



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

Update prepared by
Climate Prediction Center / NCEP
June 26, 2006



Outline

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



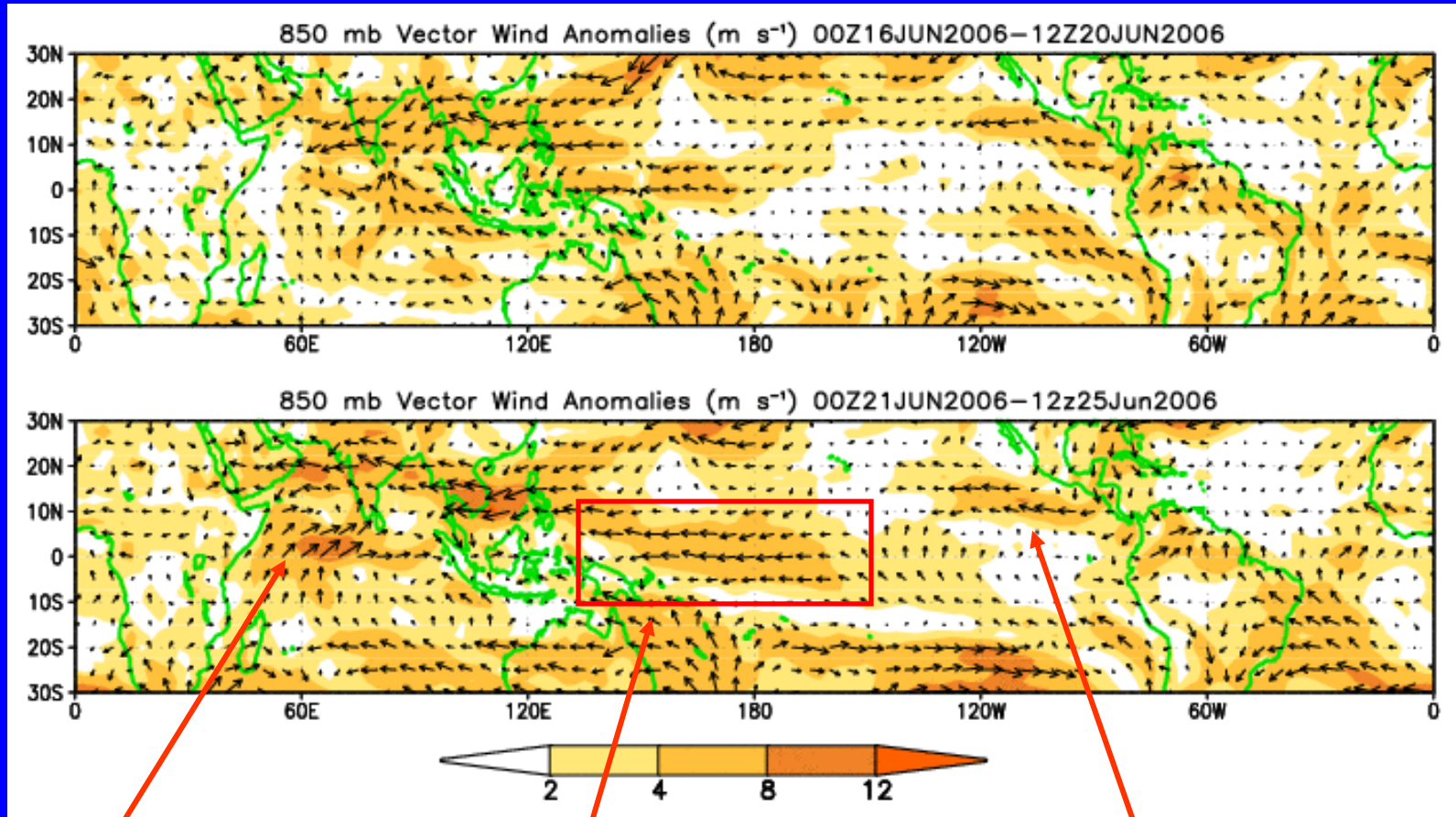
Overview

- 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 both week 1 and 2 include an increased chance of above normal rainfall for India, the Bay of Bengal, southeast Asia, the Maritime continent, and the western Pacific along with favorable conditions for tropical cyclone activity in the South China Sea and the western Pacific east of the Philippines.
- Tropical depression 3W will likely strengthen to tropical storm status and impact the South China Sea and southeast China early in the period.
- Two additional potential hazards exist during week 1. These include the threat of above average rainfall early in the period along the eastern seaboard of the US worsening ongoing flood conditions and a heightened wildfire risk in the southwest US due to “dry” thunderstorms (lightning with little surface rain).



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

Note that shading denotes the magnitude of the anomalous wind vectors



Indian monsoon once again becoming active as shown with a strengthening Somali Jet.

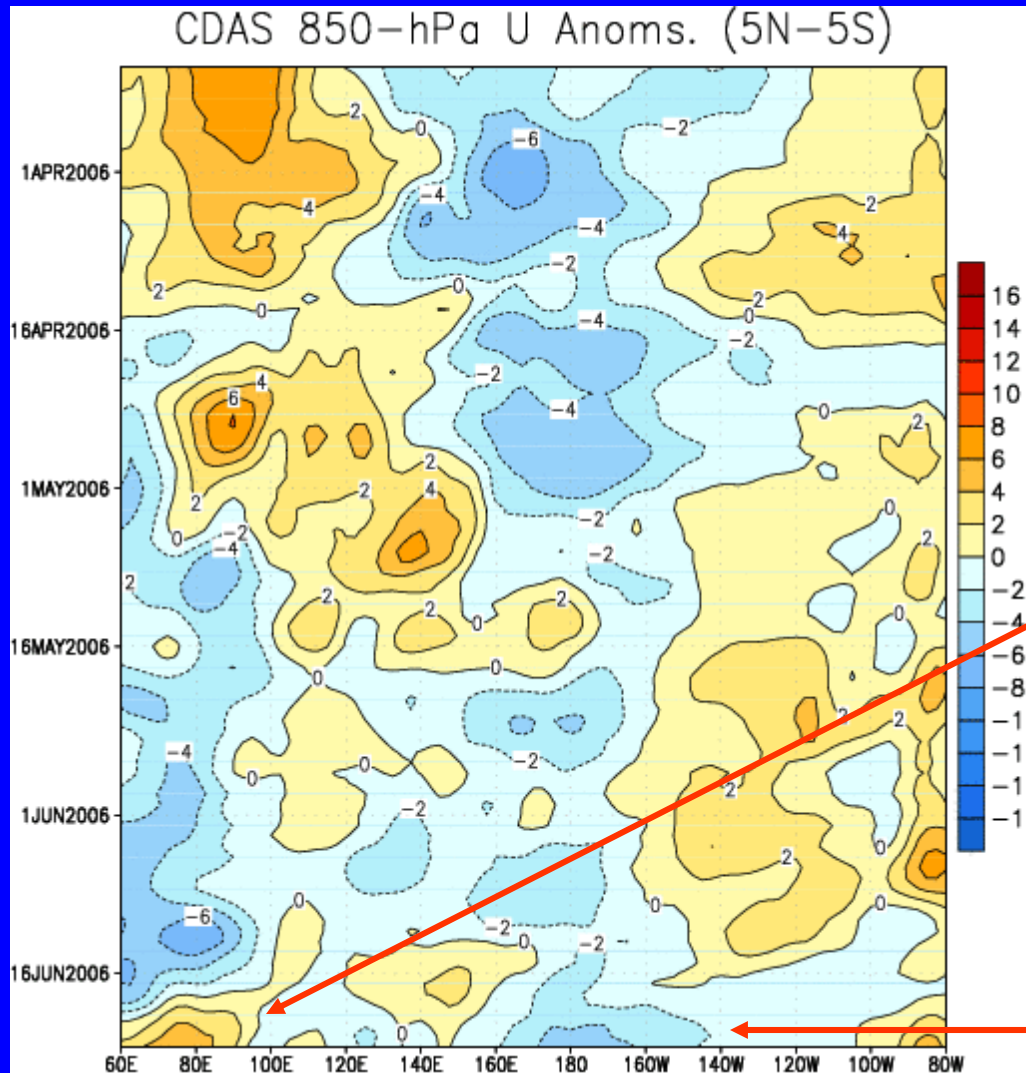
Easterly anomalies have increased in the western Pacific.

Easterly anomalies in the eastern Pacific during the last ten days.



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)

Westerly anomalies have developed in the Indian Ocean during the last week.

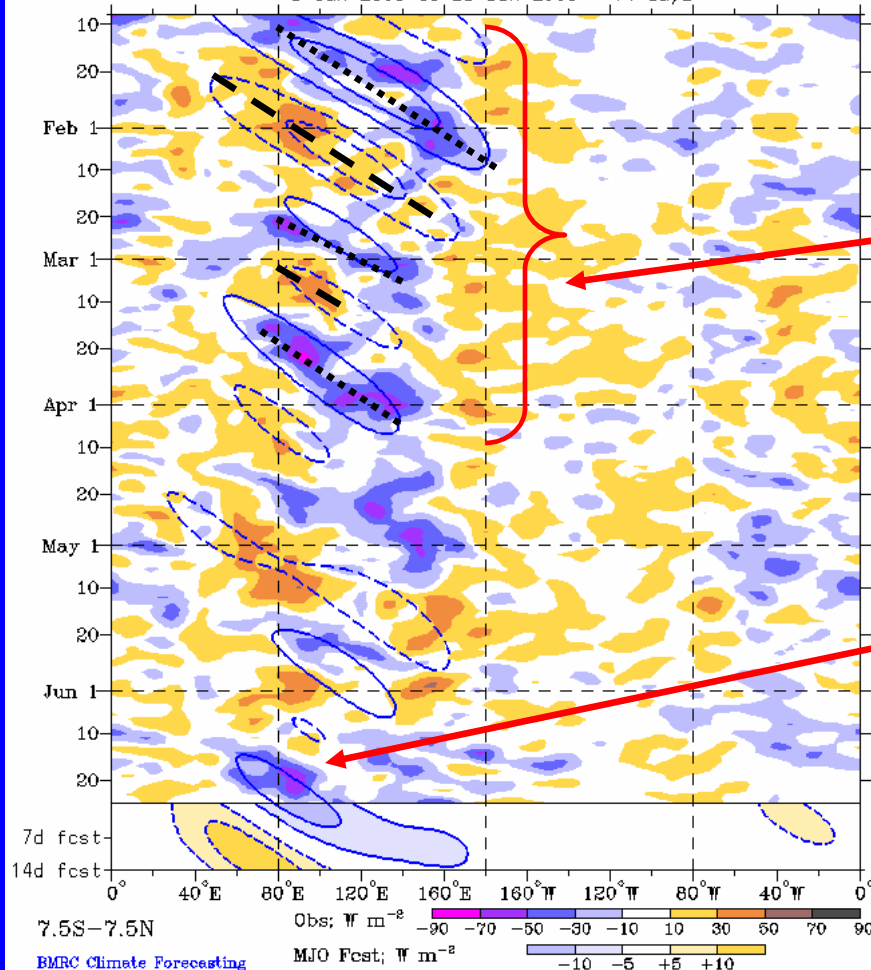
Strengthening easterly anomalies near the Date line during the last week.

Longitude



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

Real-time MJO filtering superimposed upon 3drn R21 OLR Anomalies
MJO anomalies blue contours, CNT=10. (5. for forecast)
Negative contours solid, positive dashed
8-Jan-2006 to 25-Jun-2006 + 14 days



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.

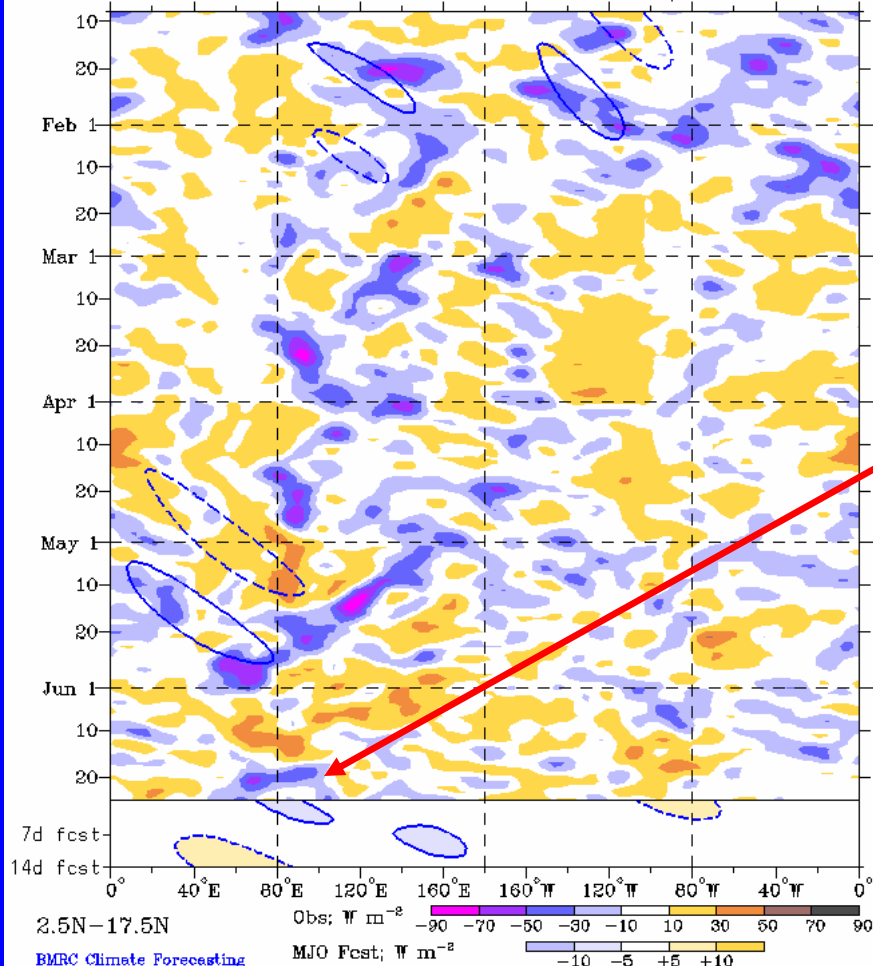
Enhanced convection has shifted eastward from the Indian Ocean to western Indonesia during the past ten days.

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
8-Jan-2006 to 25-Jun-2006 + 14 days



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

Enhanced convection has been evident across the Arabian Sea, India and the Bay of Bengal.

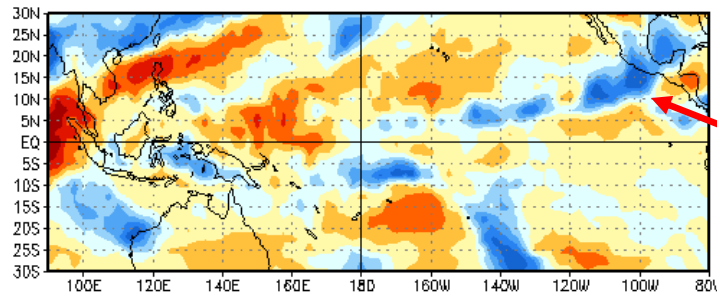
Time
↓

Longitude



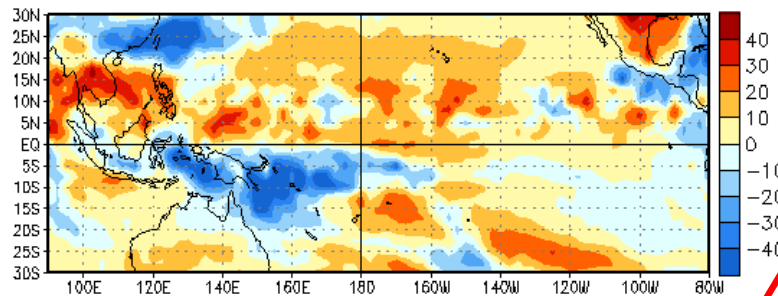
Anomalous OLR and 850-hPa Wind: Last 30 days

OLR Anomalies
26 MAY 2006 to 4 JUN 2006

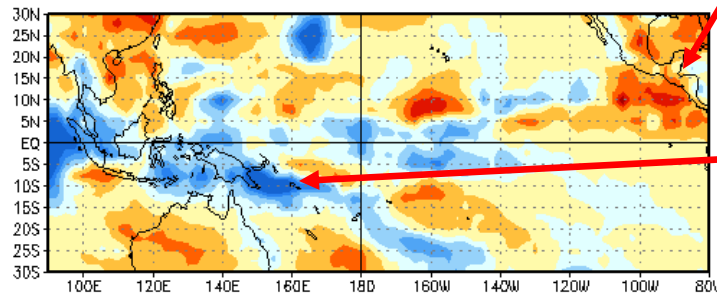


Wet conditions in the eastern Pacific during early June have been replaced with drier than normal conditions during the past ten days.

5 JUN 2006 to 14 JUN 2006



15 JUN 2006 to 24 JUN 2006

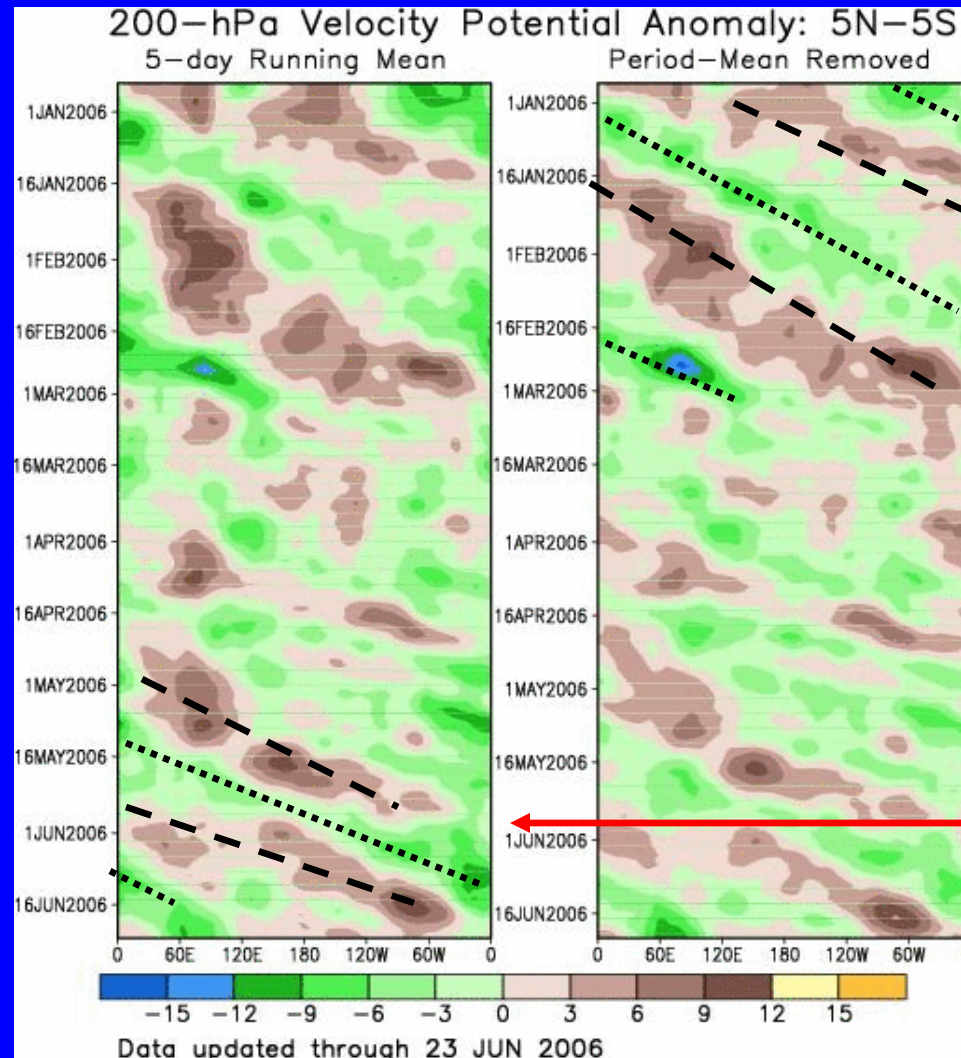


Enhanced convection has developed across sections of the Indian Ocean, the Maritime Continent, and the western Pacific.



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



Longitude

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

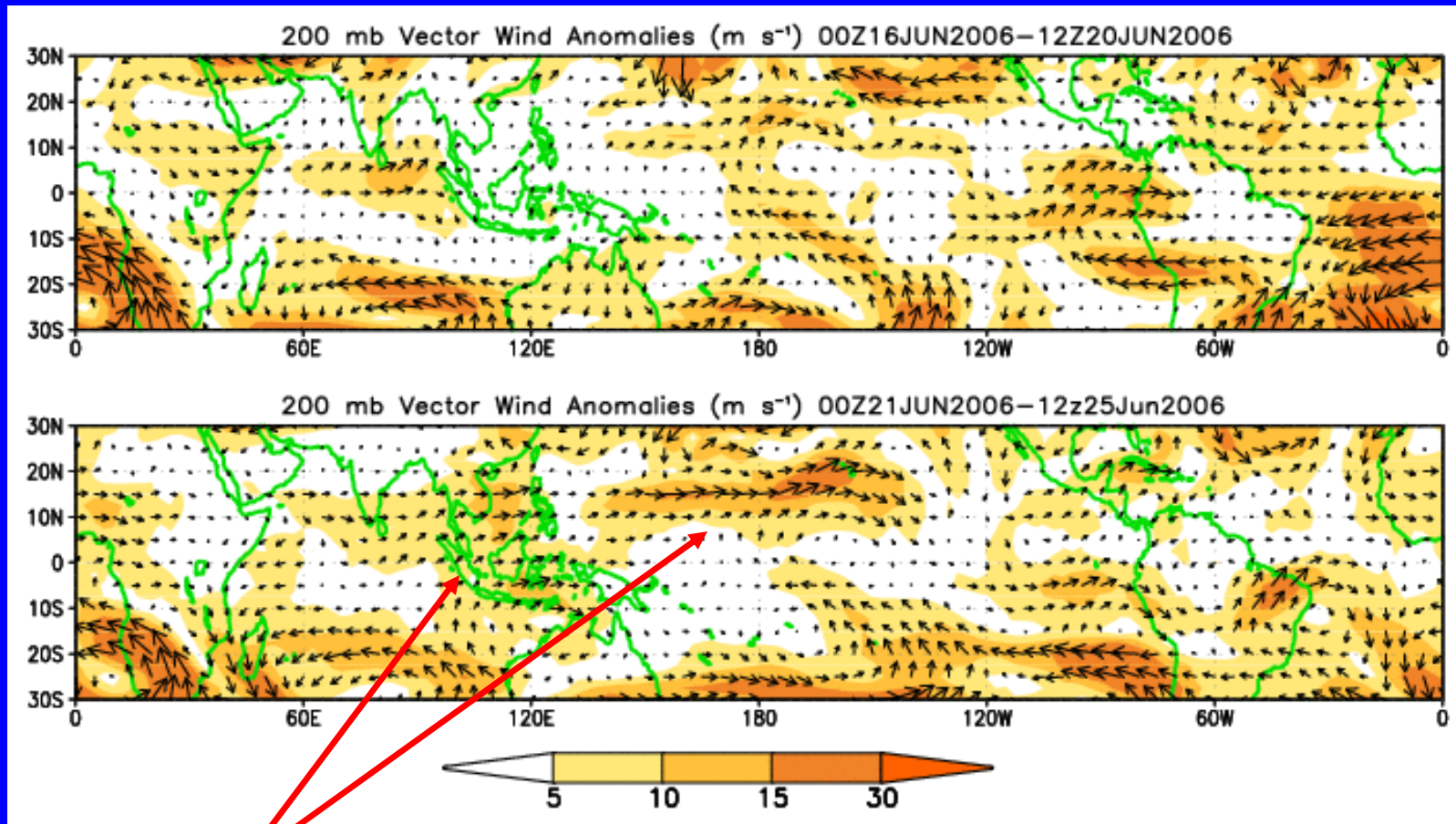
The MJO was incoherent during much of March and April.

MJO activity strengthened during May but remains weak.



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

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

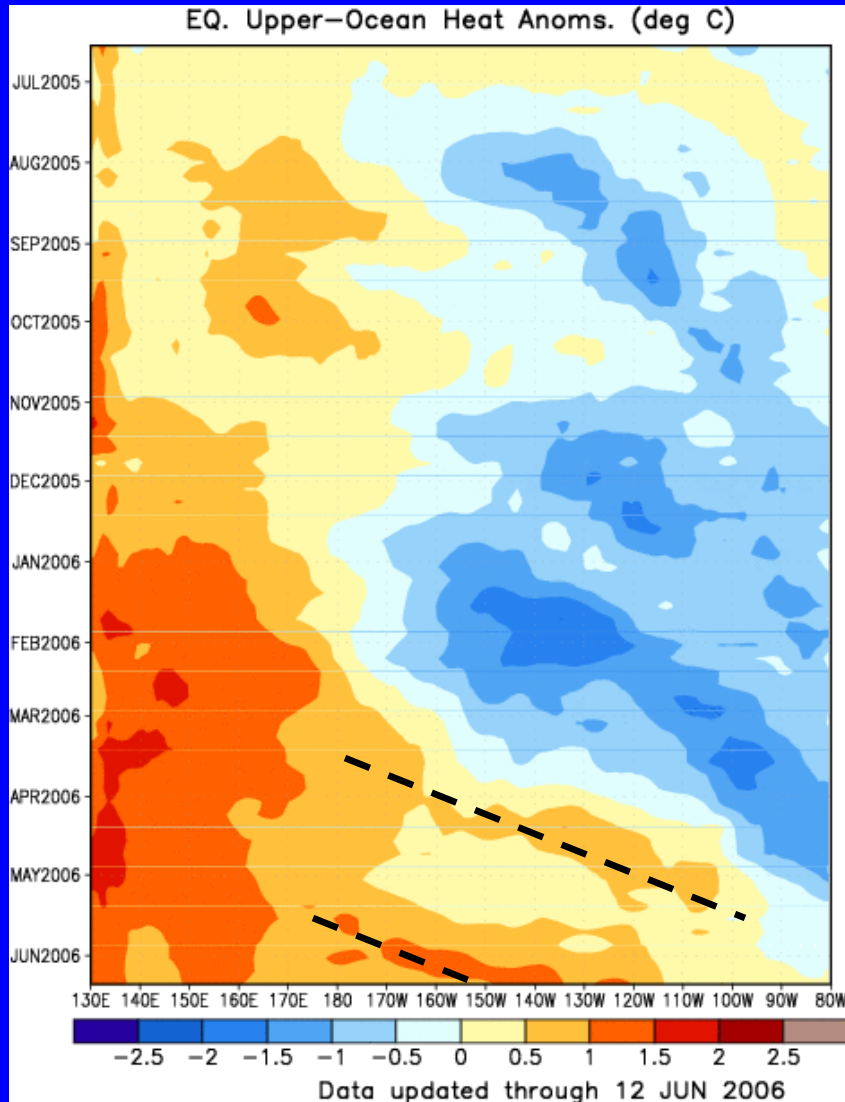


Westerly anomalies have become more evident across the global tropics mainly north of the equator.



Heat Content Evolution in the Eq. Pacific

Time



Longitude

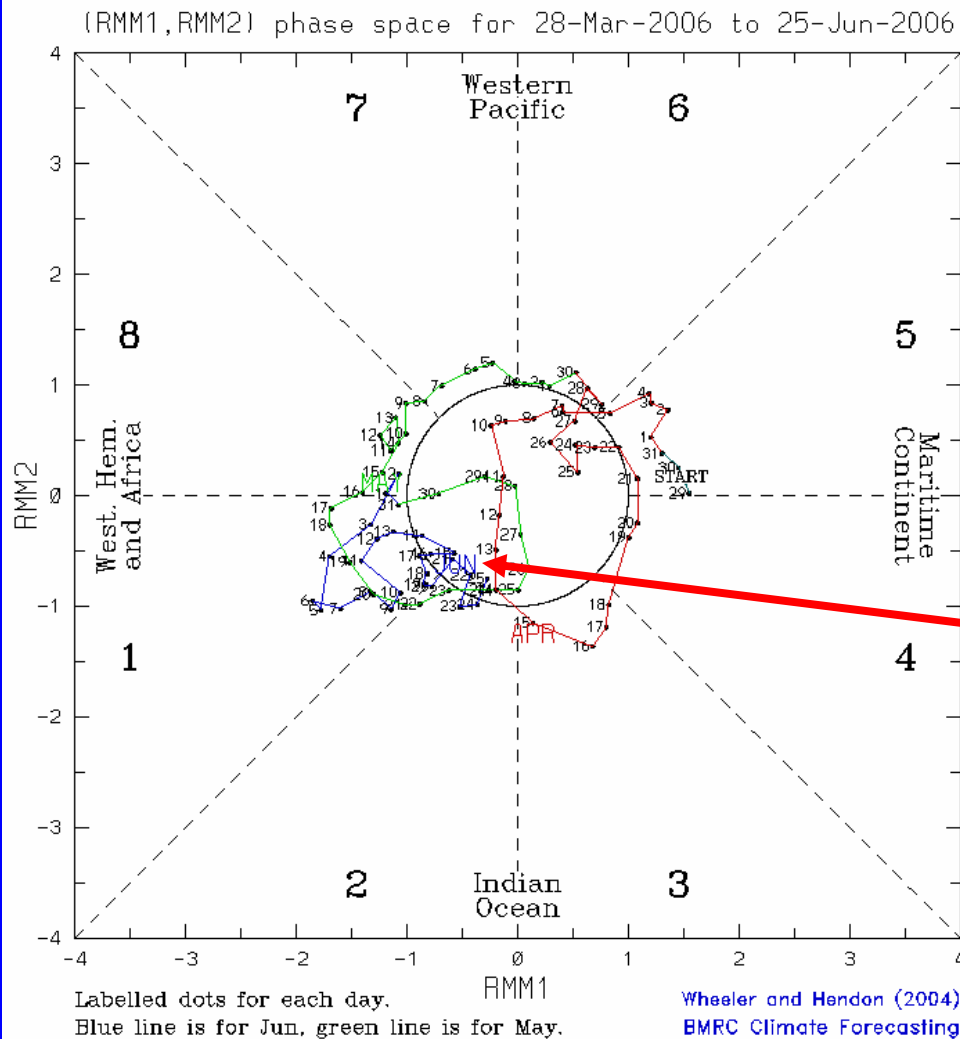
Above normal heat content expanded into the eastern Pacific beginning in April associated with Kelvin wave activity.



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).

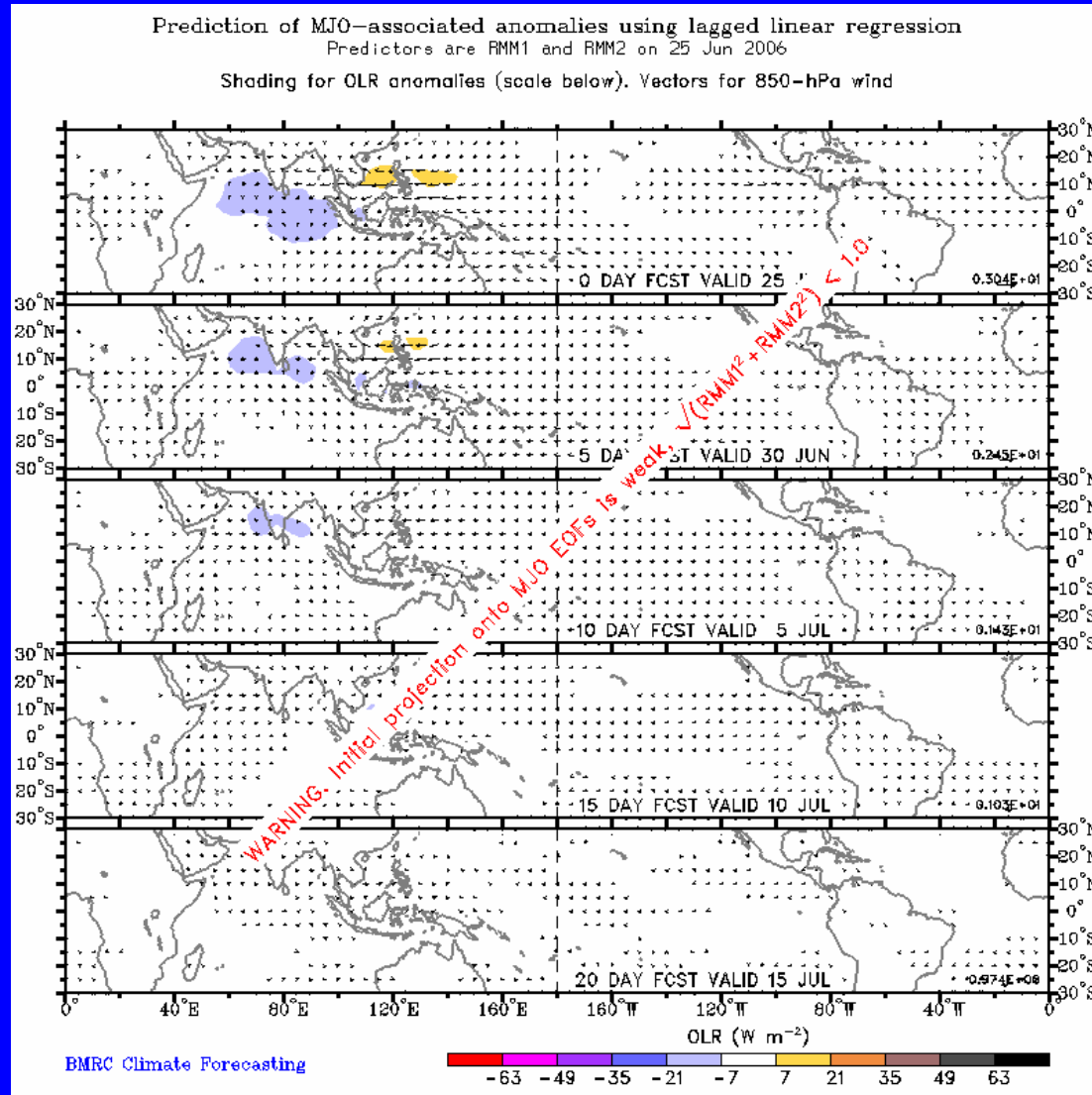
The axes represent the time series of the two leading modes of variability and are used to measure the amplitude while the triangular areas indicate the phase or location of the enhanced phase of the MJO. The farther away from the center of the circle the stronger the MJO. Different color lines indicate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



The MJO signal is now centered in the western Indian Ocean but remains quite weak.



Statistical OLR MJO Forecast

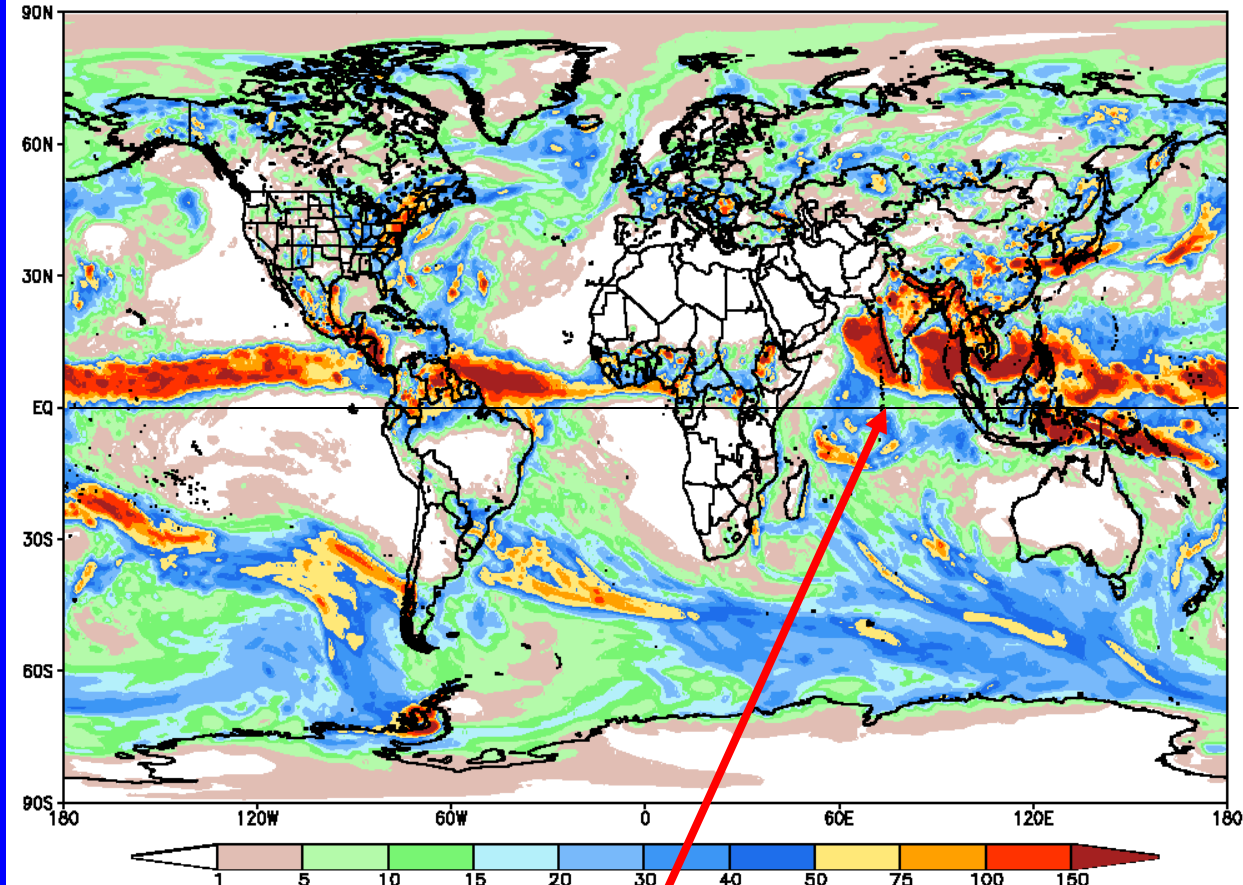


A statistical MJO forecast indicates weak enhanced convection in the Indian Ocean and India during the next ten days.



Global Forecast System (GFS) Week 1 Precipitation Forecast

NOAA GFS 37.5 km Week 1 Total Precipitation (mm)
Issued at Jun 26 2006 00Z for the period ending at Jul 3 2006 00Z



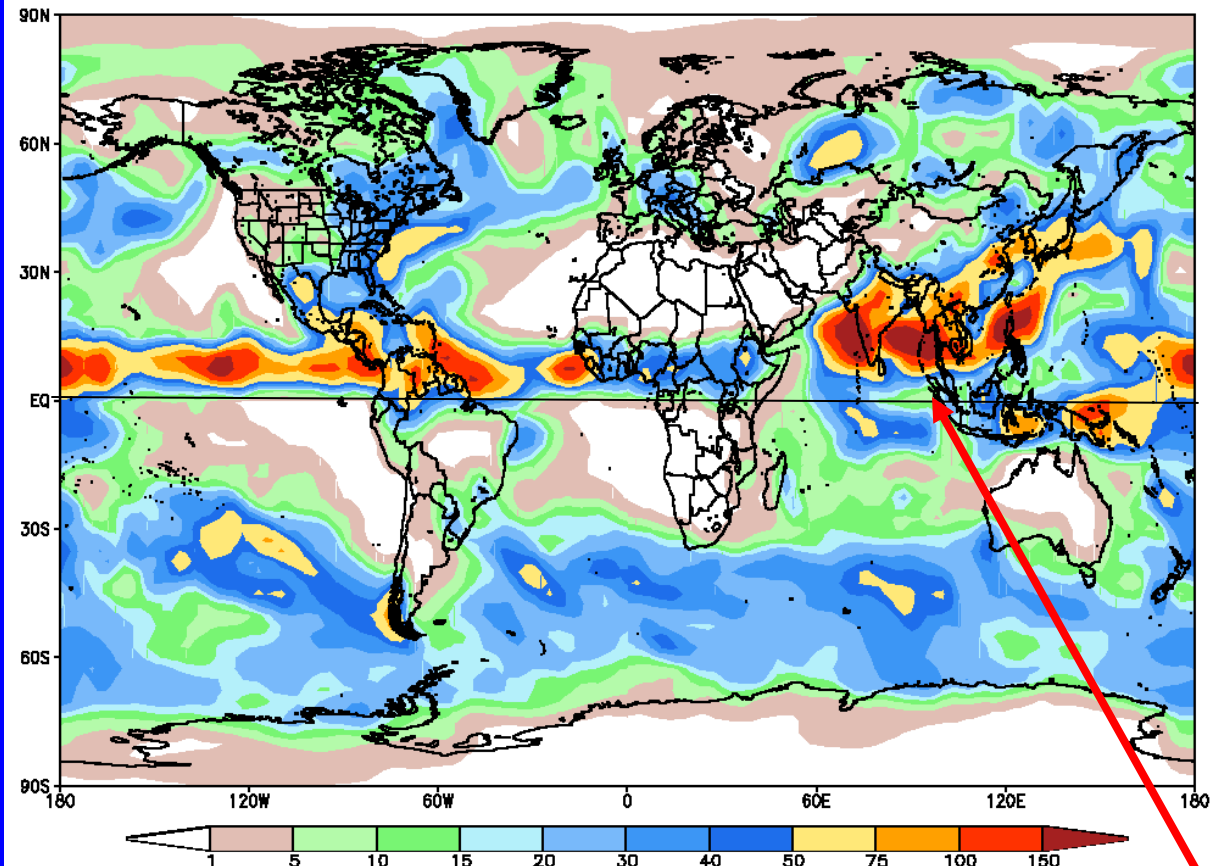
Abundant rainfall across the Arabian Sea, much of India, and sections of southeast Asia, the Maritime Continent, and the western Pacific Ocean.



Global Forecast System (GFS) Week 2

Precipitation Forecast

NOAA GFS 100 km Week 2 Total Precipitation (mm)
Issued Jun 26 2006 00Z for the period ending at Jul 9 2006 00Z

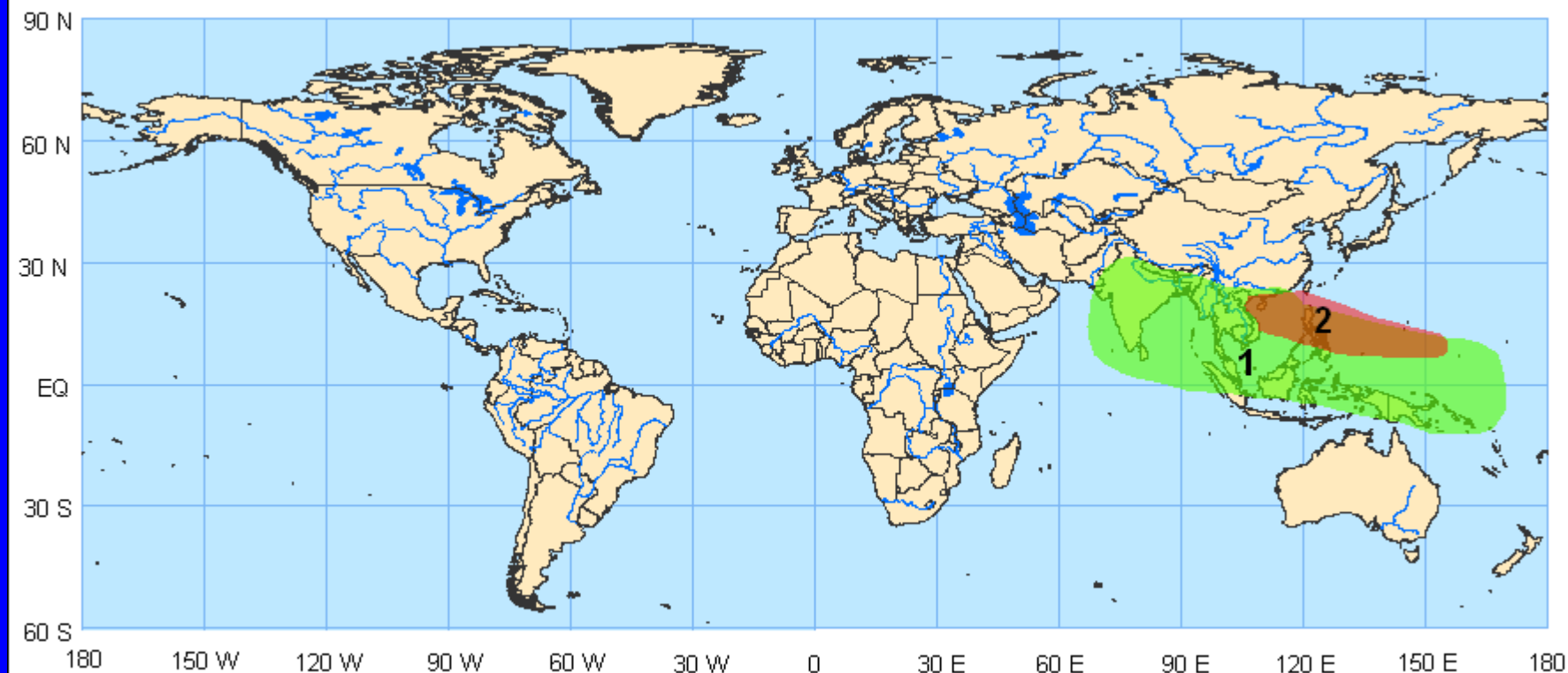


Rainfall expected to remain during week 2 across south and southeast Asia.



Potential Benefits/Hazards – Week 1

Valid June 27 – July 3, 2006

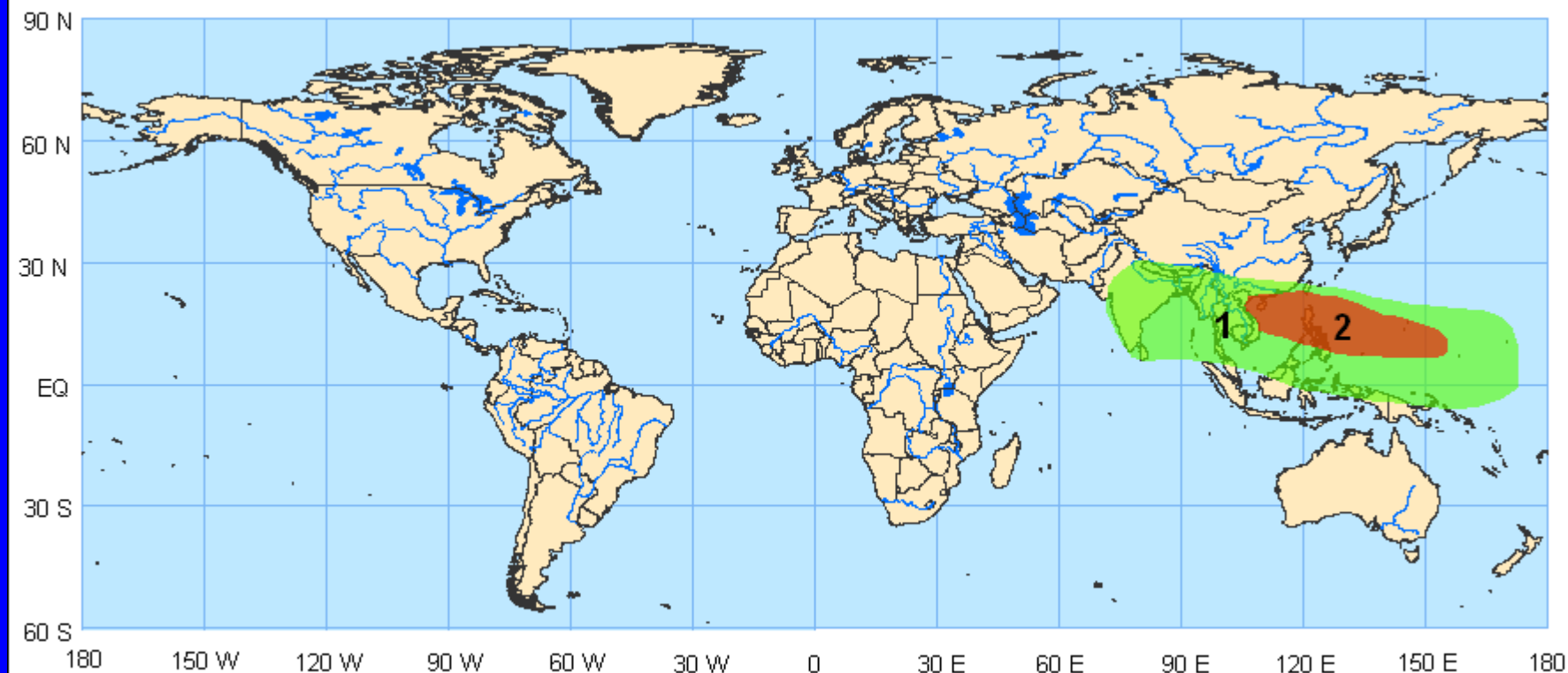


1. Increased chance of above normal rainfall for India, the Bay of Bengal, southeast Asia, the Maritime Continent, and the western Pacific.
2. Tropical depression 3W is likely to strengthen and impact the South China Sea and southeast China early in the period. Also, conditions are favorable for tropical cyclone activity in the South China Sea and the western Pacific Ocean east of the Philippines throughout the period.



Potential Benefits/Hazards – Week 2

Valid July 4 – July 10, 2006



1. Increased chance of above normal rainfall for India, the Bay of Bengal, southeast Asia, the Maritime Continent, and the western Pacific.
2. Conditions are favorable for tropical cyclone activity in the South China Sea and the western Pacific Ocean east of the Philippines during the period.



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