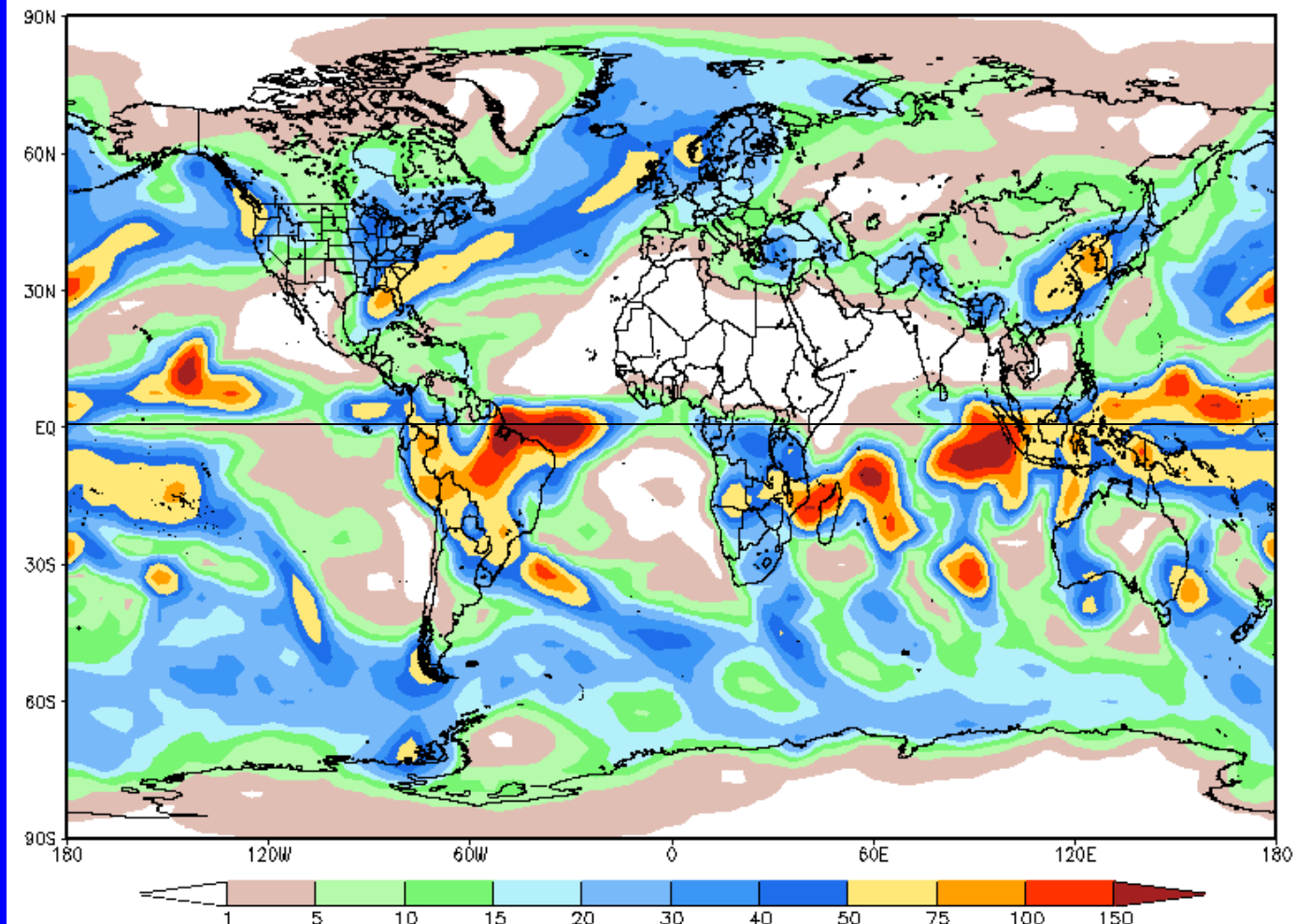
NOAA GFS 37.5 km Week 1 Total Precipitation (mm)
Issued at Feb 20 2007 00Z for the period ending at Feb 27 2007 00Z



Global Forecast System (GFS) Week 2

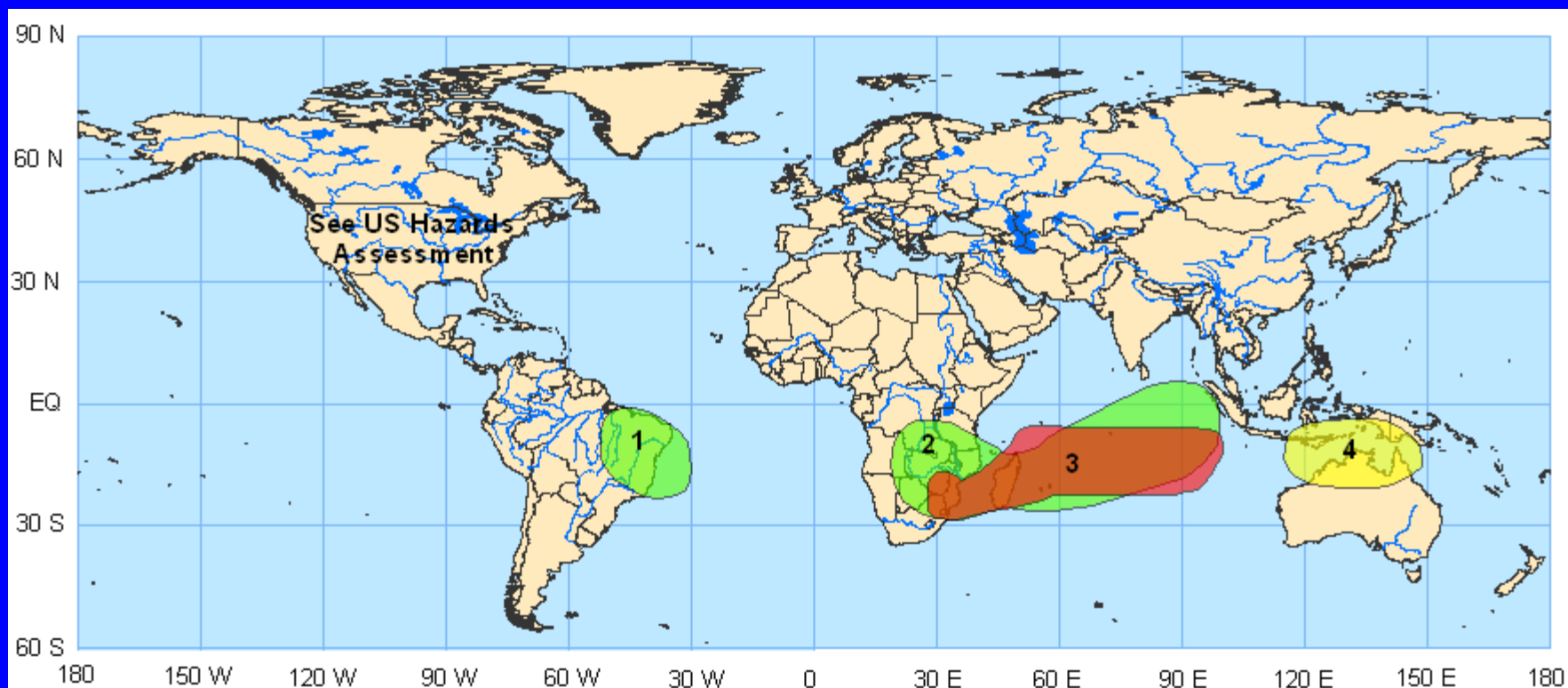
Precipitation Forecast

NOAA GFS 100 km Week 2 Total Precipitation (mm)
Issued Feb 20 2007 00Z for the period ending at Mar 5 2007 00Z



Potential Benefits/Hazards – Week 1

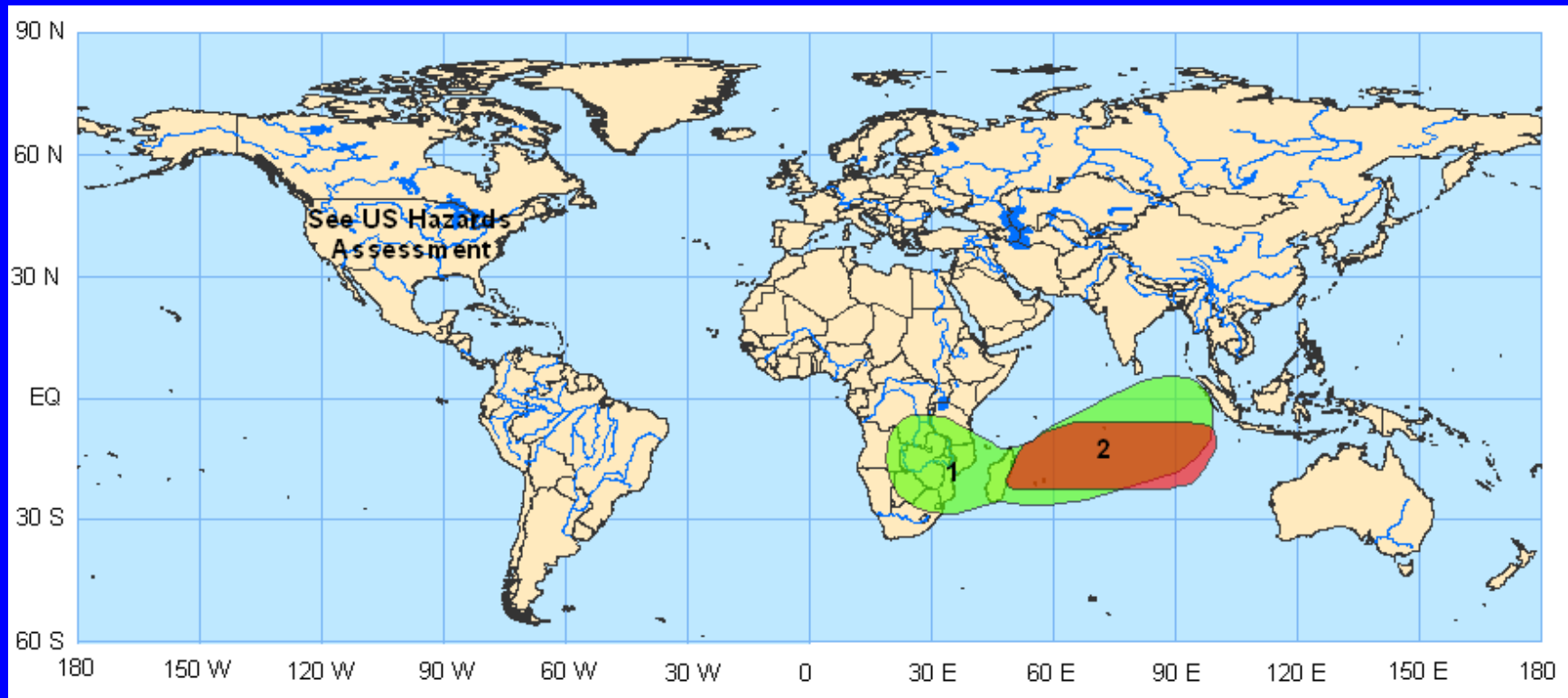
Valid 20 February- 26 February 2007



- 1. An increased chance for above normal rainfall for northeastern Brazil.**
- 2. An increased chance for above normal rainfall extending from south-east Africa to the central Indian Ocean.**
- 3. Conditions favorable for tropical cyclogenesis near Madagascar and the central Indian Ocean. Tropical Cyclone Favio will impact Mozambique.**
- 4. An increased chance for below normal rainfall for southern regions of the Maritime Continent and northern Australia.**

Potential Benefits/Hazards – Week 2

Valid 27 February- 5 March 2007



1. An increased chance for above normal rainfall extending from south-east Africa to the central Indian Ocean.
2. Conditions favorable for tropical cyclogenesis in the Indian Ocean.

Summary

- **The latest observations indicate that the MJO is weak.**
- **Tropical Cyclone Favio will impact Mozambique during week 1.**
- **During both weeks 1 and 2, there is an increased chance for above-normal rainfall extending from south-east Africa to the central Indian Ocean. Conditions will remain favorable for tropical cyclogenesis in the Indian Ocean.**
- **Additional impacts for week 1 include an increased chance of below-normal rainfall for southern parts of the Maritime Continent and northern Australia. Also, there is an increased chance of above-normal rainfall for northeastern Brazil.**