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

Update prepared by
Climate Prediction Center / NCEP
July 10, 2006

Outline

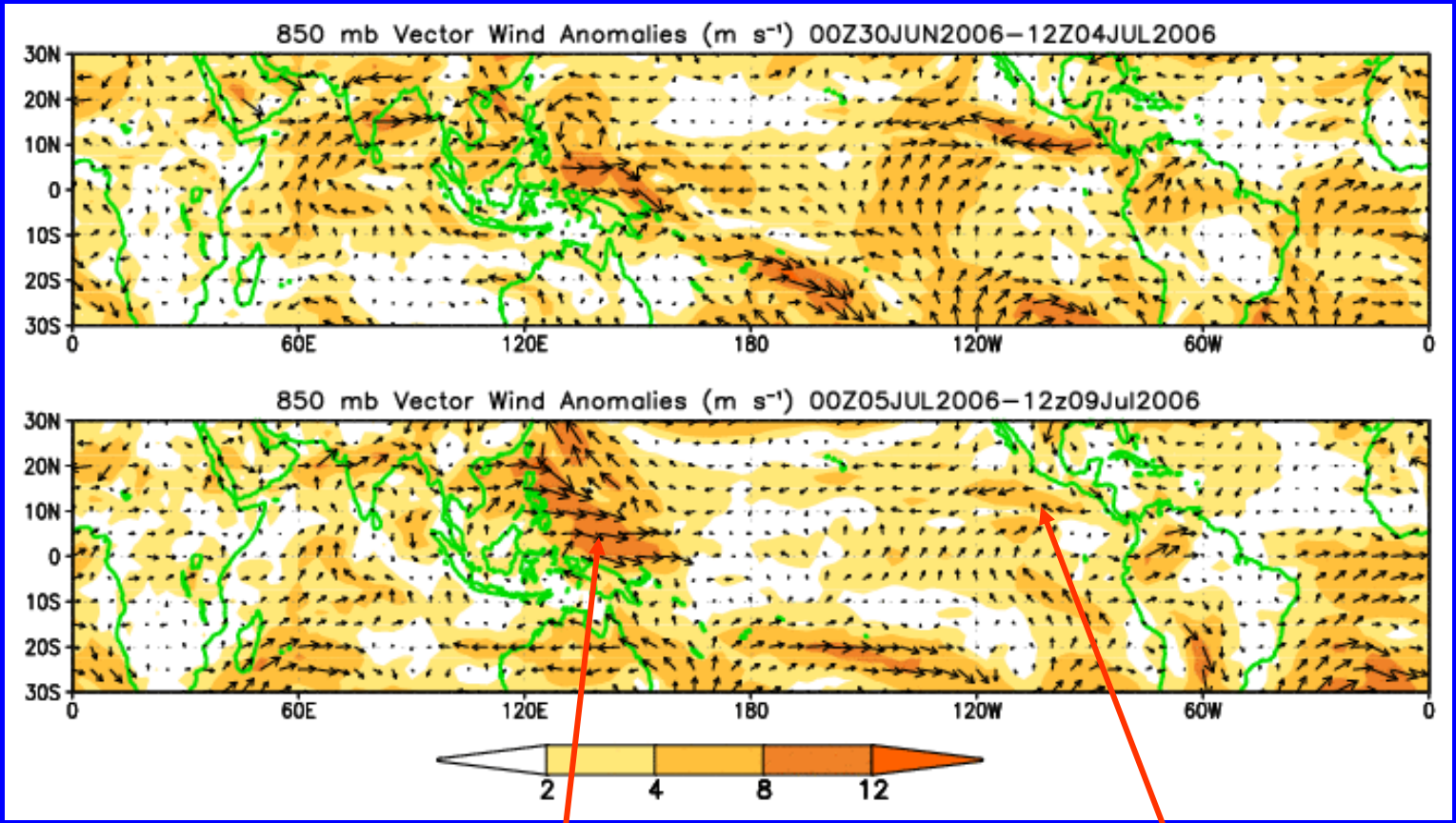
- Overview
- Recent Evolution and Current Conditions
- Madden Julian Oscillation Forecast
- Summary

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 for above normal rainfall over Southeast Asia, the east Pacific, southern Mexico, and Central America. Tropical Storm Bilis is forecast to strengthen and may impact Taiwan and southeast China. Meanwhile, over the east Pacific, an increased chance for tropical cyclogenesis exists for both weeks 1 and 2.
- During week 2, an increased chance of above average rainfall will extend from South Asia into Southeast Asia.
- Also, the west Pacific may benefit from a period of suppressed tropical cyclone activity especially entering week 2.

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

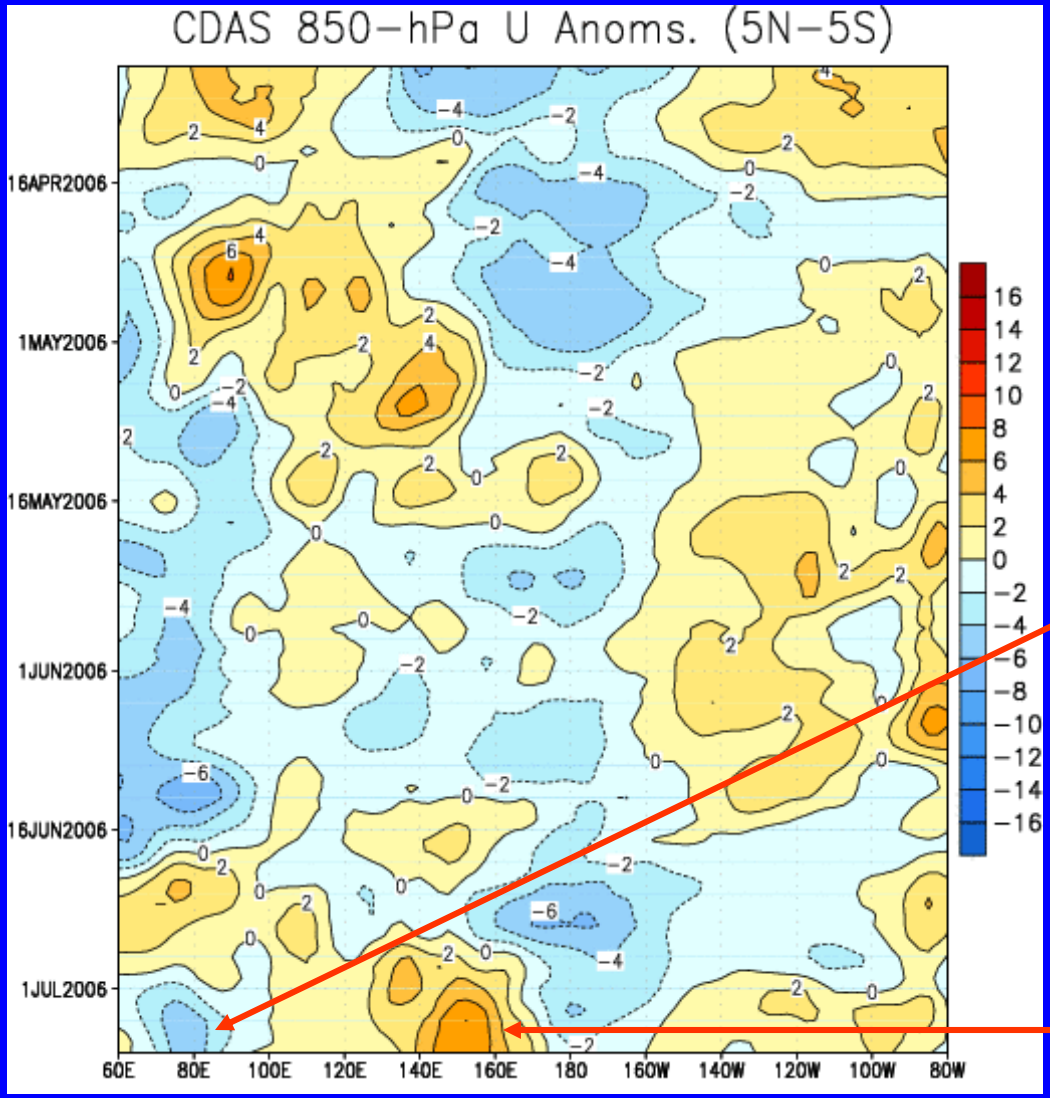
Note that shading denotes the magnitude of the anomalous wind vectors



Westerly anomalies across the western Pacific.

Easterly anomalies have weakened in the east 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)

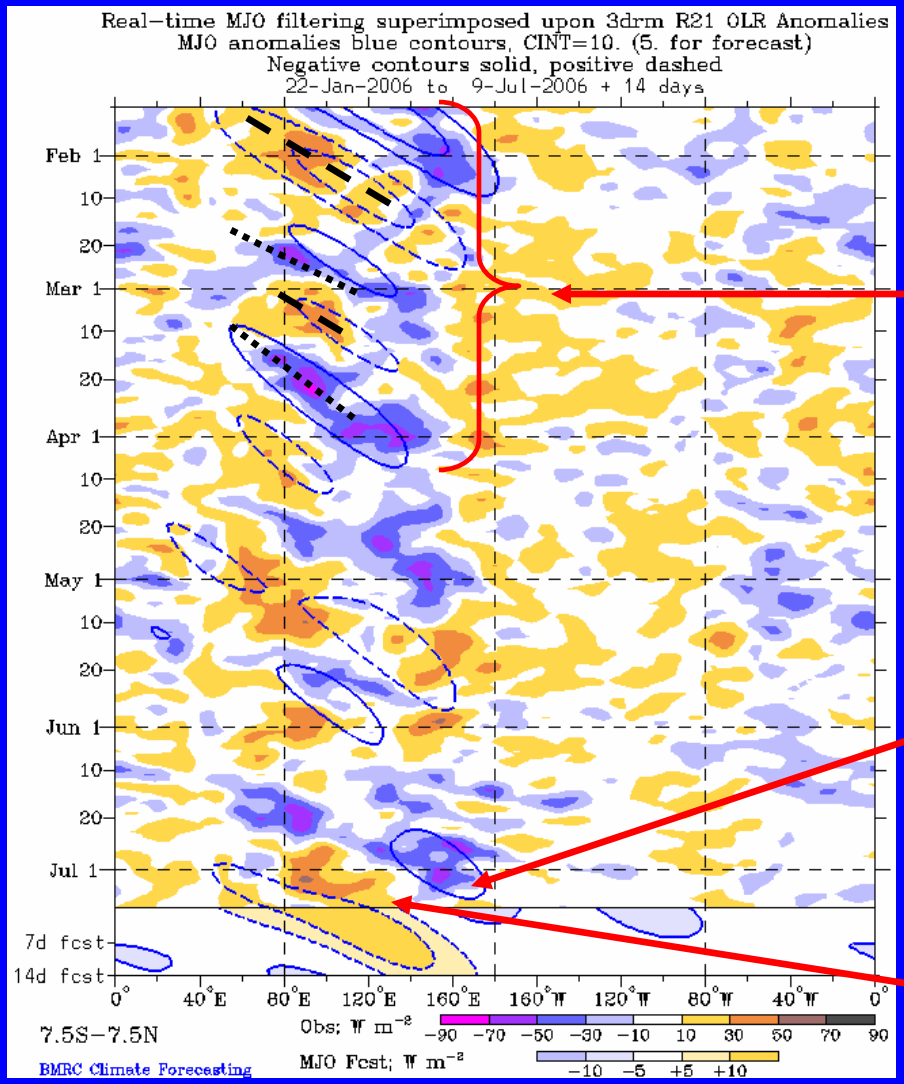
Easterly anomalies have developed over the Indian Ocean.

Westerly anomalies have strengthened across the west Pacific.

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

Drier-than-average conditions (/red shading)

Wetter-than-average conditions (blue shading)



Time

Longitude

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

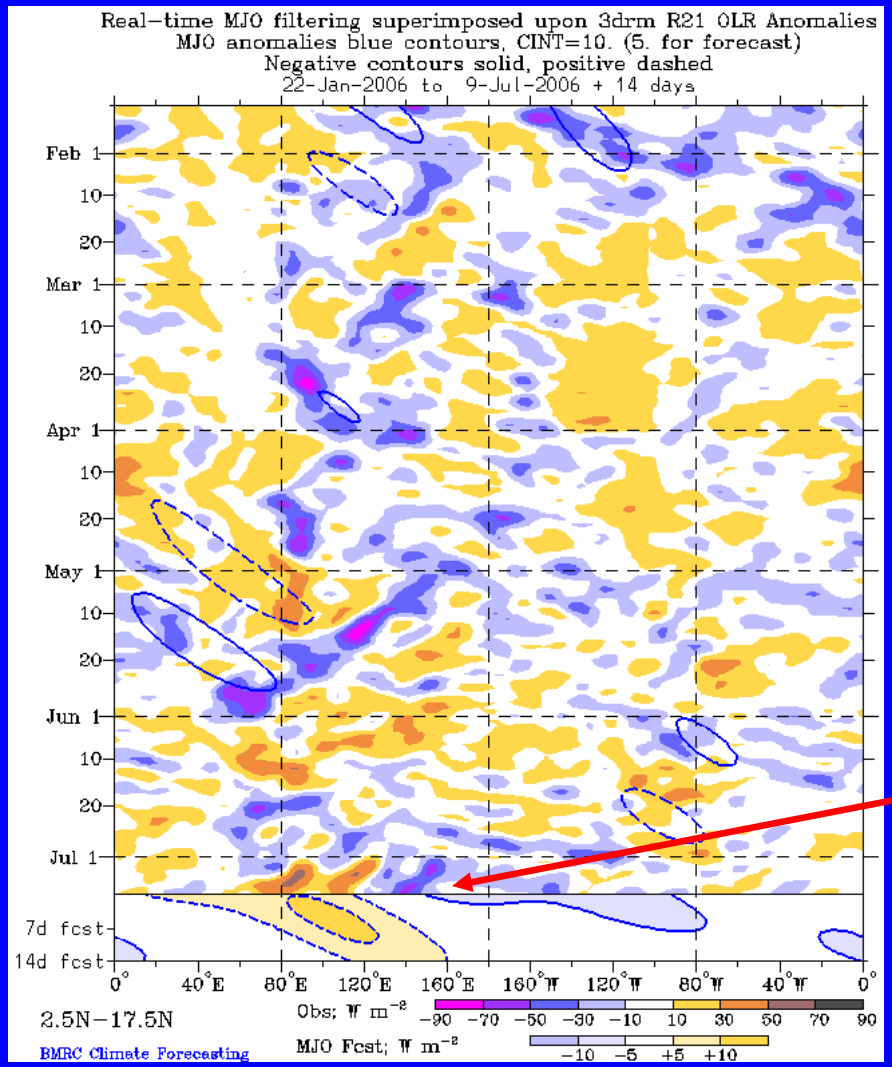
Enhanced convection has diminished over the west Pacific.

Suppressed convection has spread across the Indian Ocean.

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

Drier-than-average conditions (/red shading)

Wetter-than-average conditions (blue shading)

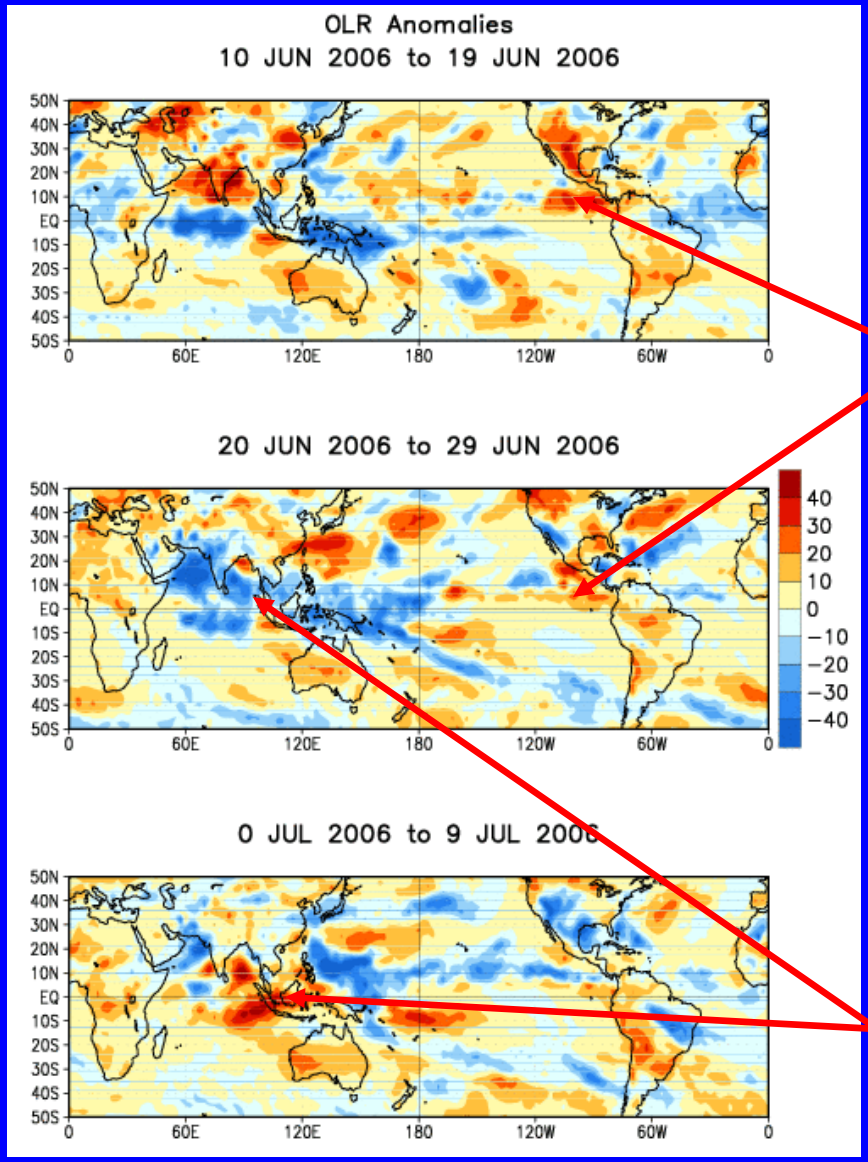


Time

Longitude

Suppressed (enhanced) convection has developed over South Asia (west Pacific).

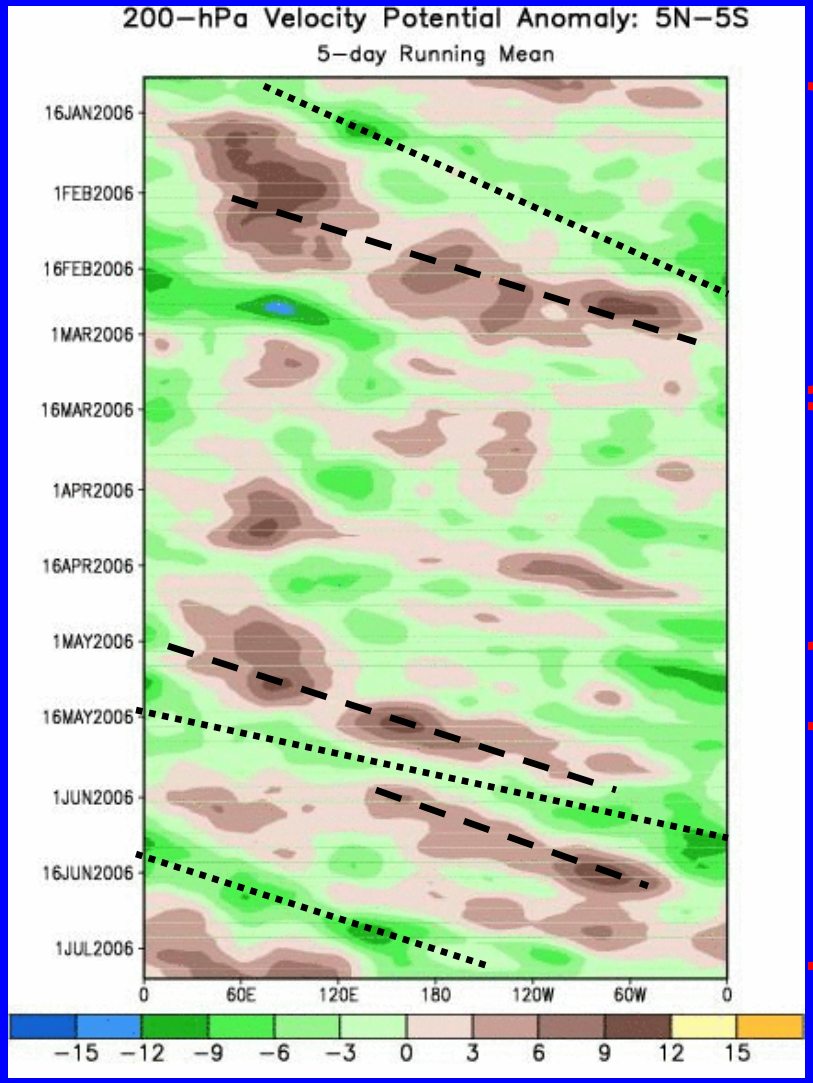
Anomalous OLR Wind: Last 30 days



During mid to late June, suppressed convection was evident in the east Pacific.

Enhanced convection has been replaced by suppressed convection over the Indian Ocean and Maritime Continent.

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



Time

Longitude

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

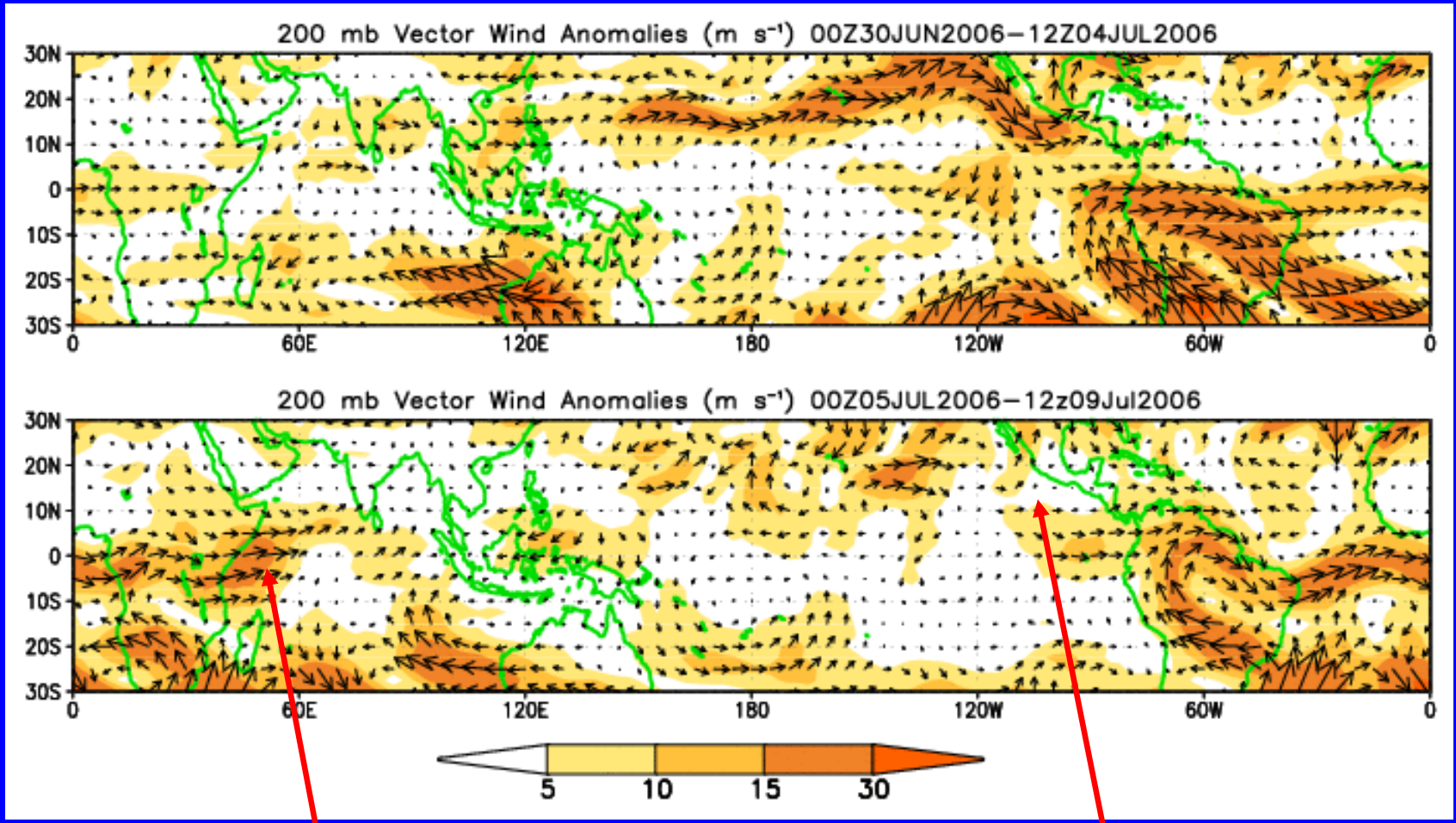
Weak to moderate MJO activity was observed during January and February.

The MJO was incoherent during much of March and April.

MJO activity strengthened during May and June but remains weak.

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

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

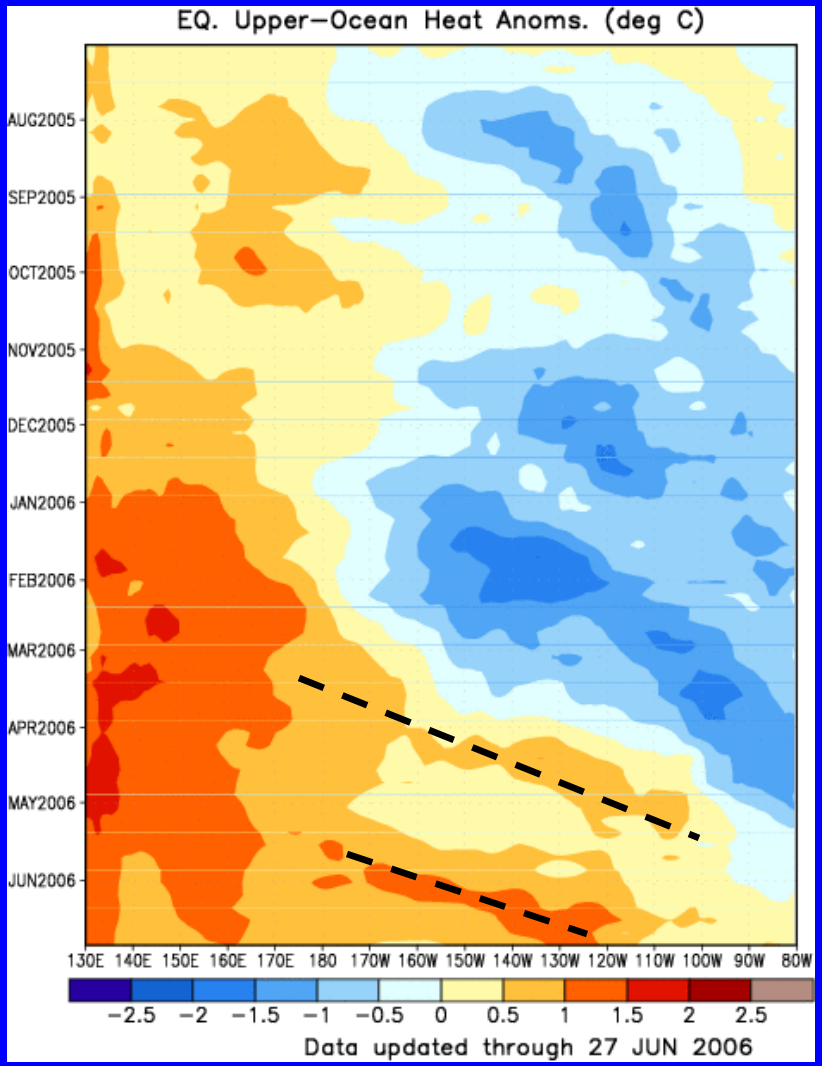


Westerly anomalies have spread over Africa and the western Indian Ocean.

Across the east Pacific, strong cyclonic circulation has weakened.

Heat Content Evolution in the Eq. Pacific

Time



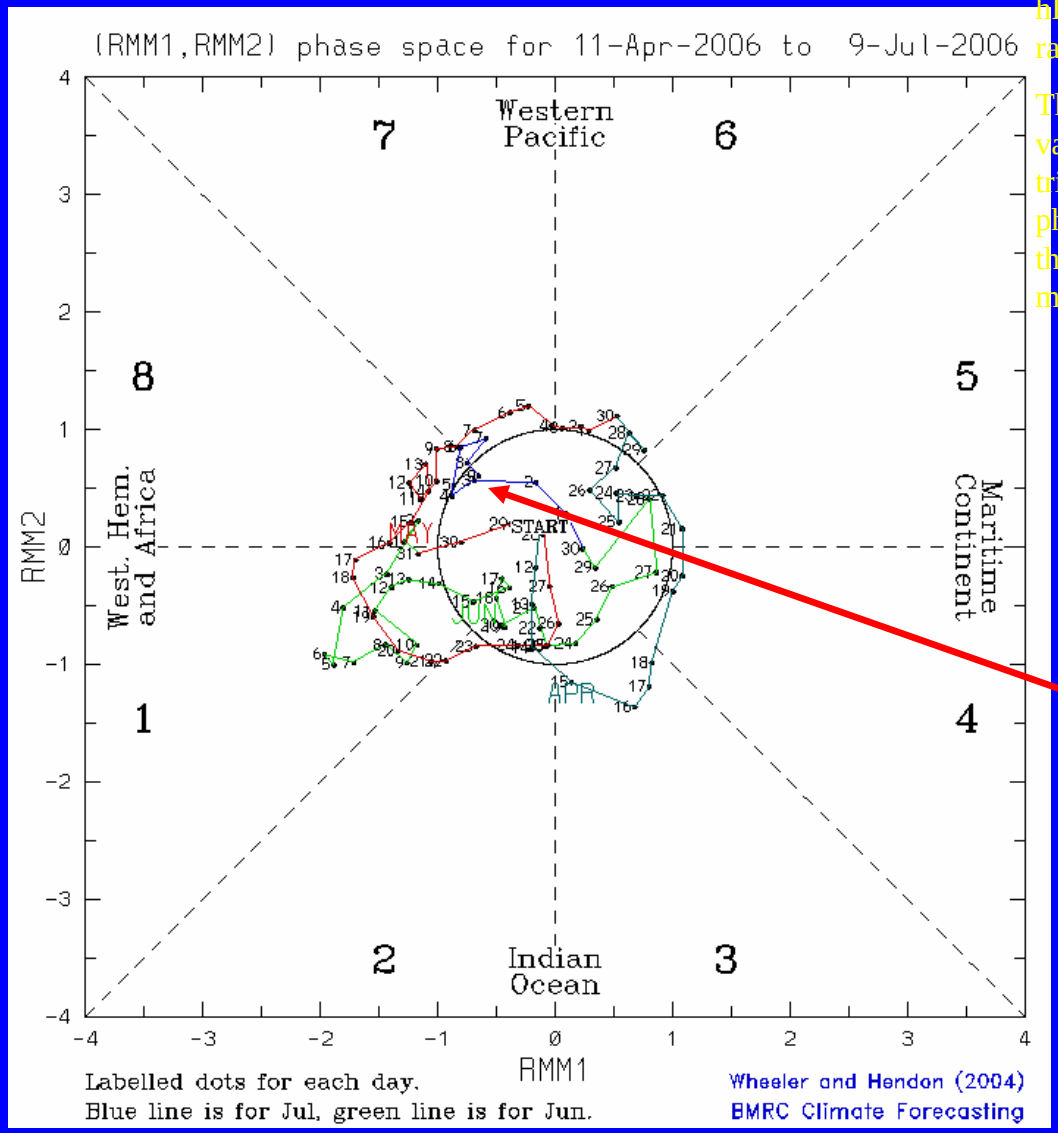
Longitude

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

MJO Index (Magnitude and Phase)

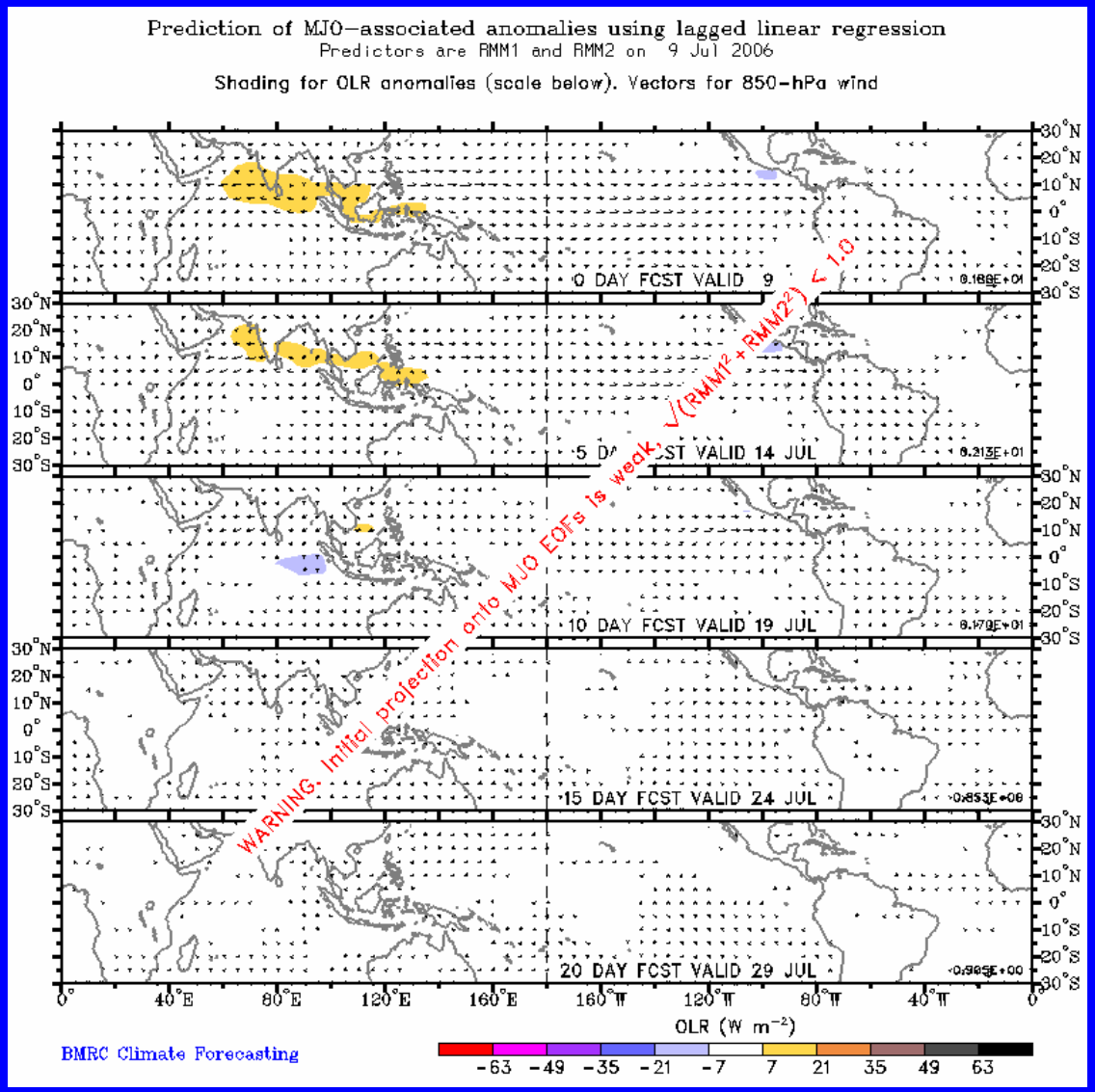
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850 hPa zonal wind, 200 hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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.



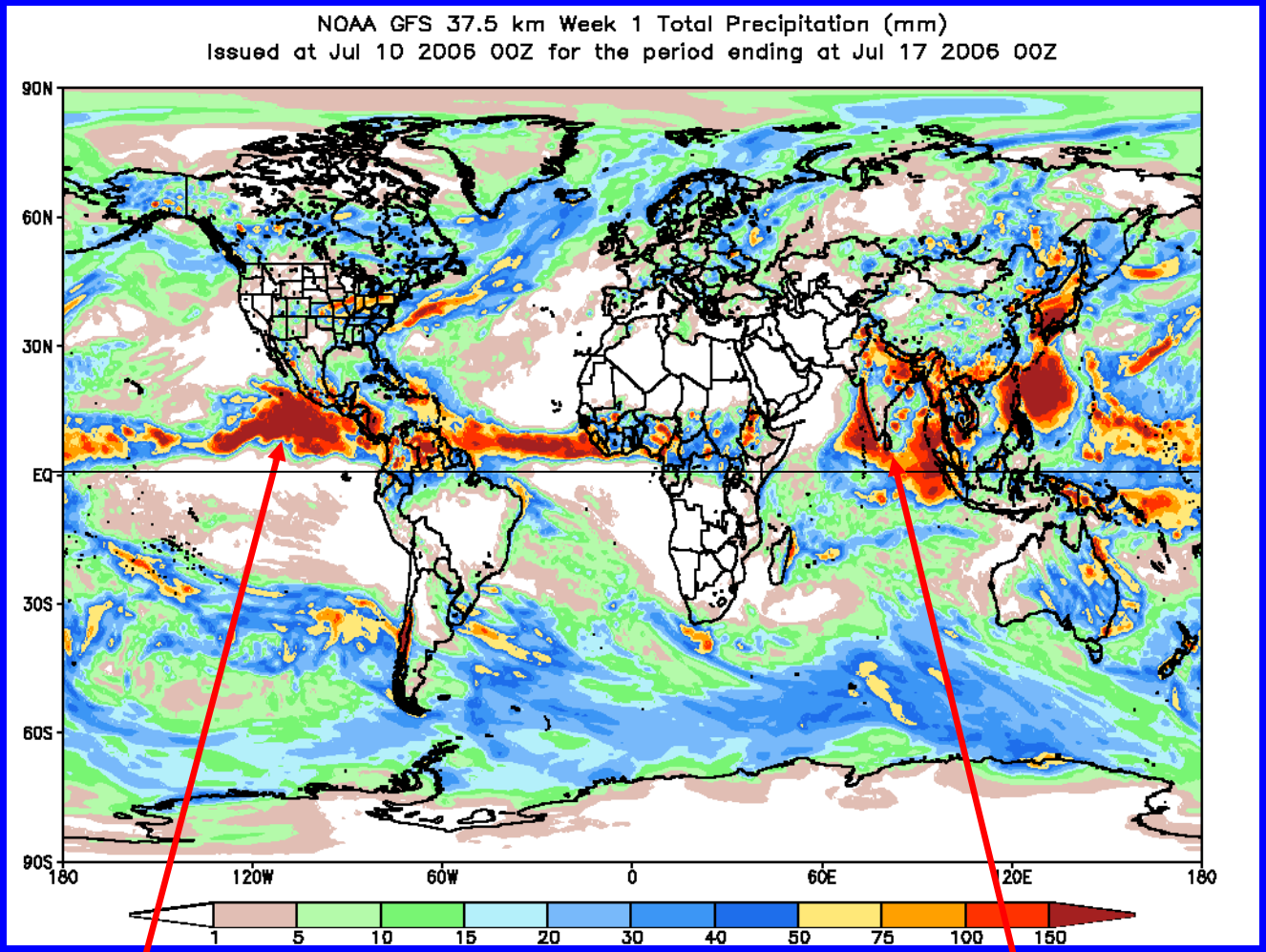
The MJO signal remains weak.

Statistical OLR MJO Forecast



A statistical MJO forecast indicates weak MJO activity during the next 1-2 weeks.

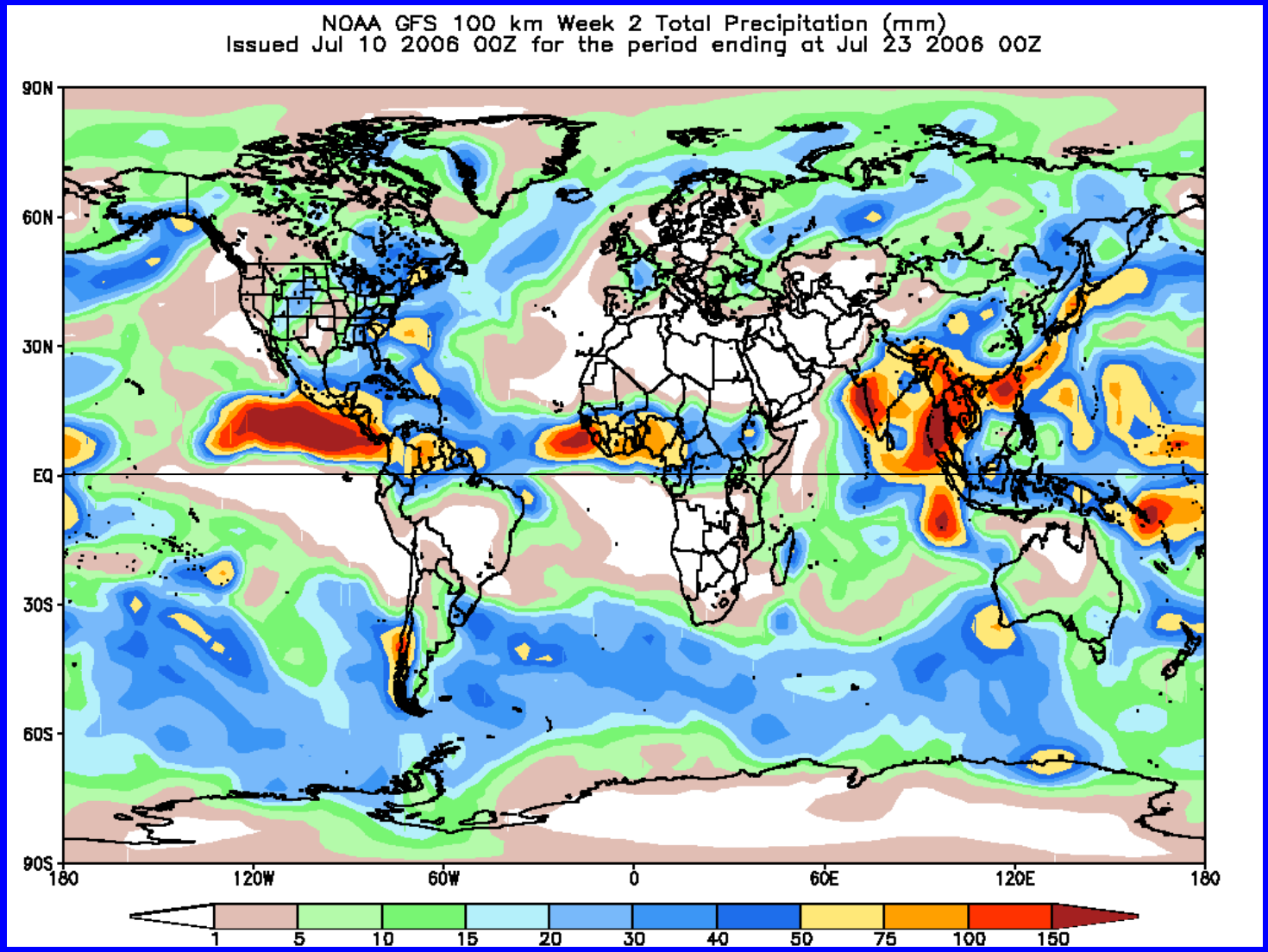
Global Forecast System (GFS) Week 1 Precipitation Forecast



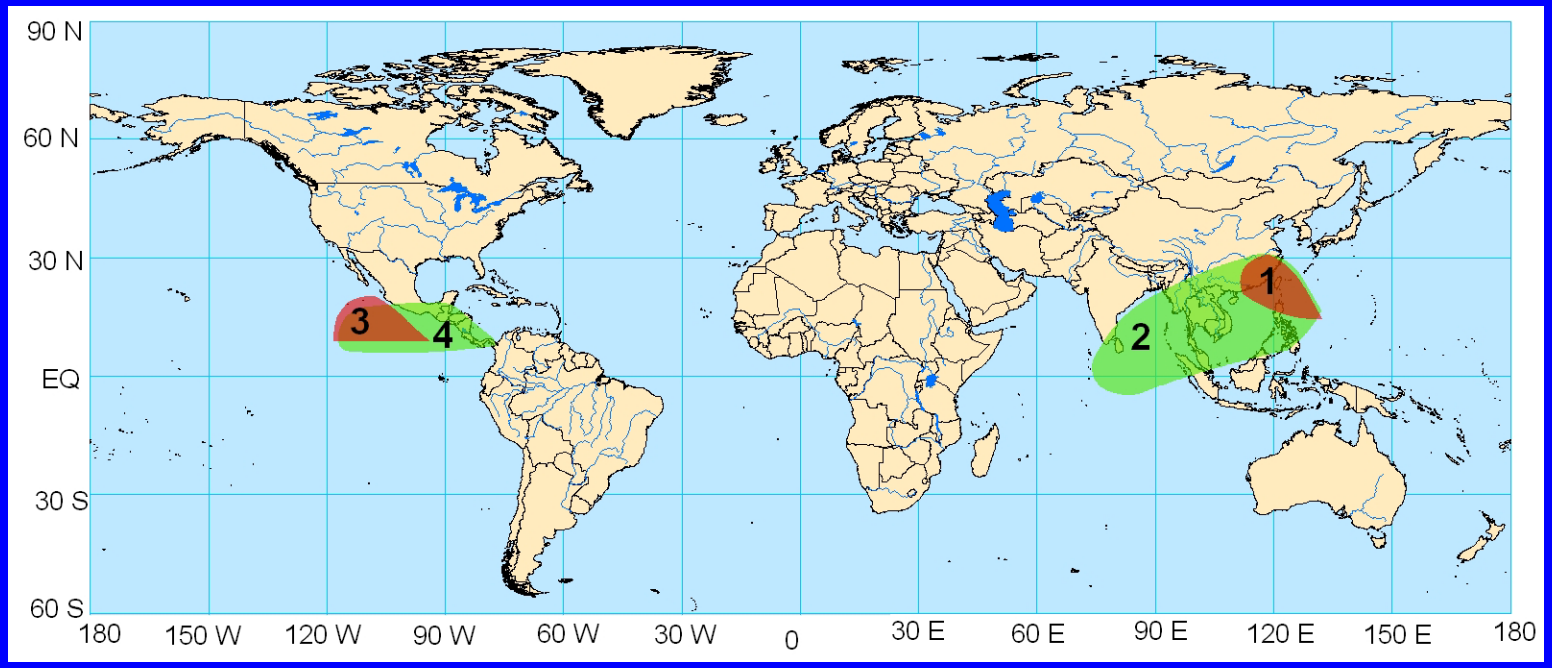
Heavy rainfall expected in the eastern Pacific.

Convection is expected to develop across the equatorial Indian Ocean.

Global Forecast System (GFS) Week 2 Precipitation Forecast

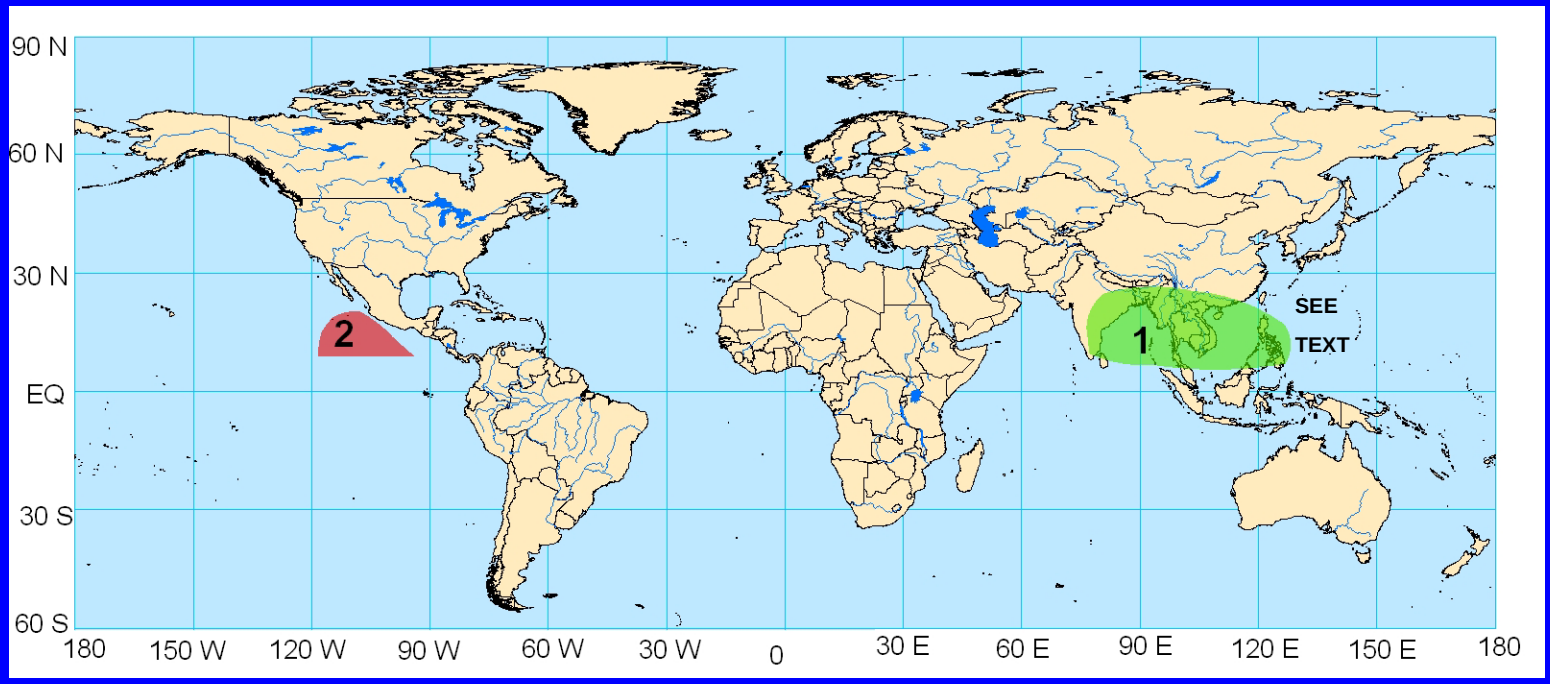


Potential Benefits/Hazards – Week 1
Valid July 11 – July 17, 2006



1. Tropical Storm Bilis will likely strengthen and impact Taiwan and southeast China
2. An increased chance for above normal rainfall for the equatorial Indian Ocean, Southeast Asia, southeast China and the Philippines
3. An increased chance for tropical cyclogenesis for the east Pacific
4. An increased chance for above normal rainfall over the east Pacific, southern Mexico, and Central America

Potential Benefits/Hazards – Week 2
Valid July 18 – July 24, 2006



1. An increased chance for above normal rainfall for South and Southeast Asia

2. An increased chance for tropical cyclogenesis in the east Pacific.

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 for above normal rainfall over Southeast Asia, the east Pacific, southern Mexico, and Central America. Tropical Storm Bilis is forecast to strengthen and may impact Taiwan and southeast China. Meanwhile, over the east Pacific, an increased chance for tropical cyclogenesis exists for both weeks 1 and 2.
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