



Madden-Julian Oscillation: Recent Evolution, Current Status and Forecasts

Update prepared by
Climate Prediction Center / NCEP
June 12, 2006



Outline

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



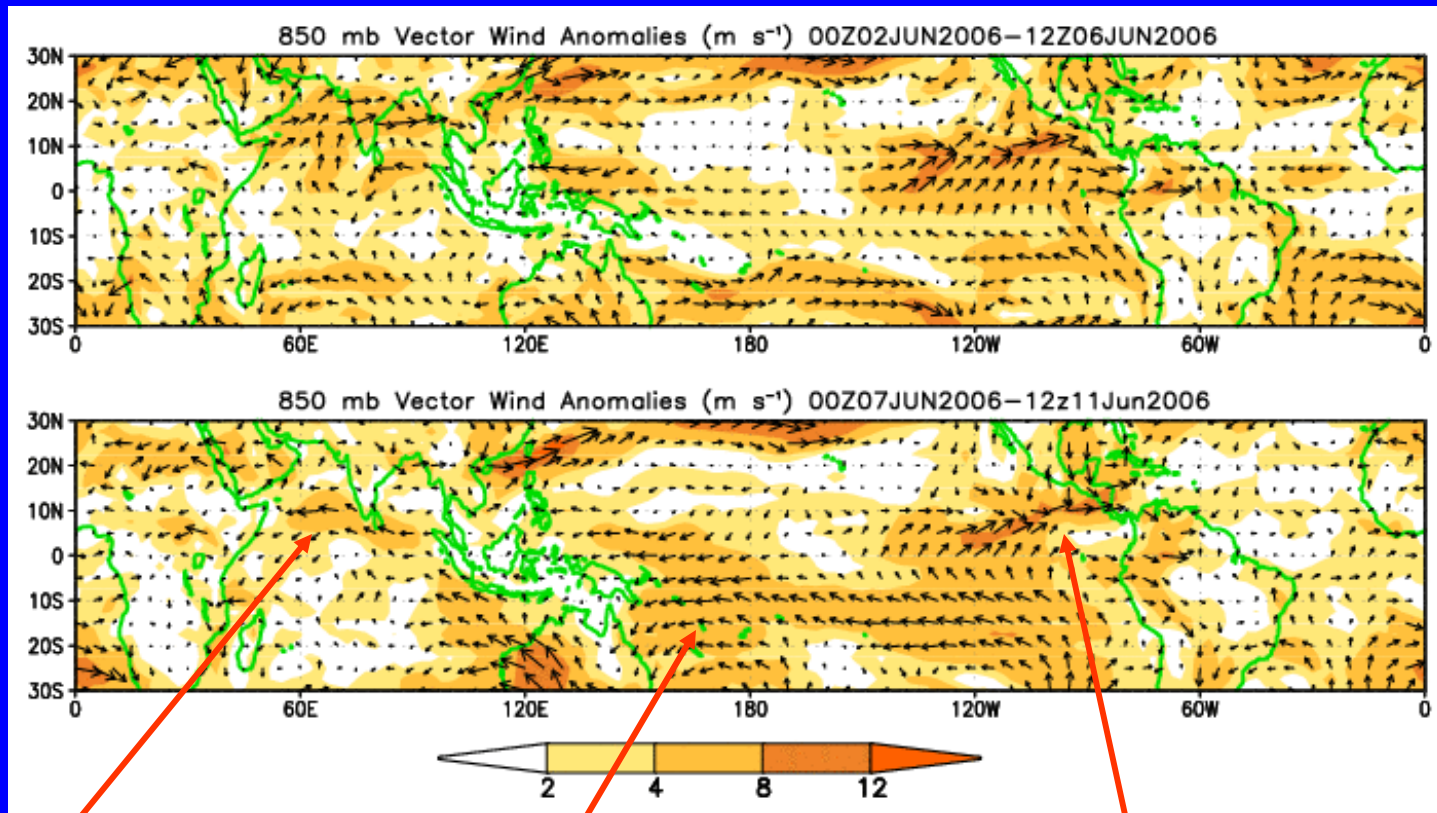
Overview

- The latest observations indicate a continued weak MJO.
- Based on the latest observations and model forecasts, the MJO is expected to remain weak during the next 1-2 weeks.
- Potential hazards during week 1 include an increased chance of above normal rainfall stretching from the eastern Indian Ocean into the western Pacific including sections of the Maritime Continent and southeast Asia, the Philippines and southern Japan. Wet conditions are also expected for the equatorial Atlantic and sections of central Africa while drier than normal conditions will impact the south-central US. Tropical storm Alberto will impact Florida and coastal areas of the southeast US.
- Increased chances of above average rainfall are expected during week 2 for sections of the Maritime continent, southeast Asia, and the Philippines.



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

Note that shading denotes the magnitude of the anomalous wind vectors



Easterly anomalies now present in the Arabian Sea.

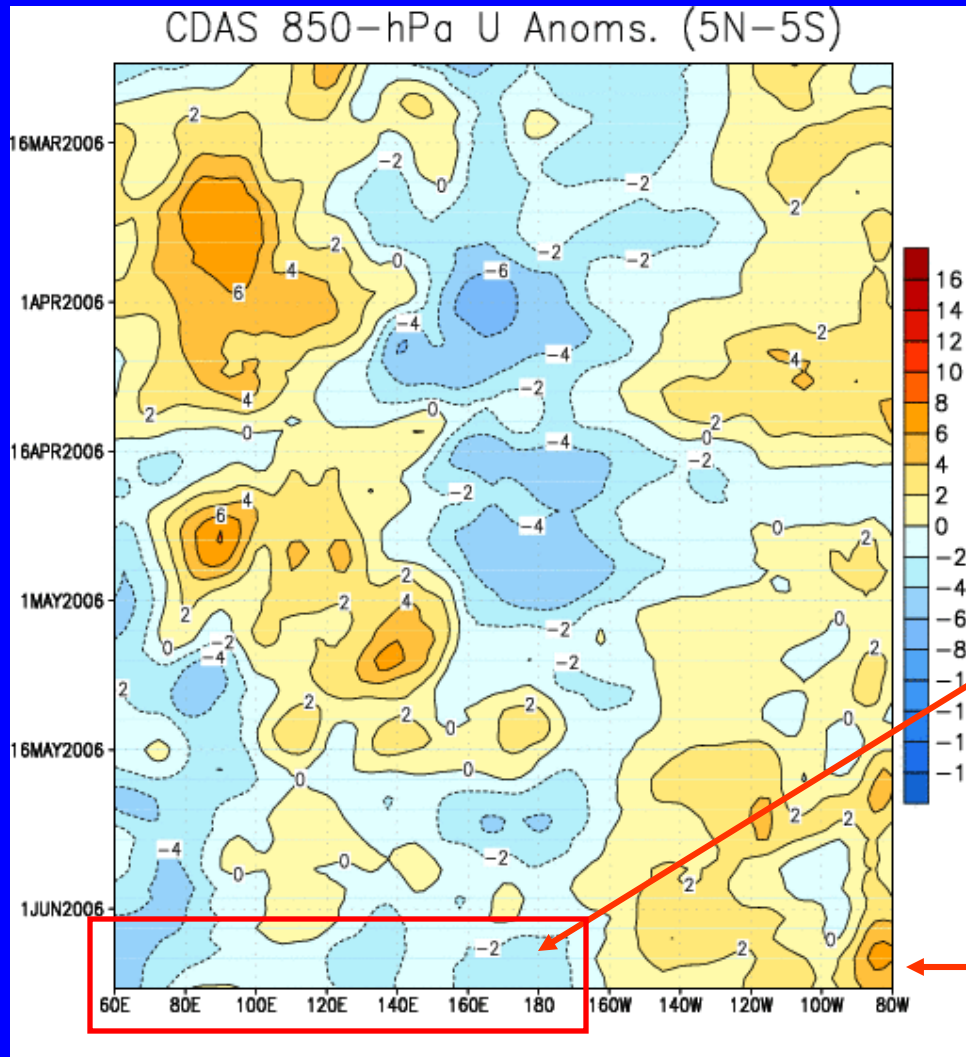
Easterly anomalies now cover a large area of the Pacific Ocean mainly south of the equator.

Westerly anomalies remain in the eastern Pacific.



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

Time



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

Stronger-than-average easterlies (blue shading)

Weak easterly anomalies are present in the Indian and western Pacific Oceans.

Westerly anomalies remain in the eastern Pacific Ocean.

Longitude

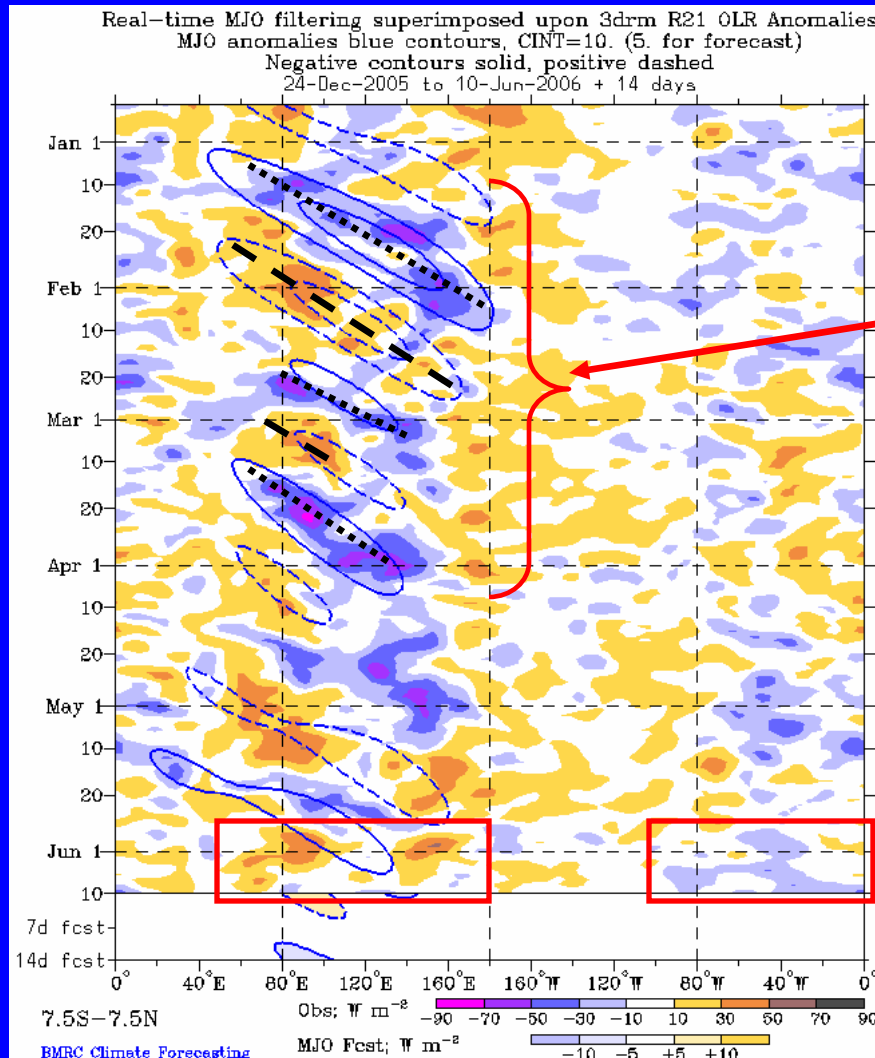


Outgoing Longwave Radiation (OLR) Anomalies (7.5°S-7.5°N)

Drier-than-average conditions (/red shading)

Wetter-than-average conditions (blue shading)

Time
↓



Eastward propagation of OLR anomalies associated with the MJO was evident from mid-January through March.

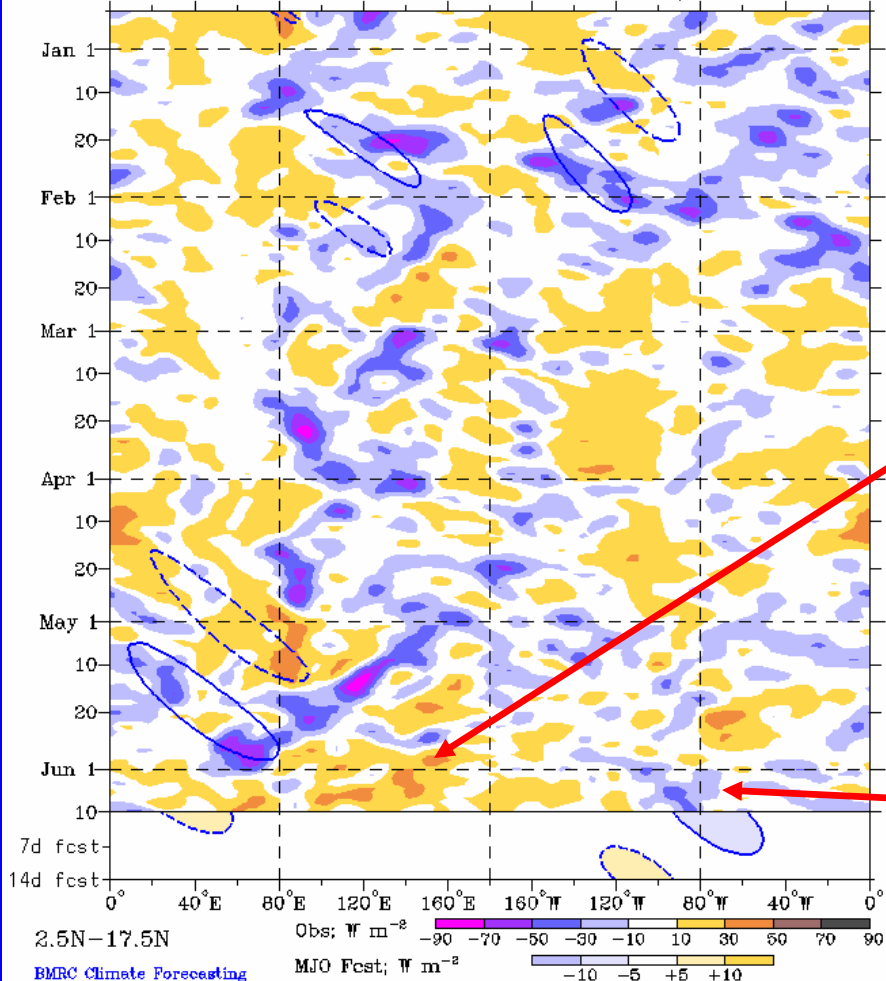
Suppressed (enhanced) convection has been evident across Indonesia/Western Pacific (South America/Atlantic) during the past 10-15 days.

Longitude



Outgoing Longwave Radiation (OLR) Anomalies (2.5°N-17.5°N)

Real-time MJO filtering superimposed upon 3drn R21 OLR Anomalies
MJO anomalies blue contours, CINT=10. (5. for forecast)
Negative contours solid, positive dashed
24-Dec-2005 to 10-Jun-2006 + 14 days



Drier-than-average conditions (/red shading)
Wetter-than-average conditions (blue shading)

Widespread suppressed convection across the western Pacific and now the Arabian Sea.

Enhanced convection continues in the eastern Pacific and Central America.

Time
↓

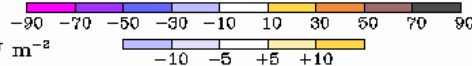
Longitude

2.5N-17.5N

BMRC Climate Forecasting

Obs: $W m^{-2}$

MJO Fcst: $W m^{-2}$

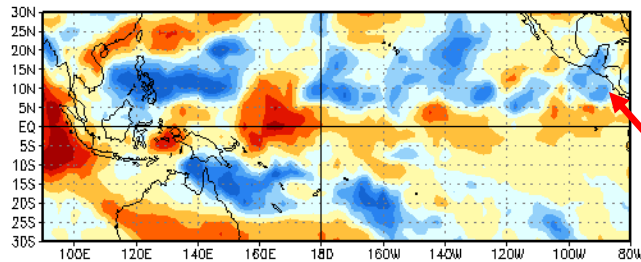




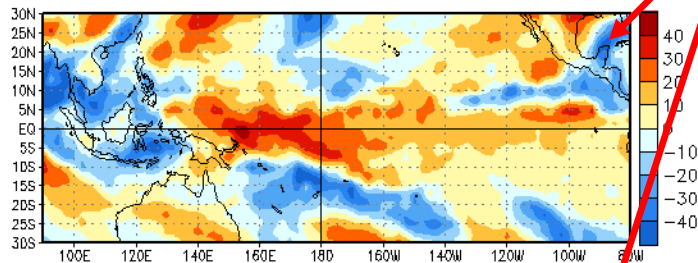
Anomalous OLR and 850-hPa Wind

Wind: Last 30 days

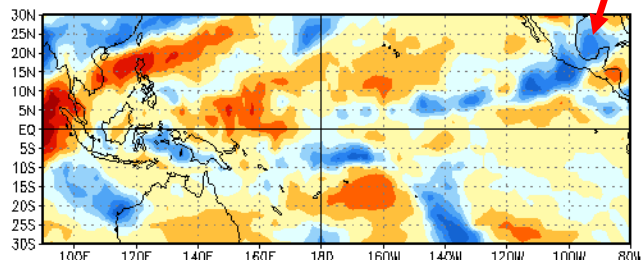
OLR Anomalies
6 MAY 2006 to 15 MAY 2006



16 MAY 2006 to 25 MAY 2006



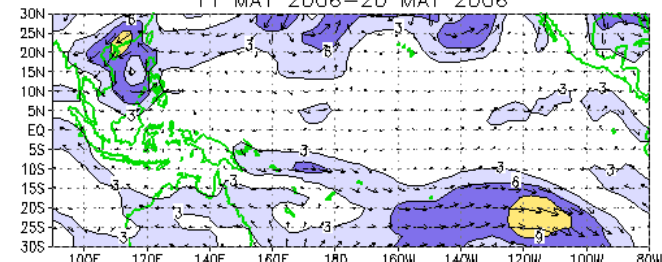
26 MAY 2006 to 4 JUN 2006



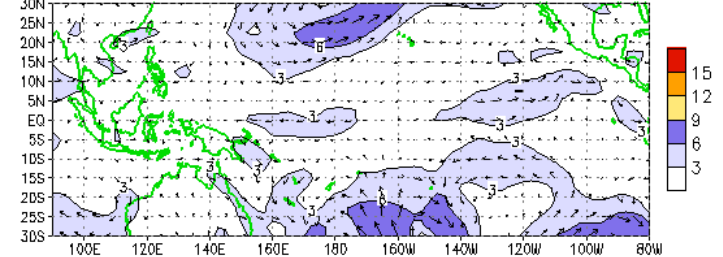
During the last 30 days the eastern Pacific, Mexico, and Central America have been wet.

Westerly anomalies have been evident in the eastern Pacific Ocean during the last 20 days.

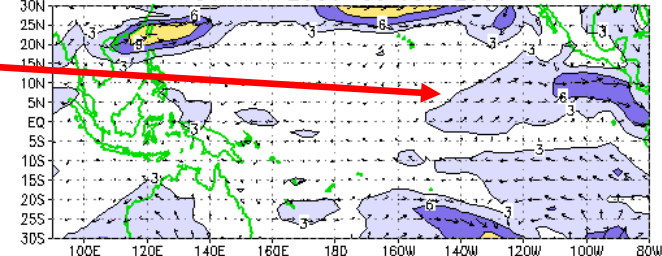
CDAS 850-hPa Wind Anoms
11 MAY 2006-20 MAY 2006



21 MAY 2006-30 MAY 2006



31 MAY 2006-09 JUN 2006

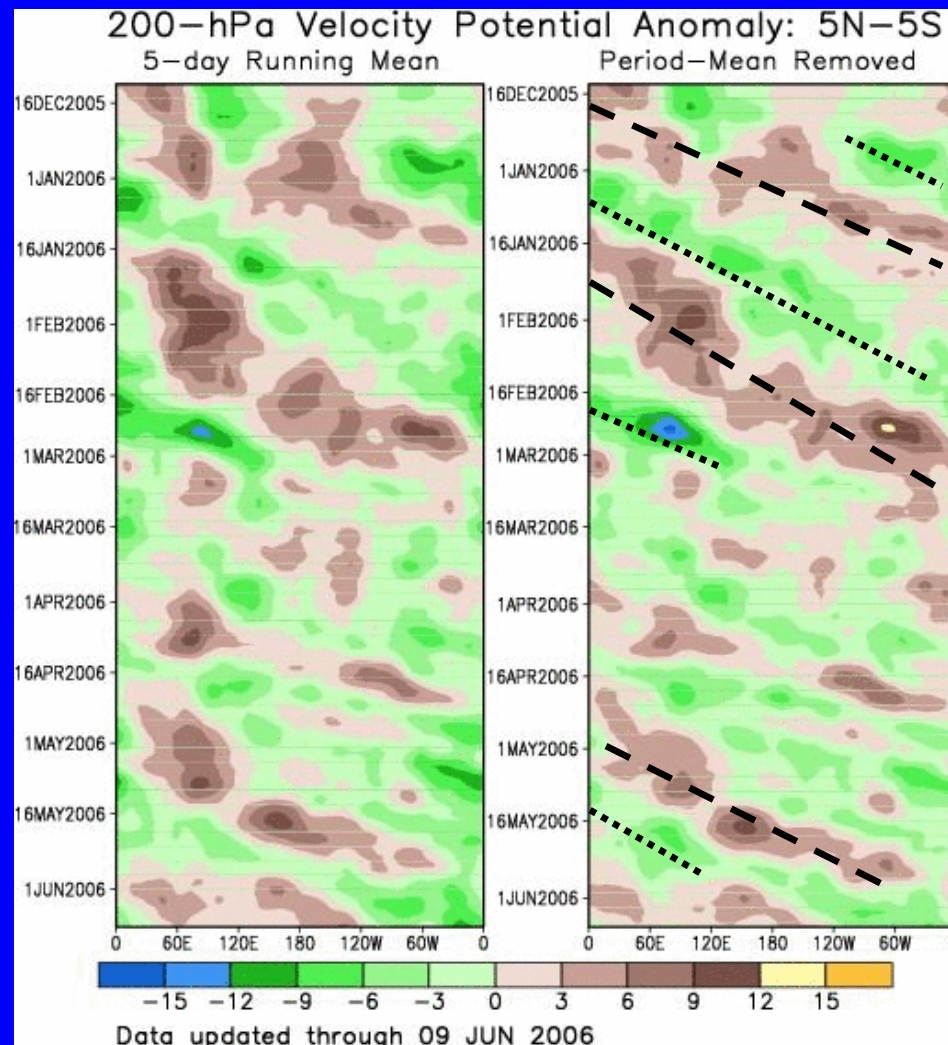




200-hPa Velocity Potential Anomalies (5°S-5°N)

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

Time



Weak to moderate MJO activity was observed during January and February.

The MJO was incoherent during much of March and April.

Some weak MJO activity has been observed during May.

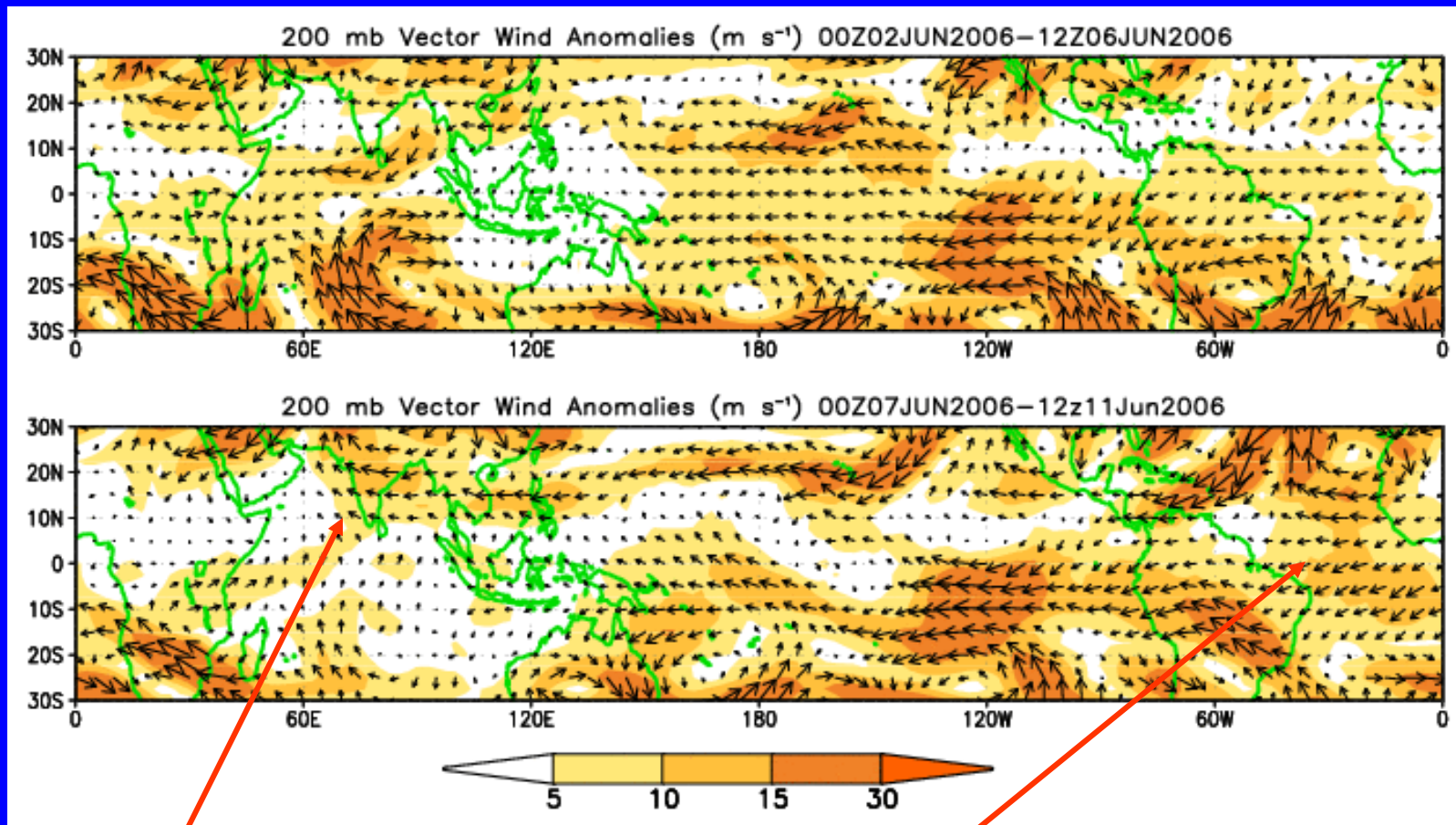
Longitude

Data updated through 09 JUN 2006



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

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



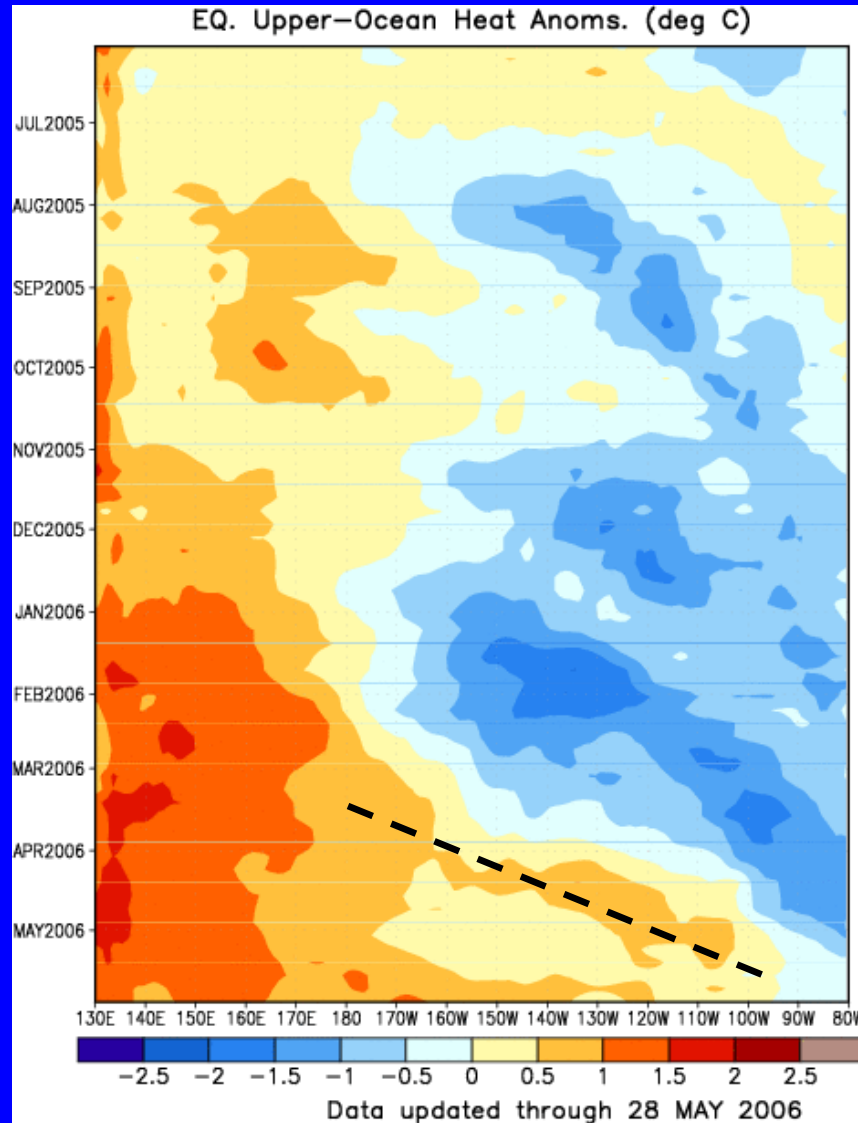
Anomalous anticyclonic flow over India.

Easterly anomalies are evident in the Atlantic.



Heat Content Evolution in the Eq. Pacific

Time



Longitude

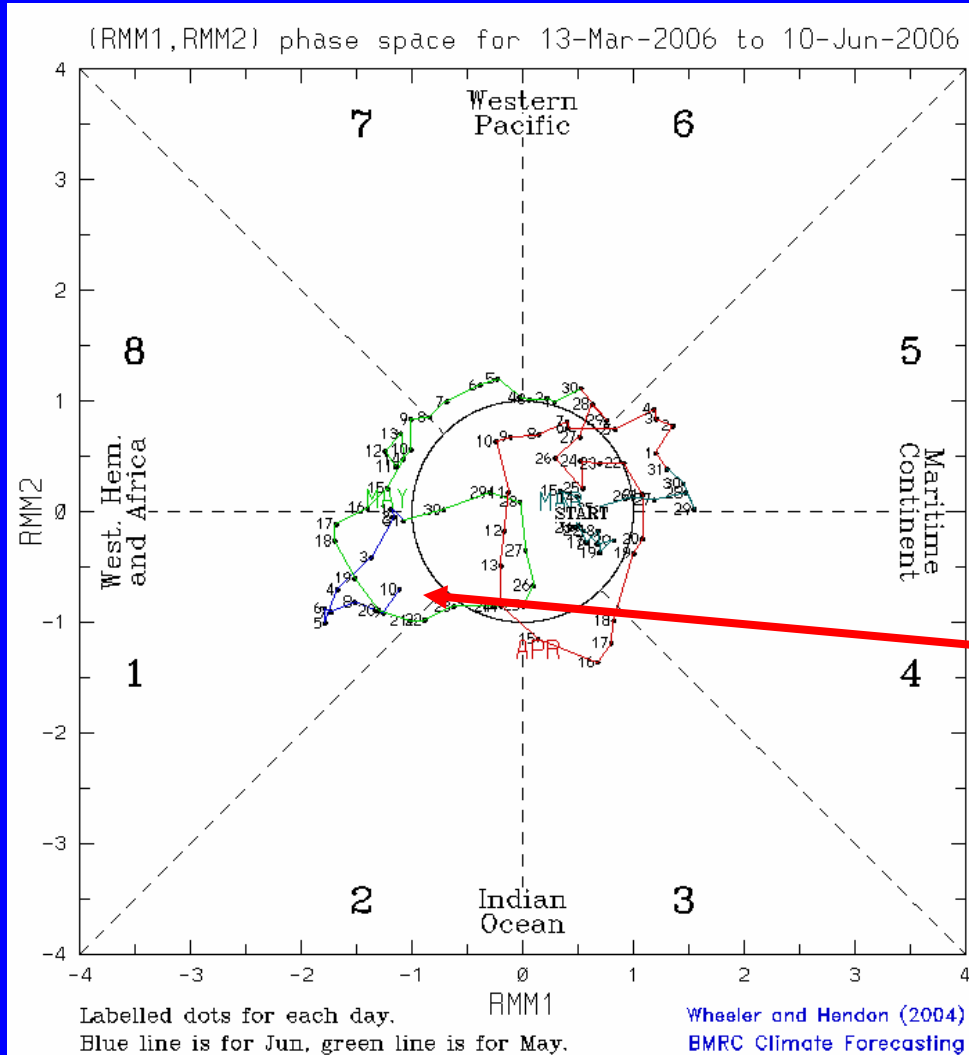
Above normal heat content expanded into the eastern Pacific during April and May 2006 associated with Kelvin wave activity.



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).

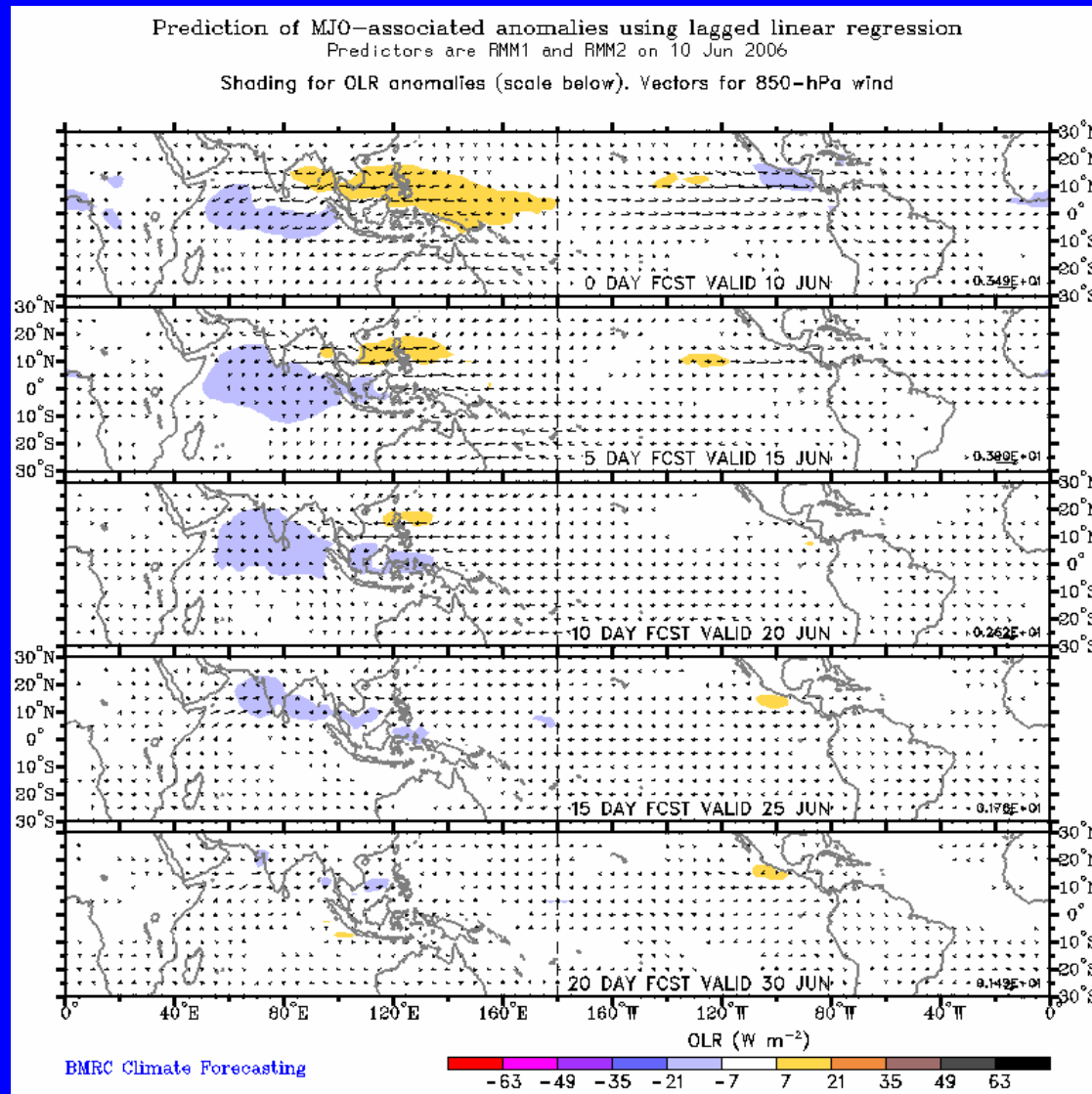
The axes represent the time series of the two leading modes of variability and are used to measure the amplitude while the triangular areas indicate the phase or location of the enhanced phase of the MJO. The farther away from the center of the circle the stronger the MJO. Different color lines indicate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



The amplitude of the MJO signal has strengthened during the past ten days but remains centered in the Western Hemisphere.



Statistical OLR MJO Forecast

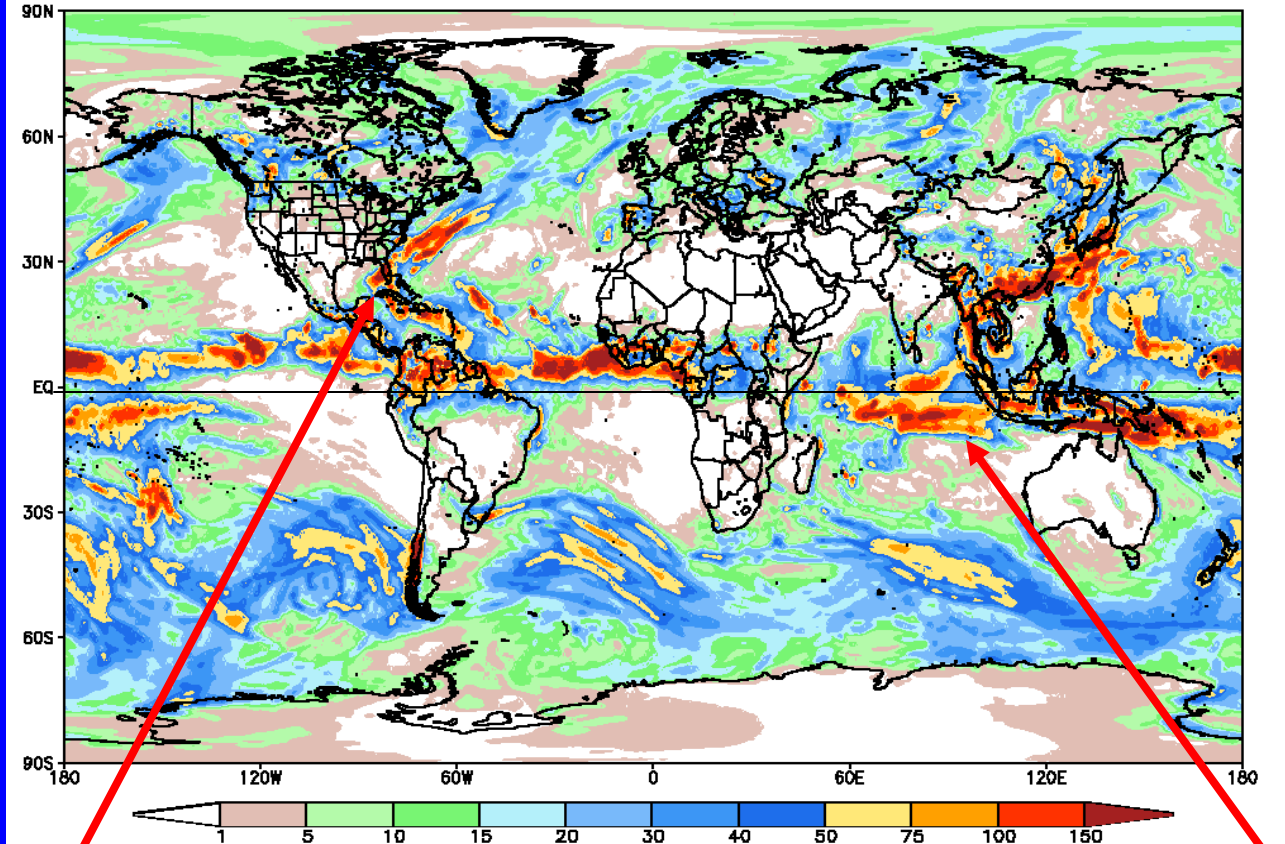


A statistical MJO forecast indicates enhanced convection in the Indian Ocean during the next ten days.



Global Forecast System (GFS) Week 1 Precipitation Forecast

NOAA GFS 37.5 km Week 1 Total Precipitation (mm)
Issued at Jun 12 2006 00Z for the period ending at Jun 19 2006 00Z



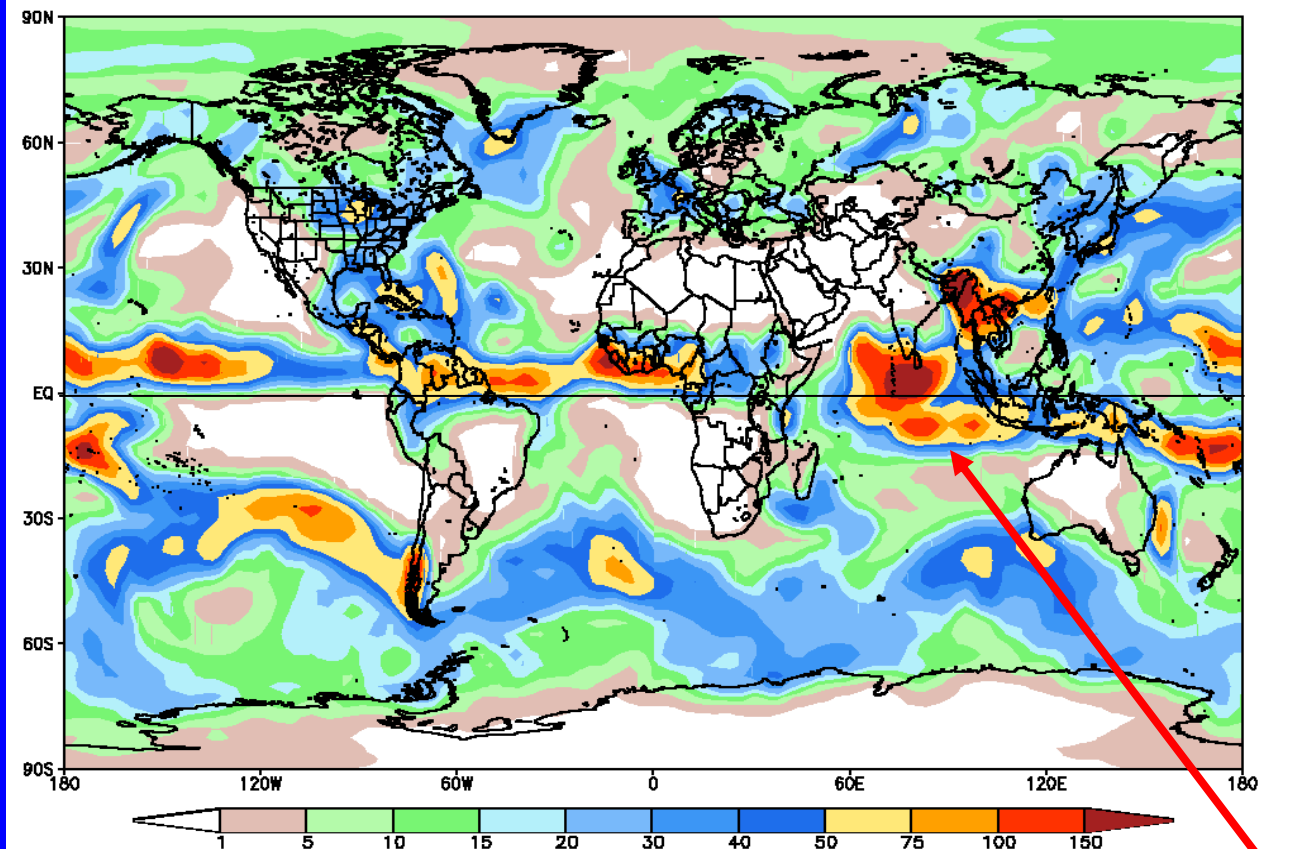
Heavy rainfall
across Florida and
off the southeast
coast of the US.

Rainfall redeveloping across
the Indian Ocean.



Global Forecast System (GFS) Week 2 Precipitation Forecast

NOAA GFS 100 km Week 2 Total Precipitation (mm)
Issued Jun 12 2006 00Z for the period ending at Jun 25 2006 00Z

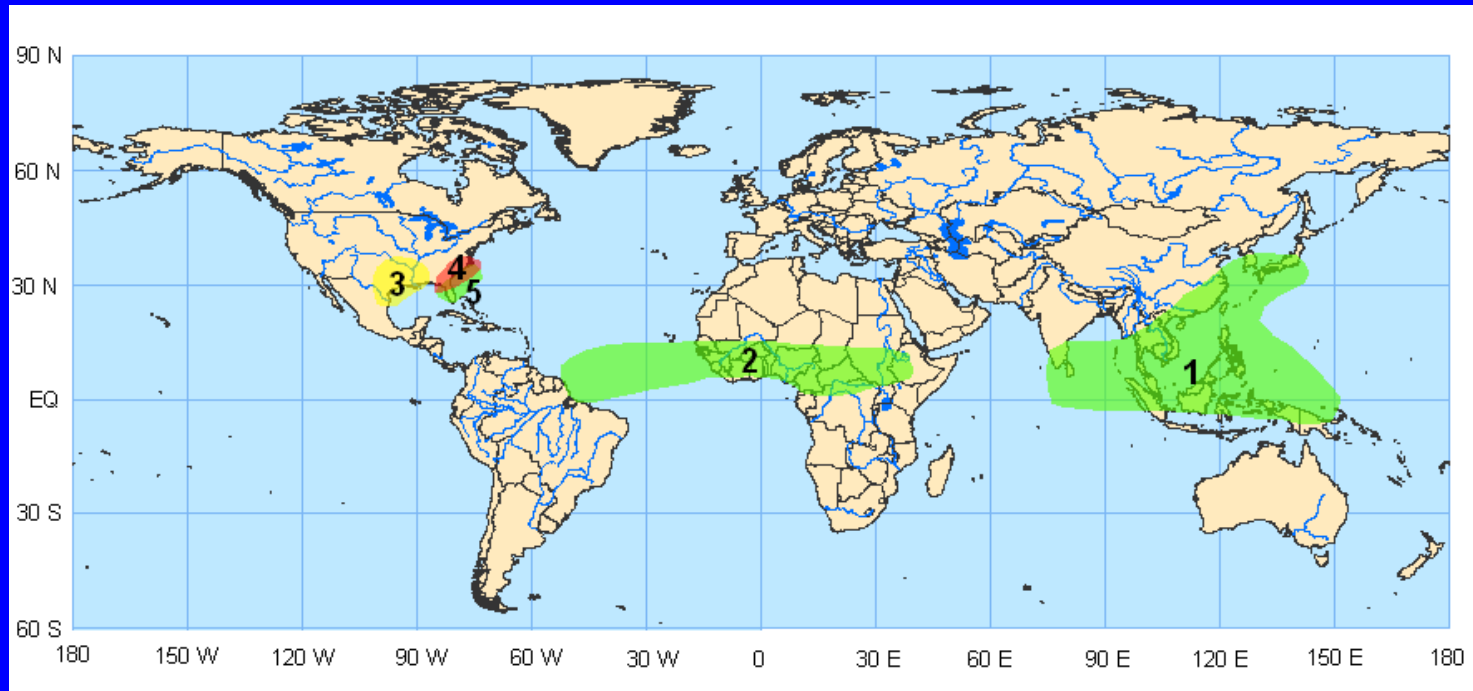


Rainfall expected to remain during week 2 across the Indian Ocean.



Potential Benefits/Hazards – Week 1

Valid June 13 – June 19, 2006

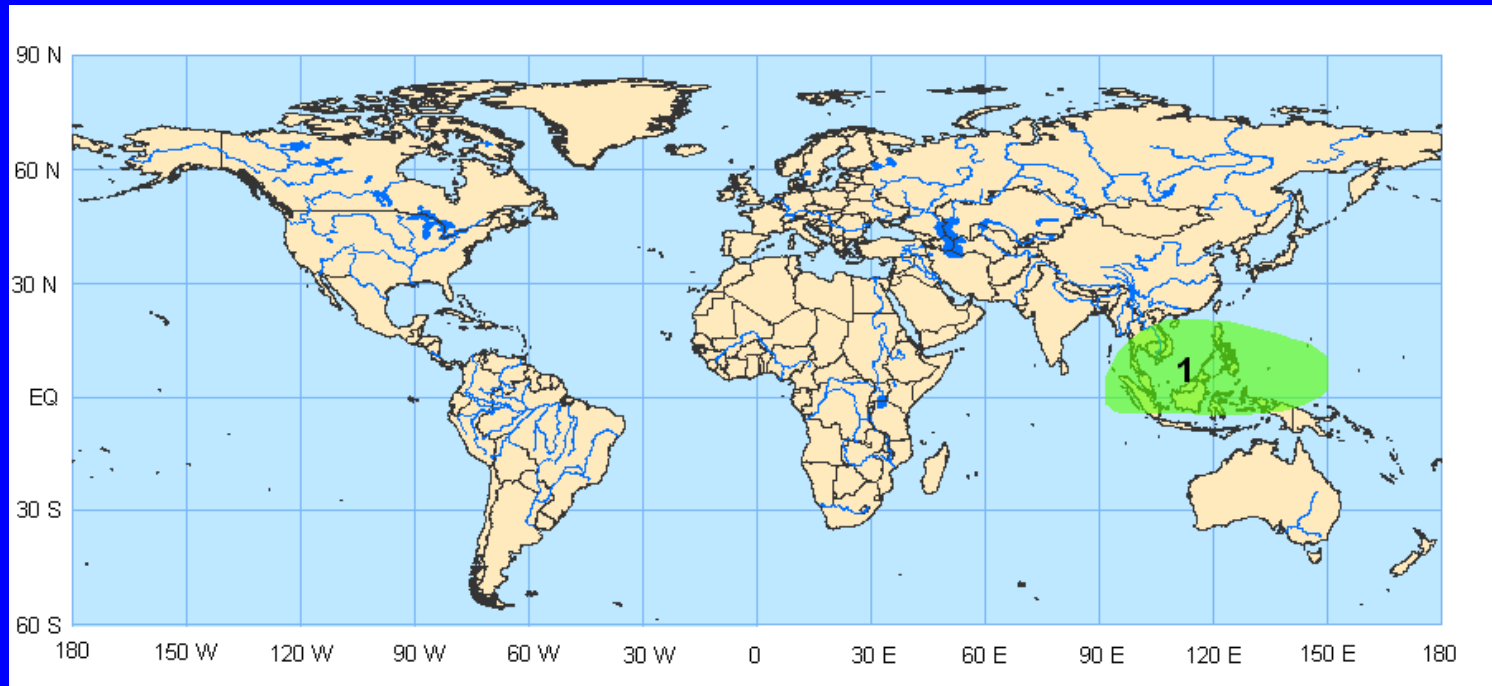


1. Increased chance of above normal rainfall in the eastern Indian Ocean, sections of the Maritime Continent and southeast Asia, the Philippines, and southern Japan
2. Increased chance of above normal rainfall across the equatorial Atlantic and sections of central Africa
3. Increased chance of below normal rainfall across the south-central US and sections of Mexico
4. Tropical storm Alberto will impact Florida and sections of the southeast US with gusty winds, above average seas and heavy rainfall
5. Increased chance of above normal rainfall for Florida and coastal areas of the southeast US



Potential Benefits/Hazards – Week 2

Valid June 20 – June 26, 2006



1. Increased chance of above normal rainfall across the Maritime continent, sections of southeast Asia, and the Philippines



Summary

- The latest observations indicate a continued weak MJO.
- Based on the latest observations and model forecasts, the MJO is expected to remain weak during the next 1-2 weeks.
- Potential hazards during week 1 include an increased chance of above normal rainfall stretching from the eastern Indian Ocean into the western Pacific including sections of the Maritime Continent and southeast Asia, the Philippines and southern Japan. Wet conditions are also expected for the equatorial Atlantic and sections of central Africa while drier than normal conditions will impact the south-central US. Tropical storm Alberto will impact Florida and coastal areas of the southeast US.
- Increased chances of above average rainfall are expected during week 2 for sections of the Maritime continent, southeast Asia, and the Philippines.