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

Update prepared by
Climate Prediction Center / NCEP
August 14, 2006

Outline

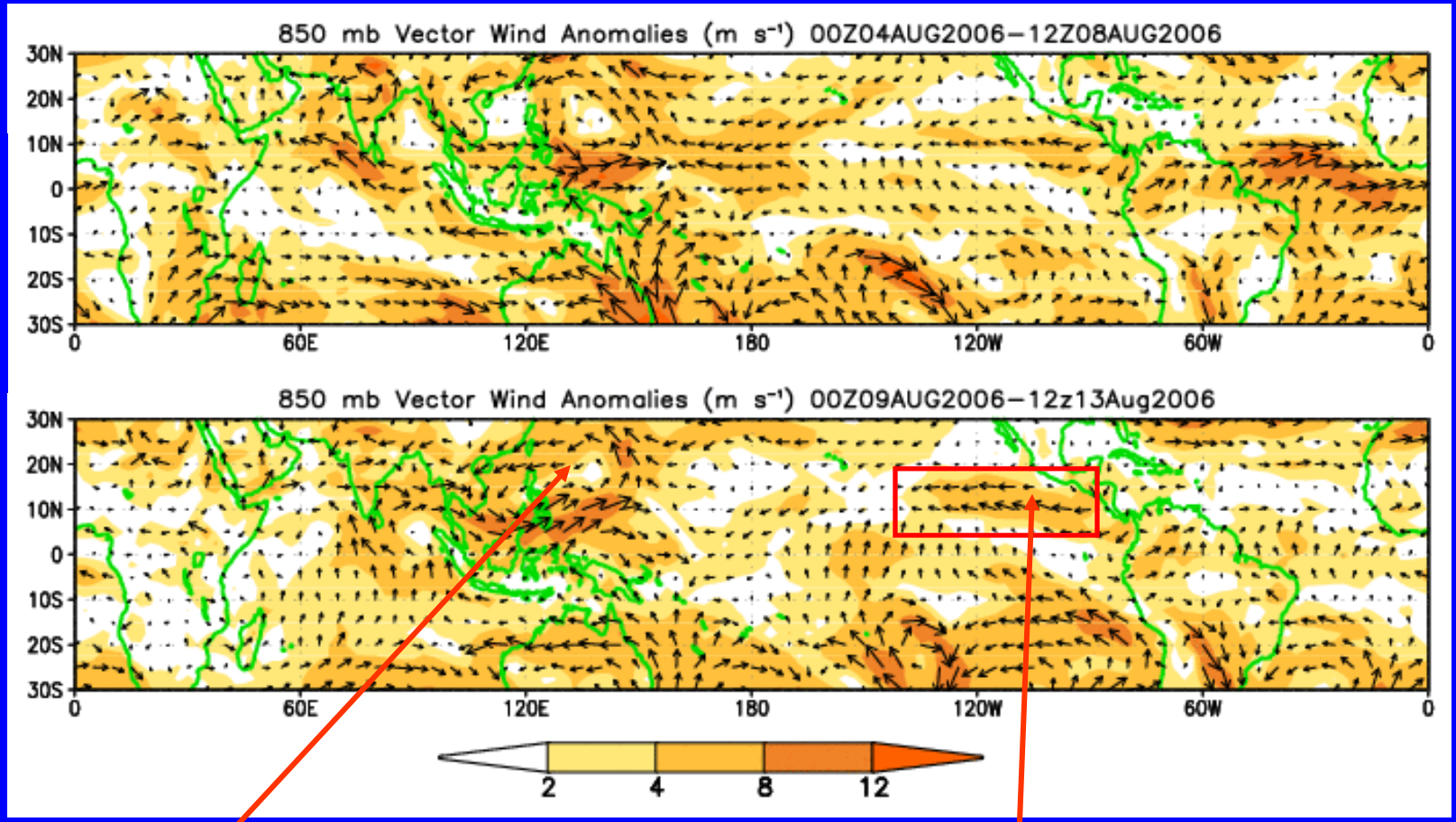
- Overview
- Recent Evolution and Current Conditions
- Madden Julian Oscillation Forecast
- Summary

Overview

- The MJO remains weak. Based on the latest observations and model forecasts, continued weak MJO activity is expected during the next 1-2 weeks.
- During week 1, there is an increased chance for above normal rainfall for the central Indian Ocean, Southeast Asia, the western Pacific, central Pacific north of the equator, and sections of northern Mexico and the southwest US. Tropical cyclones Sonamu and Wukong are expected to impact Japan and southern Korea. In addition, conditions are expected to remain favorable for tropical cyclogenesis in the western Pacific.
- Elevated chances for above normal rainfall will remain during week 2 for the Bay of Bengal, southeast Asia, the western Pacific. Also, the eastern Pacific is expected to see an increased chance of above normal rainfall and the return of favorable conditions for tropical cyclogenesis.

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

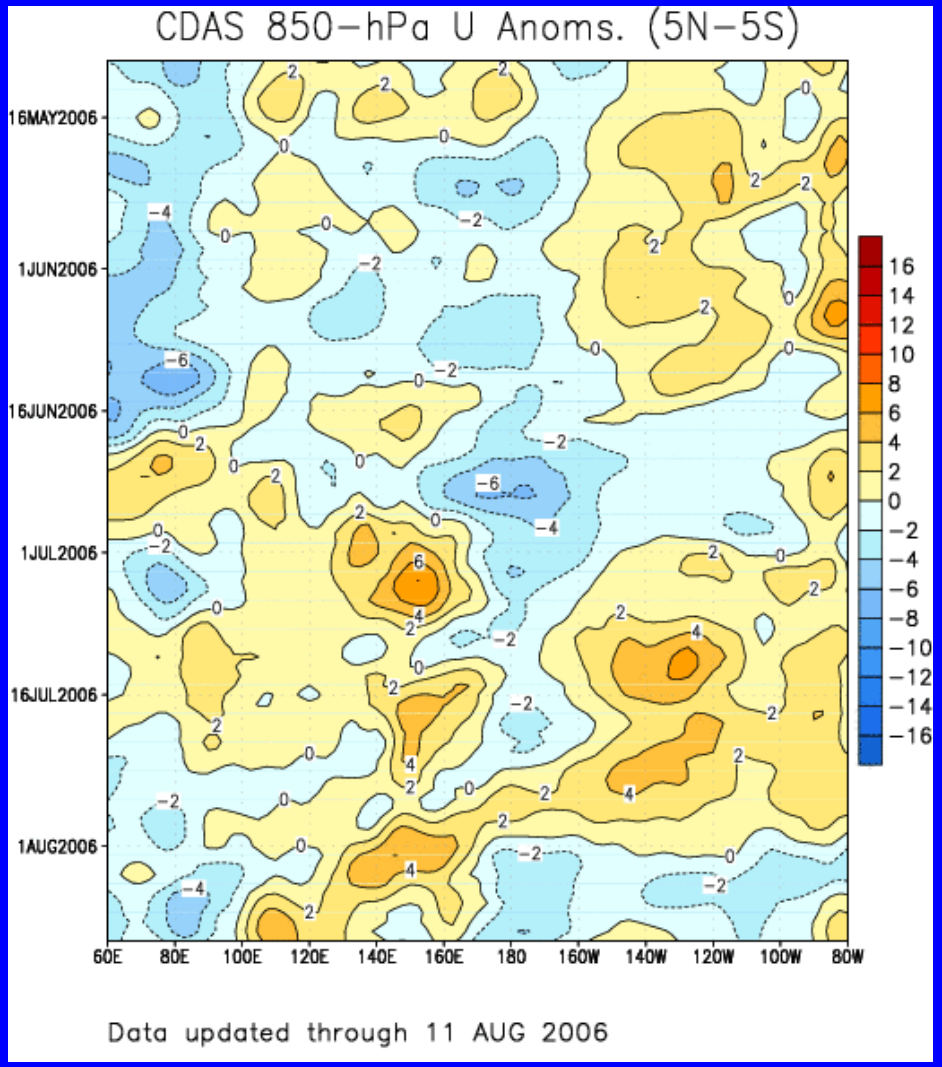
Note that shading denotes the magnitude of the anomalous wind vectors



Anomalous cyclonic circulation over the western Pacific.

Enhanced easterlies over the eastern Pacific.

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



Time

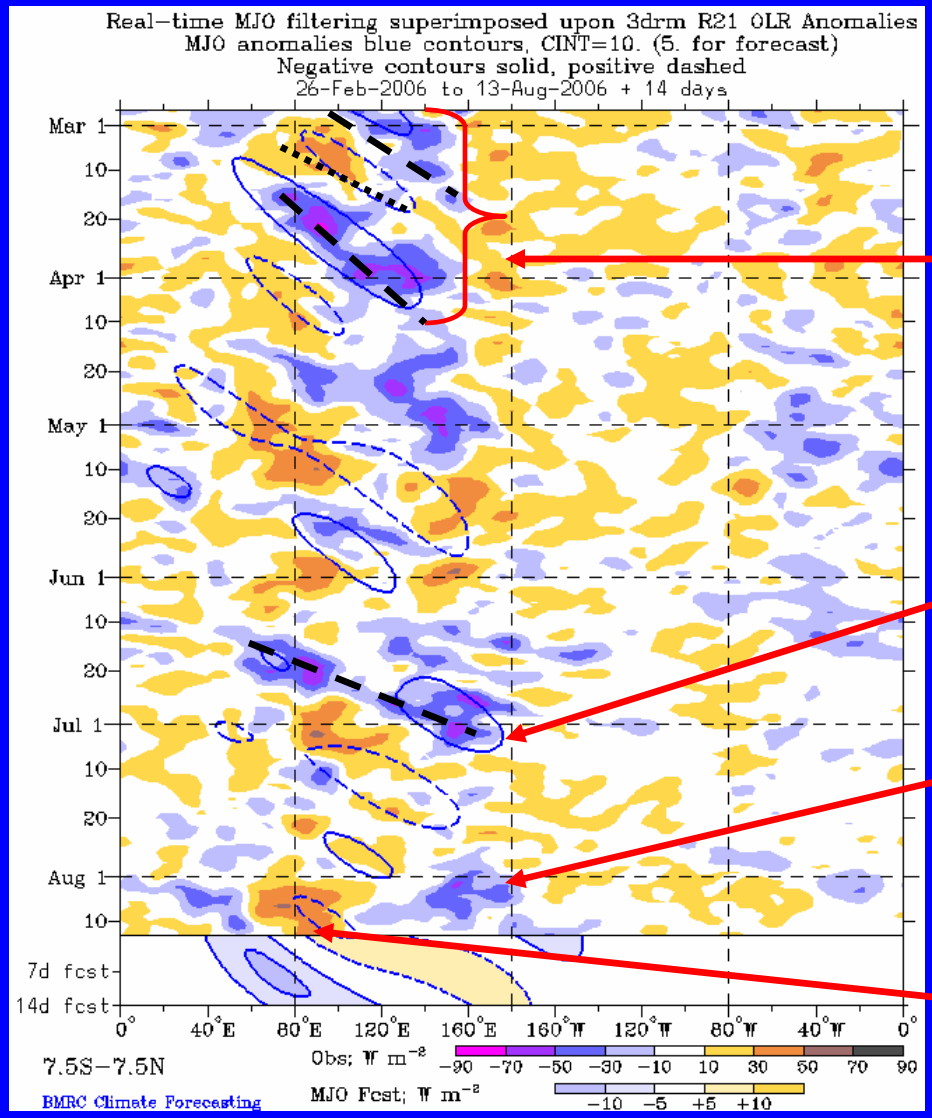
Longitude

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

Stronger-than-average easterlies (blue shading)

Westerly anomalies are evident over Indonesia and the western Pacific with easterly anomalies in the Indian Ocean and near the Date Line.

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



Time

Longitude

Drier-than-average conditions (/red shading)

Wetter-than-average conditions (blue shading)

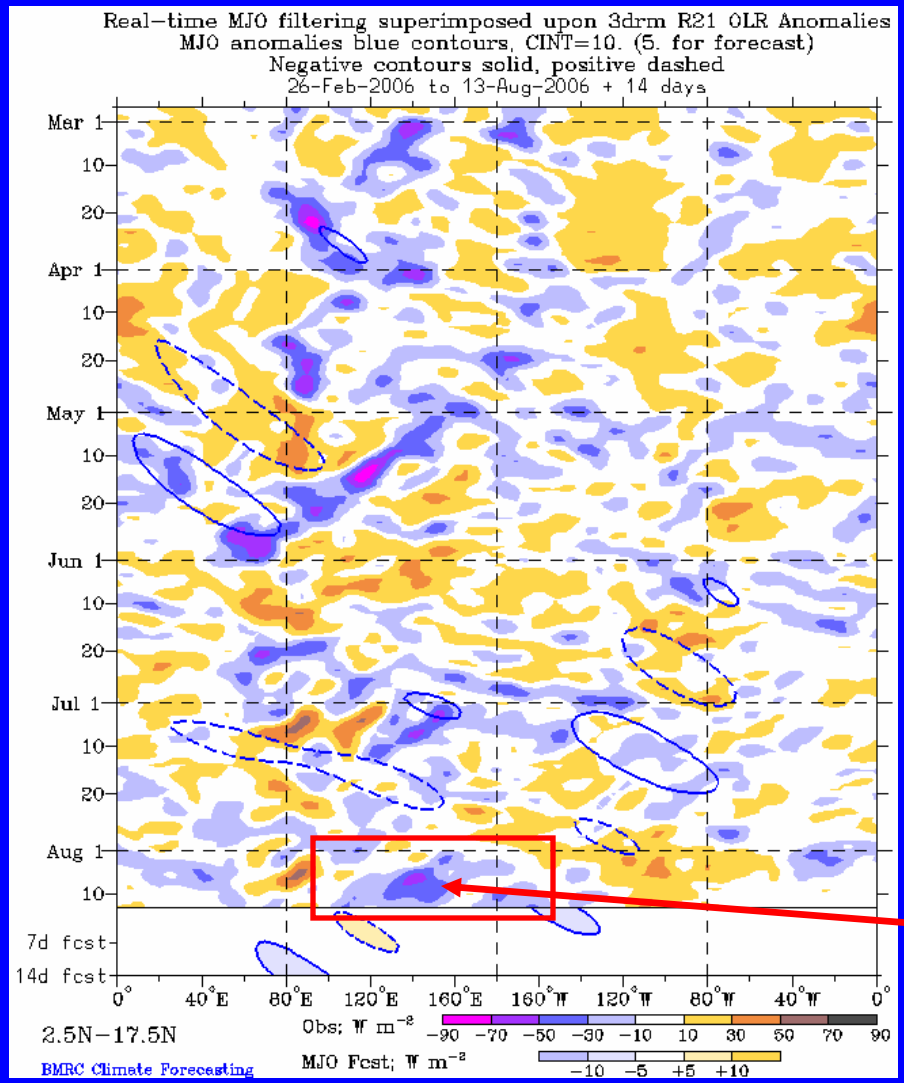
Eastward propagation of OLR anomalies associated with the MJO was evident from February into early April.

A coherent OLR anomaly moved across the Eastern Hemisphere in June.

Convection in the western Pacific extended westward.

Dry conditions in the eastern Indian Ocean during the past two weeks.

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



Time

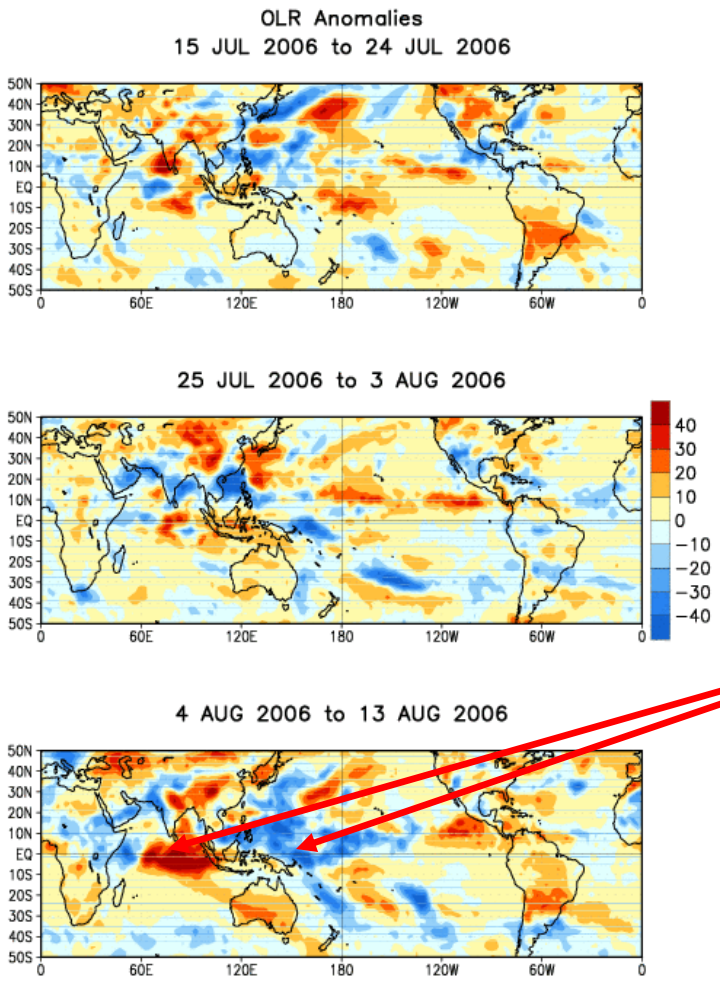
Longitude

Drier-than-average conditions (/red shading)

Wetter-than-average conditions (blue shading)

Enhanced convection during the past week in the western Pacific.

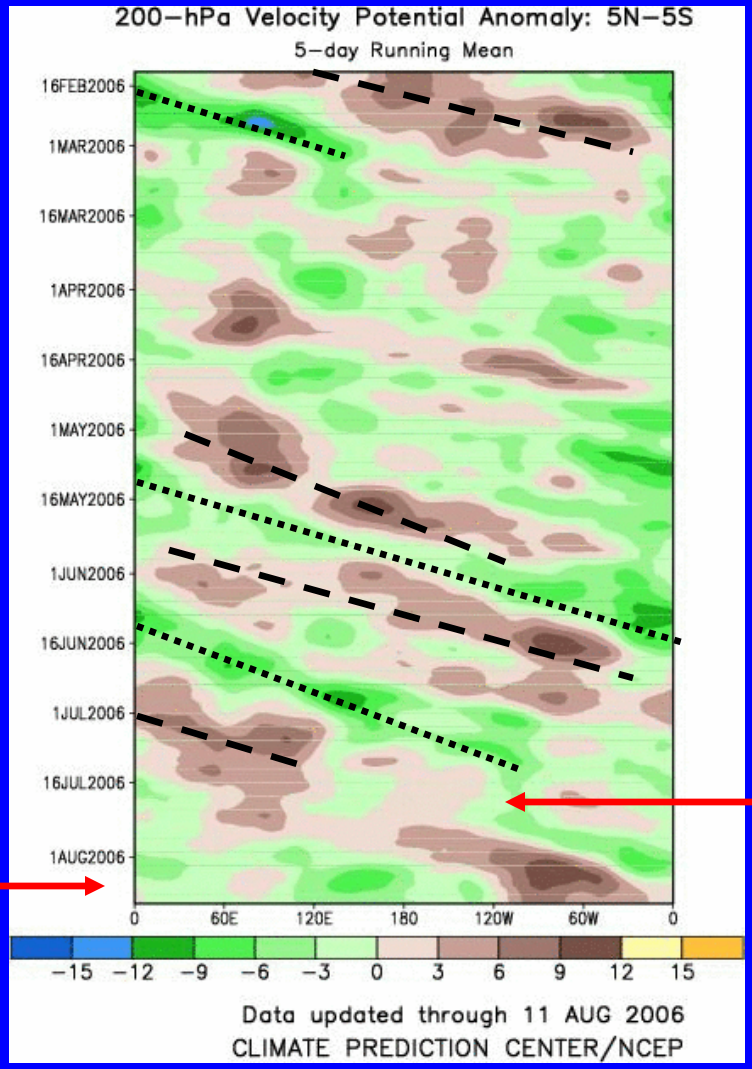
Anomalous OLR: Last 30 days



Western Pacific (eastern Indian Ocean) under wet (dry) conditions during the last ten days.

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

During early August, enhanced (suppressed) convection in the western Pacific (eastern Pacific).

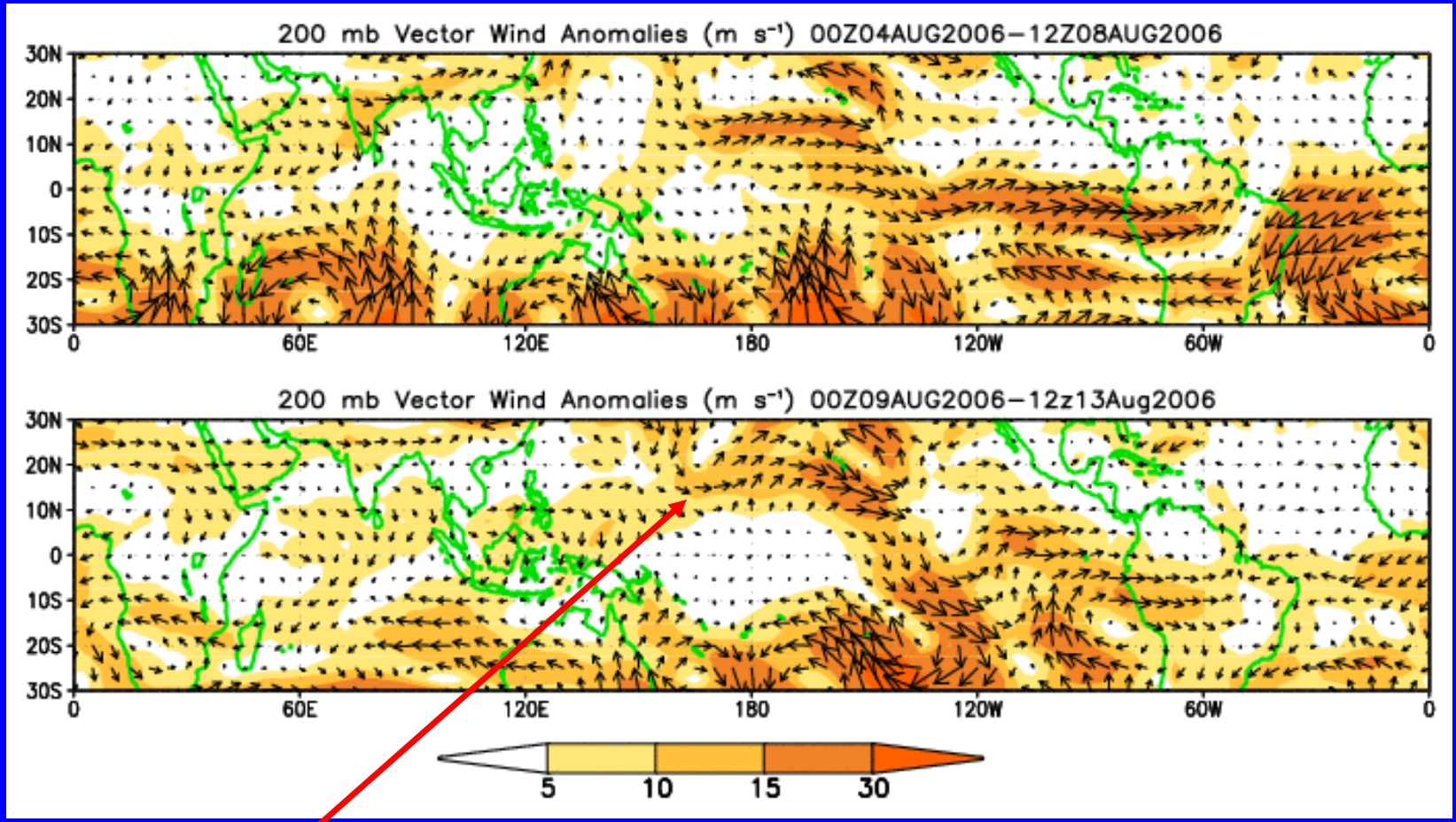
The MJO was incoherent during much of March and April.

MJO activity strengthened during May and June.

During most of July, the pattern became stationary, with enhanced divergence over the eastern tropical Pacific and convergence over the Indian Ocean and Indonesia.

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

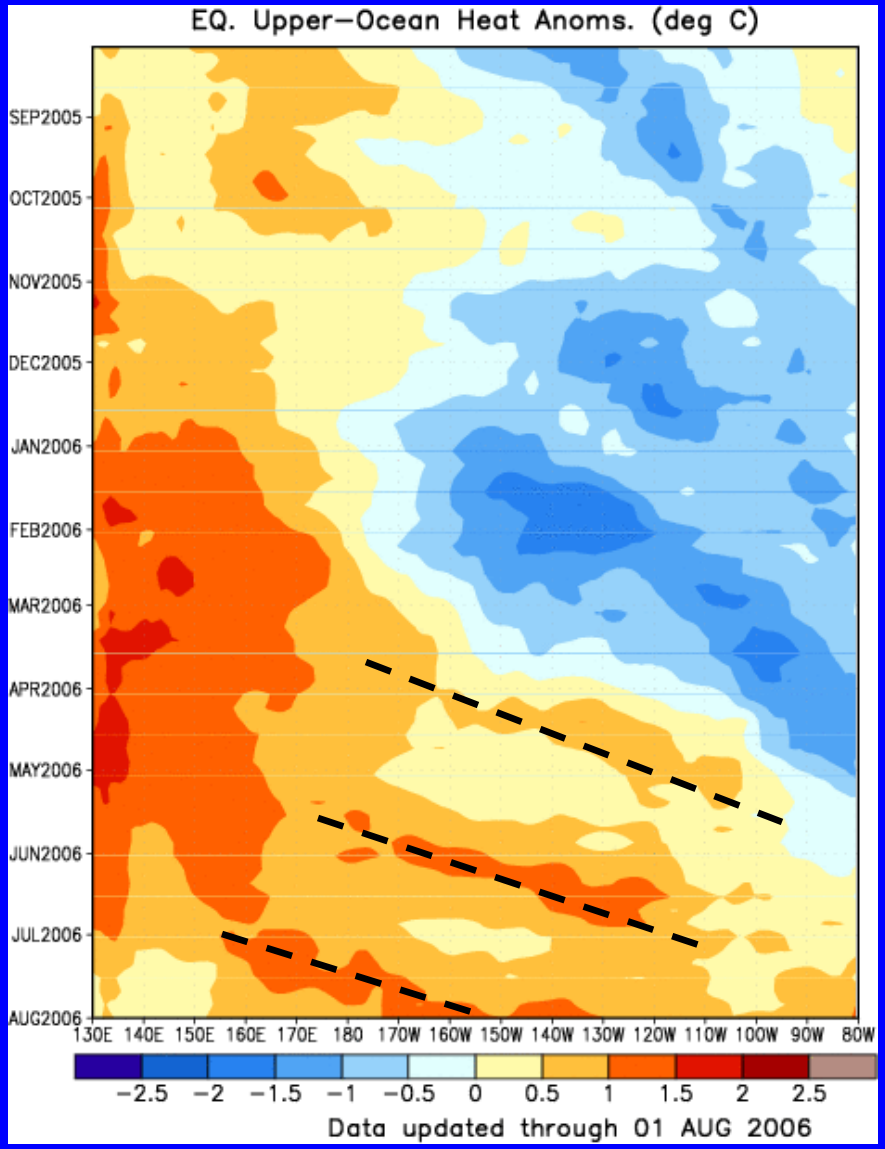
Note that shading denotes the magnitude of the anomalous wind vectors.



Westerly anomalies in the central Pacific in part due to enhanced convection in the western Pacific.

Heat Content Evolution in the Eq. Pacific

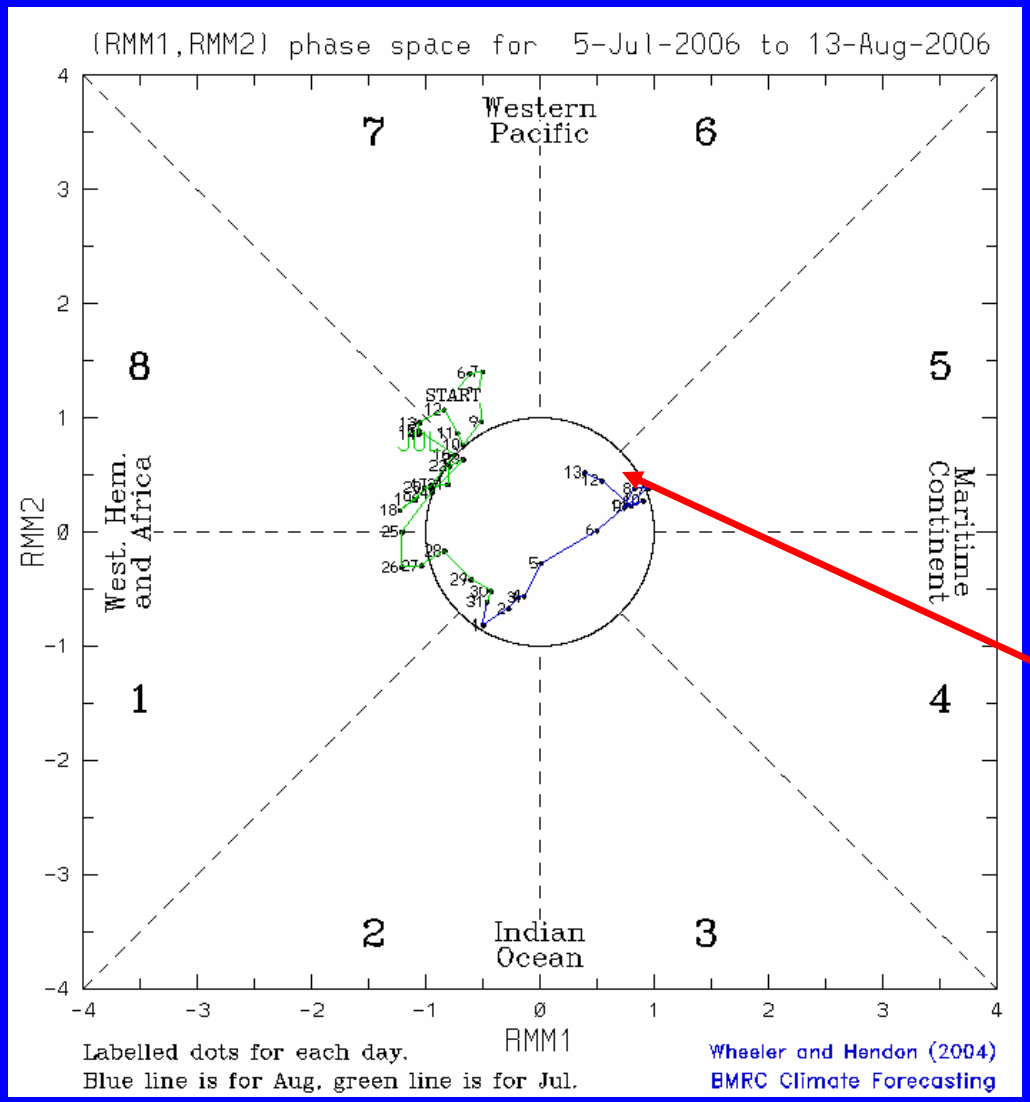
Time



Longitude

Starting in April, above normal upper oceanic water temperatures expanded from the western Pacific into the eastern Pacific in part due to Kelvin wave activity.

MJO Index (Magnitude and Phase)

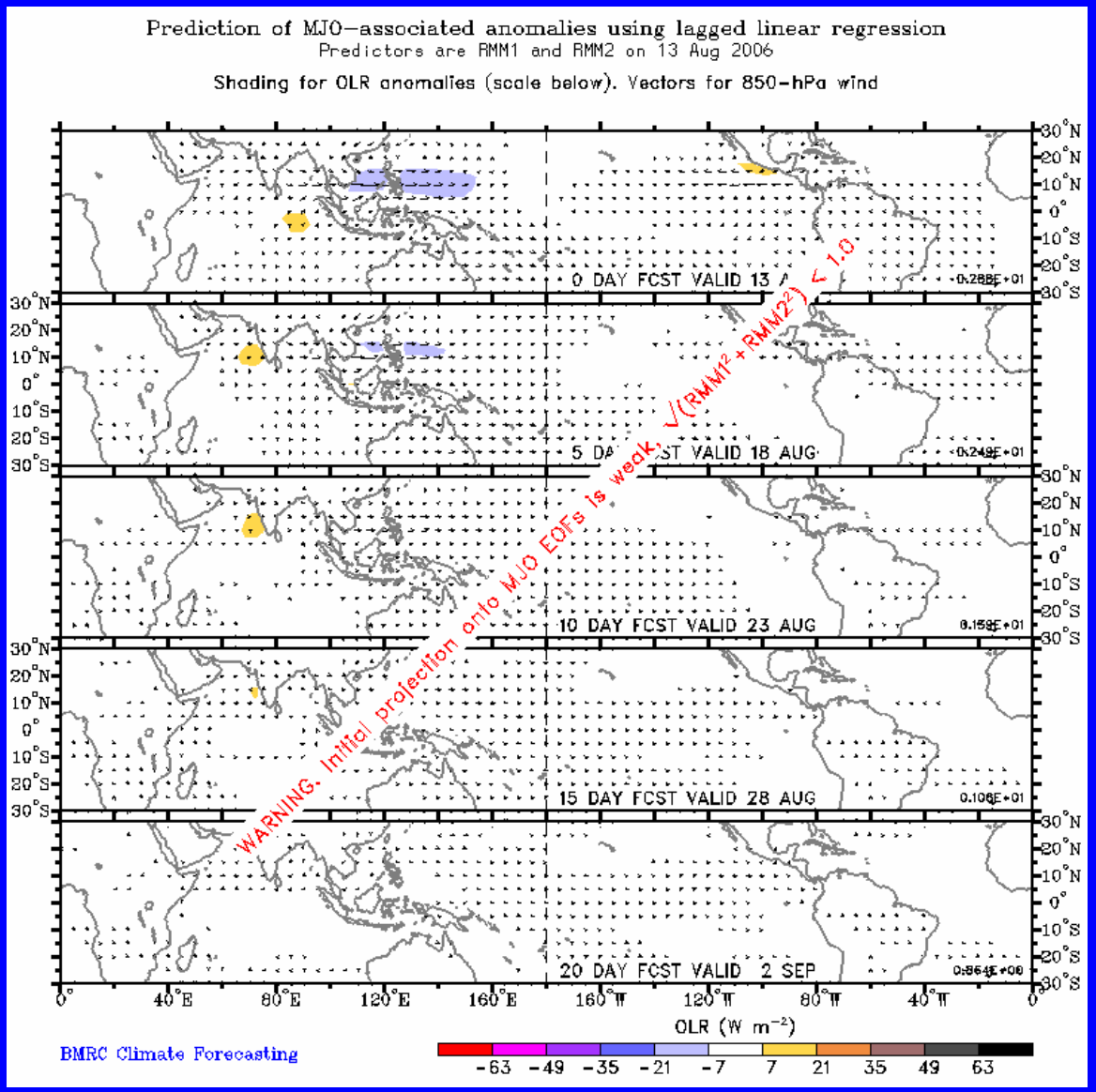


The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850 hPa zonal wind, 200 hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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.

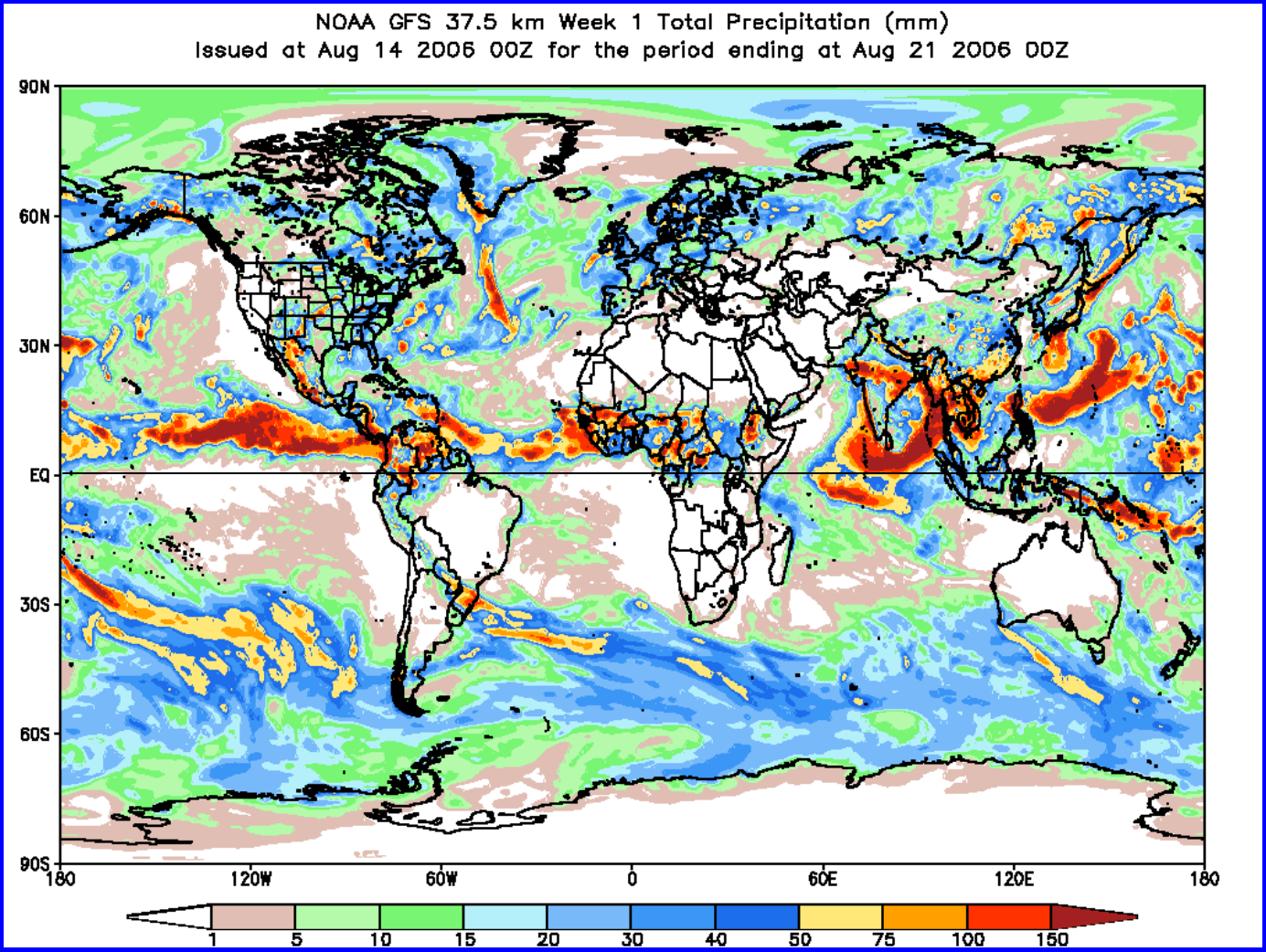
The MJO signal remained weak.

Statistical OLR MJO Forecast



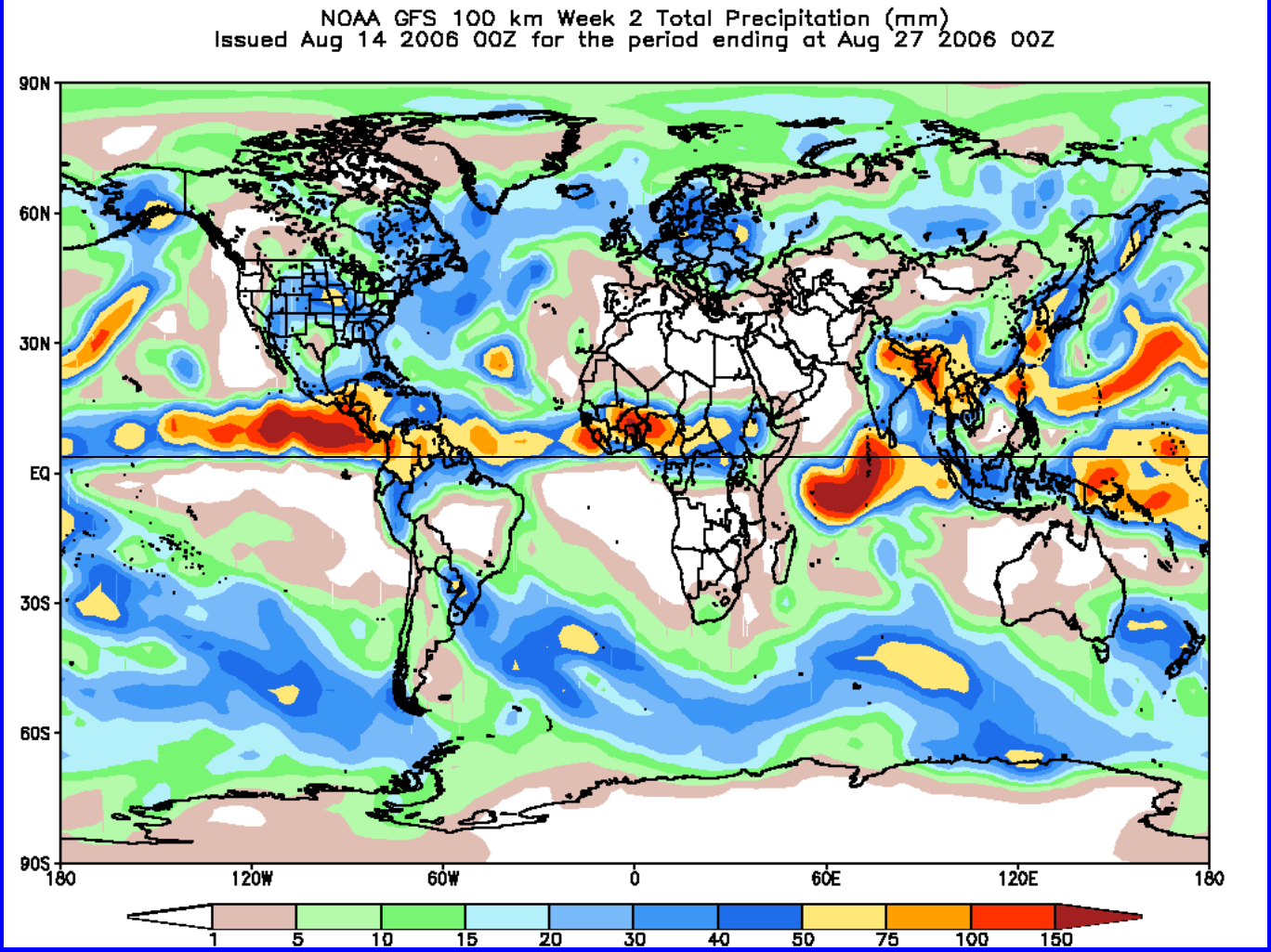
The MJO is expected to remain weak during the next 1-2 weeks.

Global Forecast System (GFS) Week 1 Precipitation Forecast



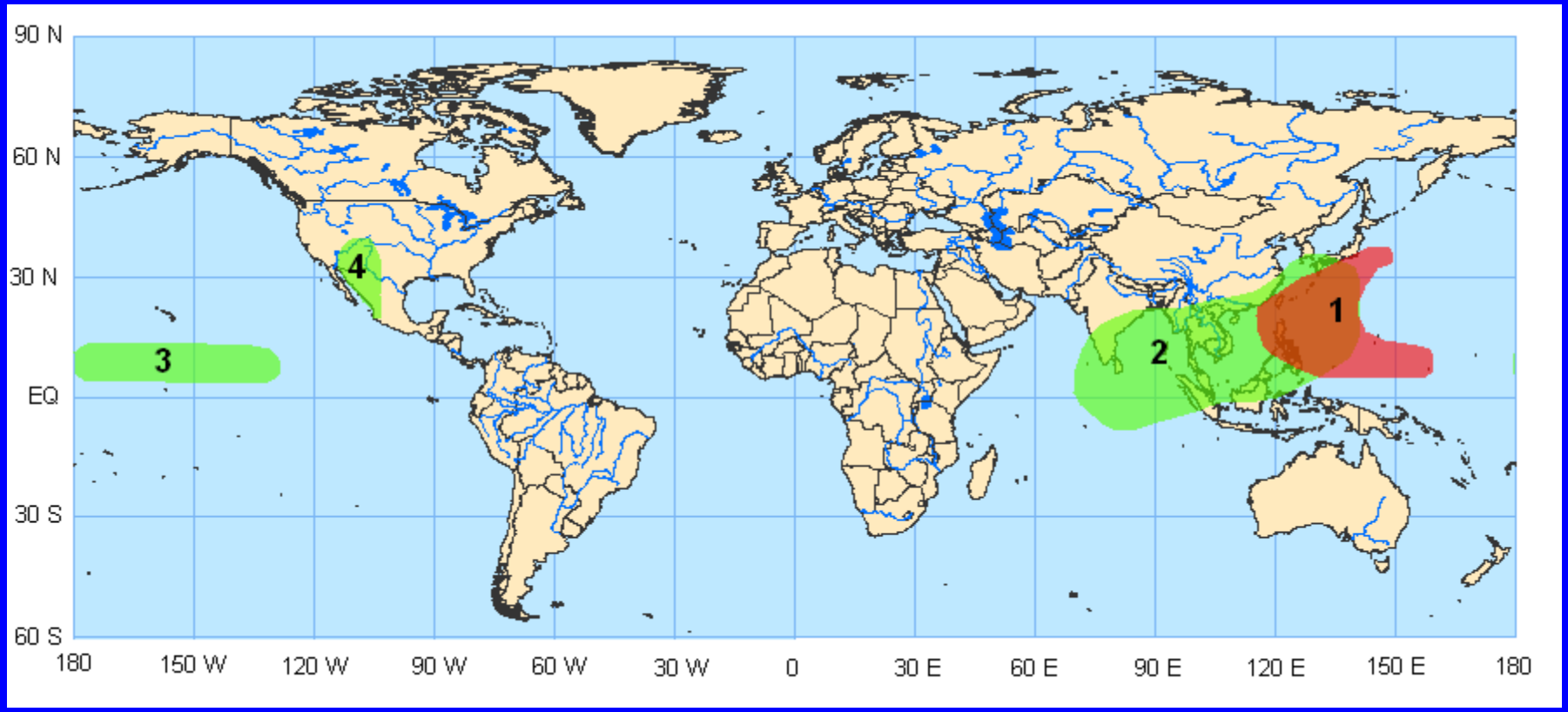
Abundant rainfall is expected over South and Southeast Asia, the central Indian Ocean, and the eastern Pacific.

Global Forecast System (GFS) Week 2 Precipitation Forecast



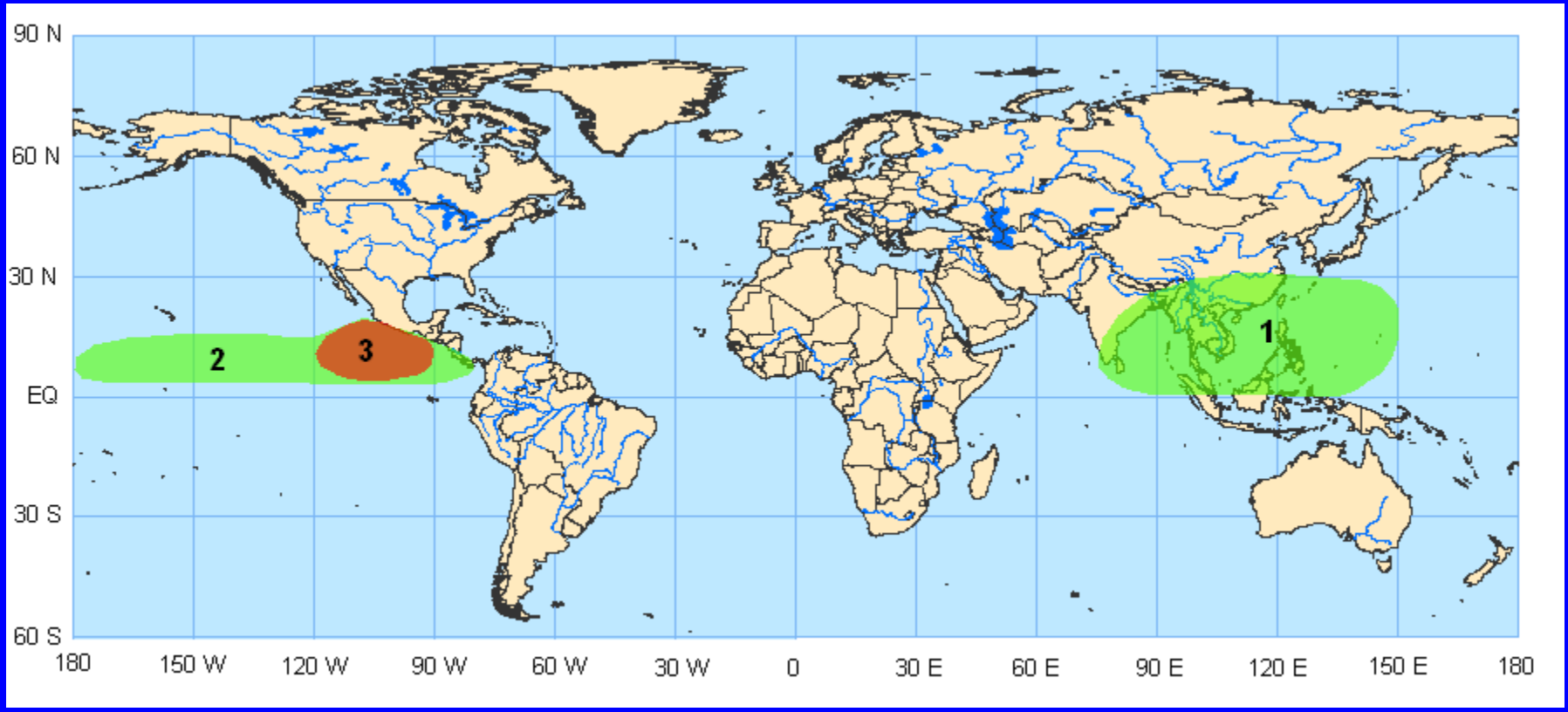
Abundant precipitation over the central Indian Ocean, the eastern Pacific and west Africa.

Potential Benefits/Hazards – Week 1
Valid August 15 - 21, 2006



1. Tropical cyclones Sonamu and Wukong are expected to impact Japan and southern Korea. Conditions are also favorable for tropical cyclogenesis in the western Pacific.
2. An increased chance for above normal rainfall over the Central Indian Ocean, Southeast Asia, and the western Pacific.
3. Increased chance for above normal rainfall over the central Pacific north of the equator.
4. Increased chance for above normal rainfall over sections of northern Mexico and the southwest US.

Potential Benefits/Hazards – Week 2
Valid August 22 - 29, 2006



1. An increased chance for above normal rainfall for the Bay of Bengal, Southeast Asia, and the western Pacific.
2. An increased chance for above normal rainfall over the central and eastern Pacific north of the equator.
3. Favorable conditions expected for tropical cyclogenesis in the eastern Pacific.

Summary

- The MJO remains weak. Based on the latest observations and model forecasts, continued weak MJO activity is expected during the next 1-2 weeks.
- During week 1, there is an increased chance for above normal rainfall for the central Indian Ocean, Southeast Asia, the western Pacific, central Pacific north of the equator, and sections of northern Mexico and the southwest US. Tropical cyclones Sonamu and Wukong are expected to impact Japan and southern Korea. In addition, conditions are expected to remain favorable for tropical cyclogenesis in the western Pacific.
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