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

Update prepared by
Climate Prediction Center / NCEP
May 1, 2006

Outline

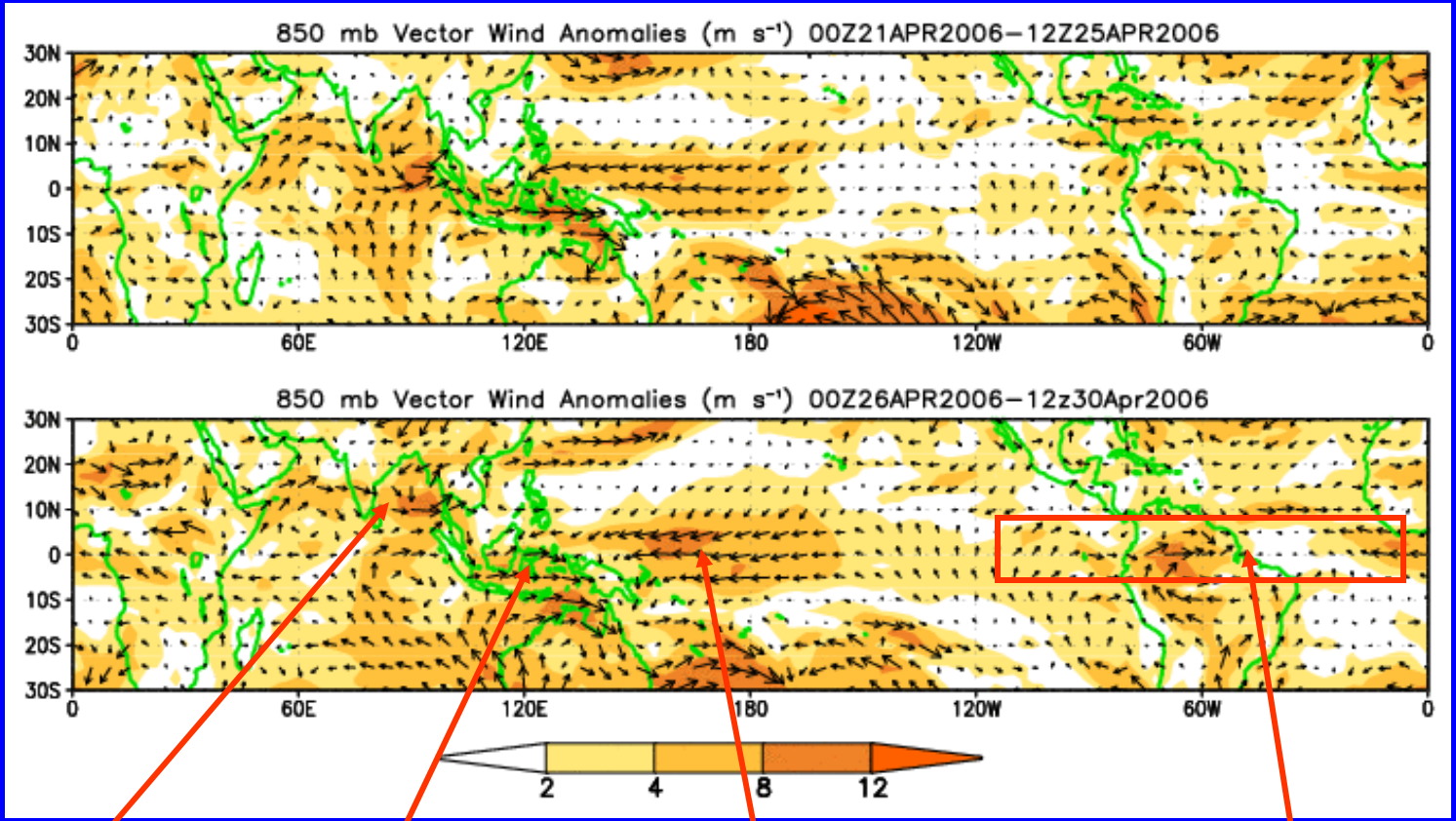
- Overview
- Recent Evolution and Current Conditions
- Madden Julian Oscillation Forecast
- Summary

Overview

- The latest observations indicate that the MJO remains weak with a lessening impact from the decaying La Nina.
- Based on the latest observational evidence, the MJO is expected to remain weak during the next 1-2 weeks.
- Potential hazards/benefits across the global tropics during week 1 include increased chances of above normal rainfall in the equatorial Atlantic, northeast Brazil, western Africa, and sections of Indonesia and the western Pacific Ocean. Also, an increased chance of below normal rainfall exists across the equatorial Indian Ocean.
- During week 2, there is an increased chance of above normal rainfall across Africa and the equatorial eastern Atlantic. Although more uncertain, the threat of above average rainfall will remain across sections of eastern Indonesia and the far western Pacific Ocean.

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

Note that shading denotes the magnitude of the anomalous wind vectors



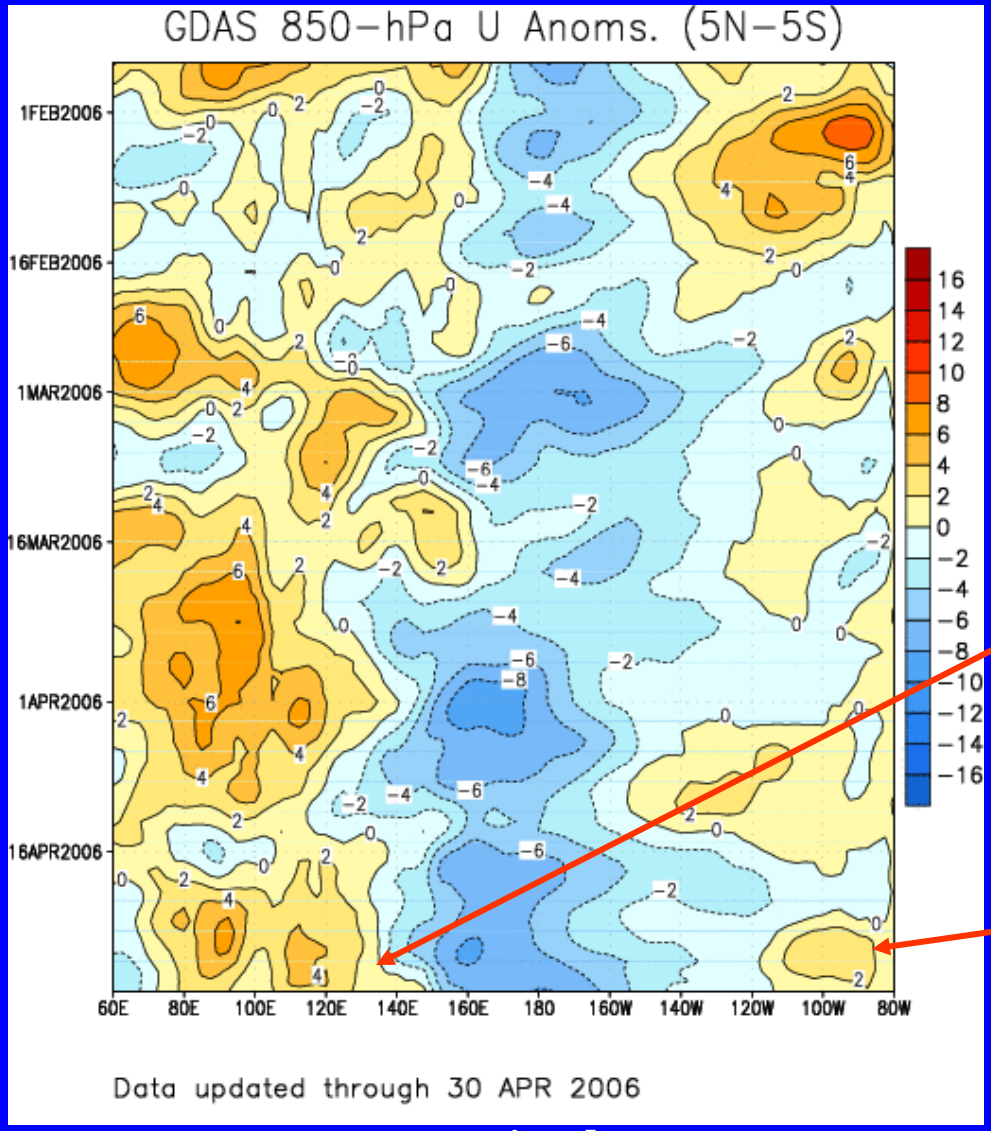
Cyclonic circulation associated with tropical cyclone Mala

Westerlies persist over maritime continent

Easterlies persist in the western Pacific

Anomalies in equatorial eastern Pacific, South America and Atlantic associated with enhanced convection

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



Time

Longitude

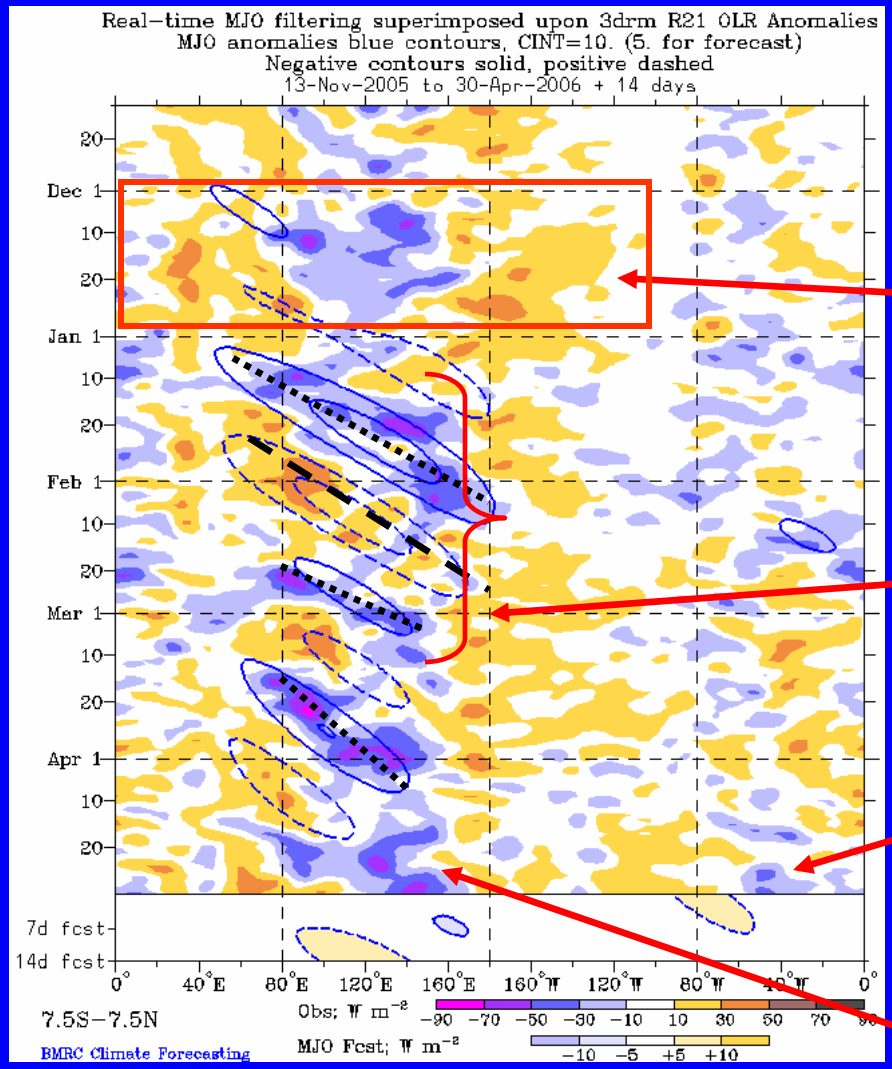
Weaker-than-average easterlies or westerlies (orange/red shading)

Stronger-than-average easterlies (blue shading)

Westerly anomalies from the Indian Ocean moved eastward during the past several days

Equatorial low-level westerly anomalies developed in the eastern Pacific.

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)

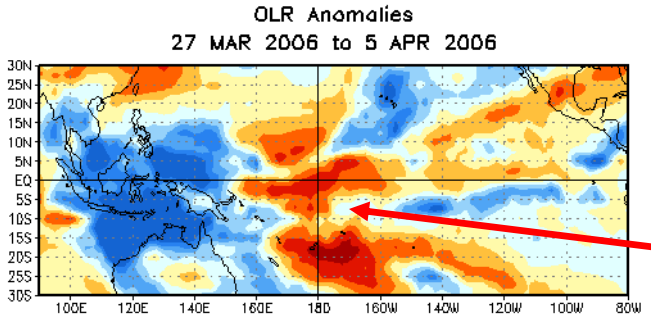
Enhanced convection was quasi-stationary across sections of the eastern Indian Ocean, Indonesia and the western Pacific Ocean during December

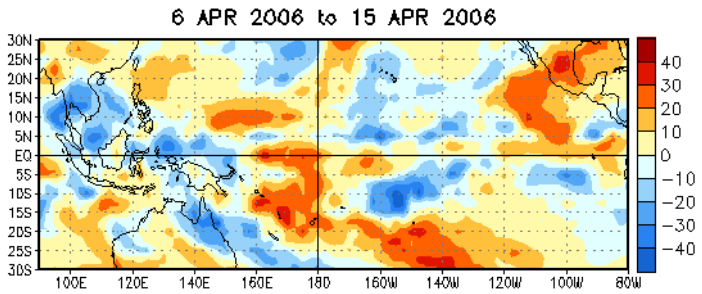
Eastward propagation of OLR anomalies was evident from mid-January through late February

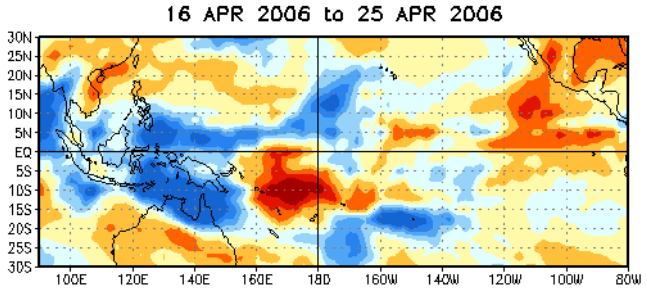
Enhanced convection developed in the Atlantic Ocean during the last several days

Enhanced convection propagated from the eastern Indian Ocean to western Pacific during the last 10 days

Anomalous OLR and 850-hPa Wind: Last 30 days

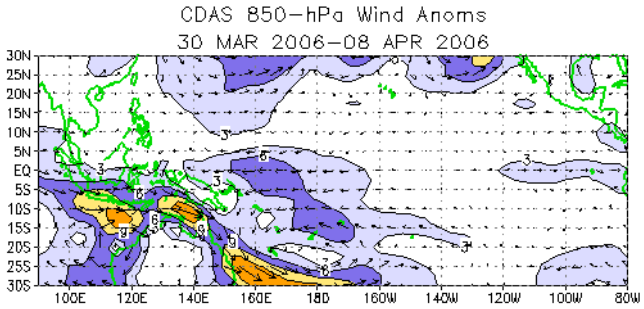


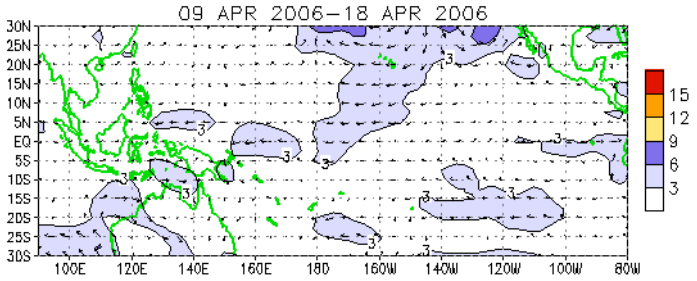


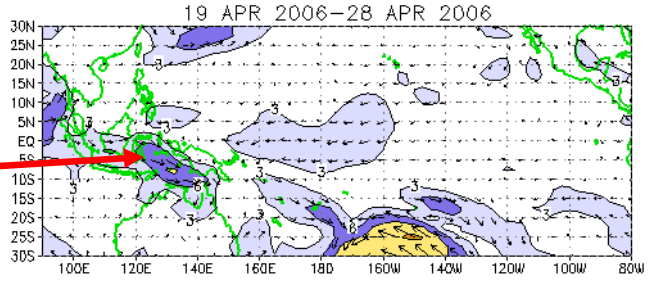


Suppressed convection near the date line in the equatorial Pacific Ocean has weakened considerably during April.

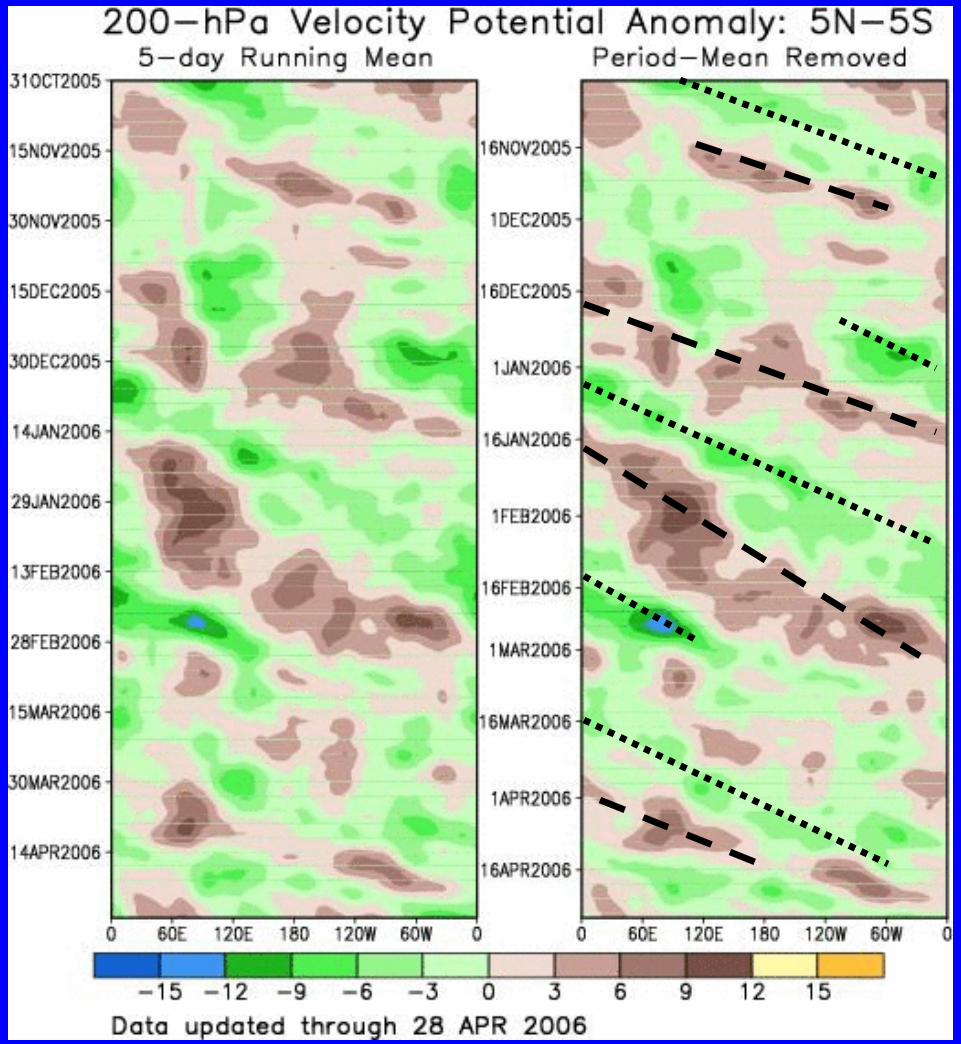
Westerly wind anomalies have shifted eastward mainly south of the equator during the last ten days.







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



Time

Longitude

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

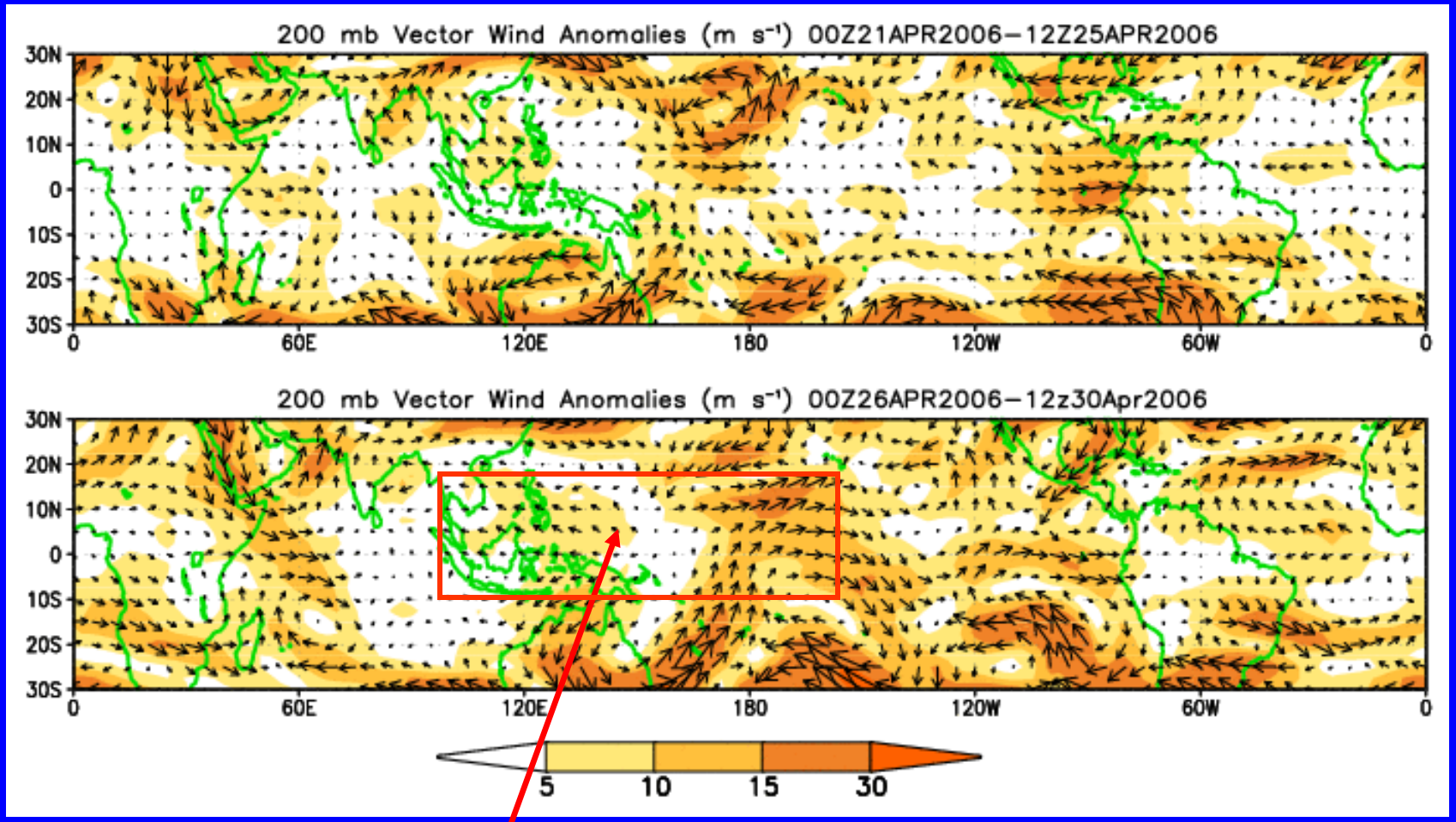
Negative anomalies (green shading) indicate favorable conditions for precipitation.

Weak to moderate MJO activity was observed during November and January-February time periods.

During April, MJO activity remained weak.

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

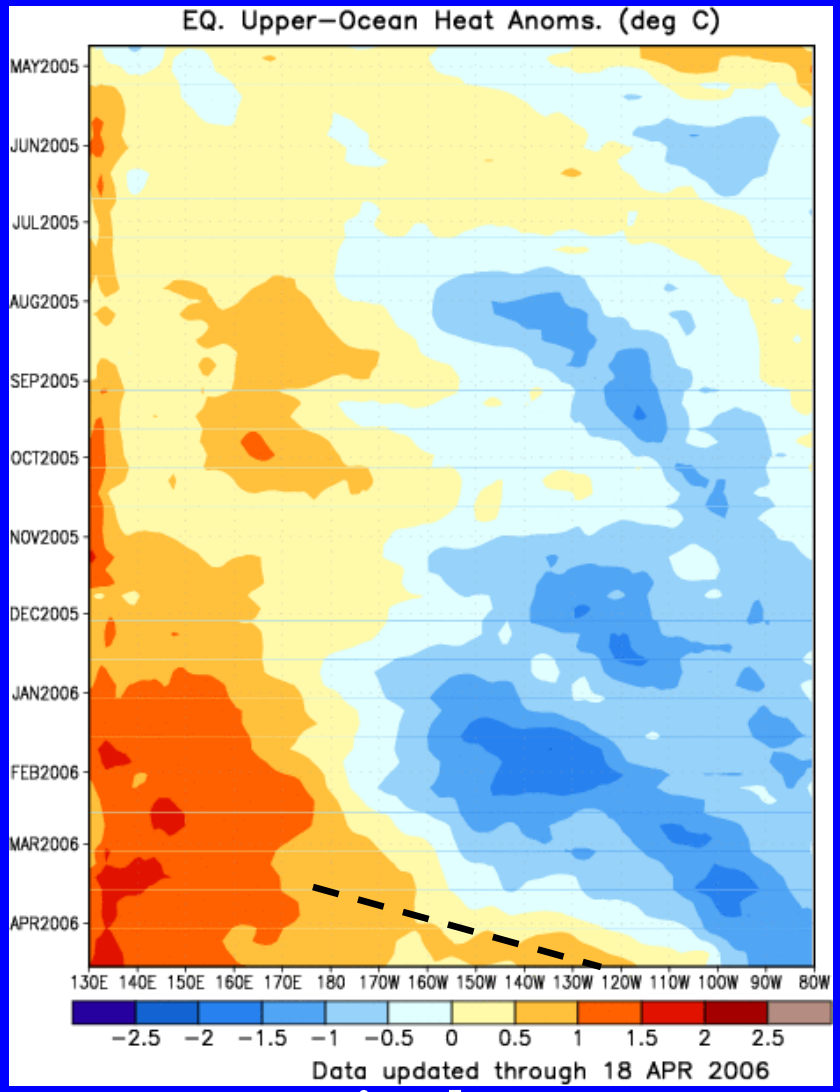
Note that shading denotes the magnitude of the anomalous wind vectors.



Wind anomalies in the tropics associated with enhanced convection in the western Pacific Ocean.

Heat Content Evolution in the Eq. Pacific

Time



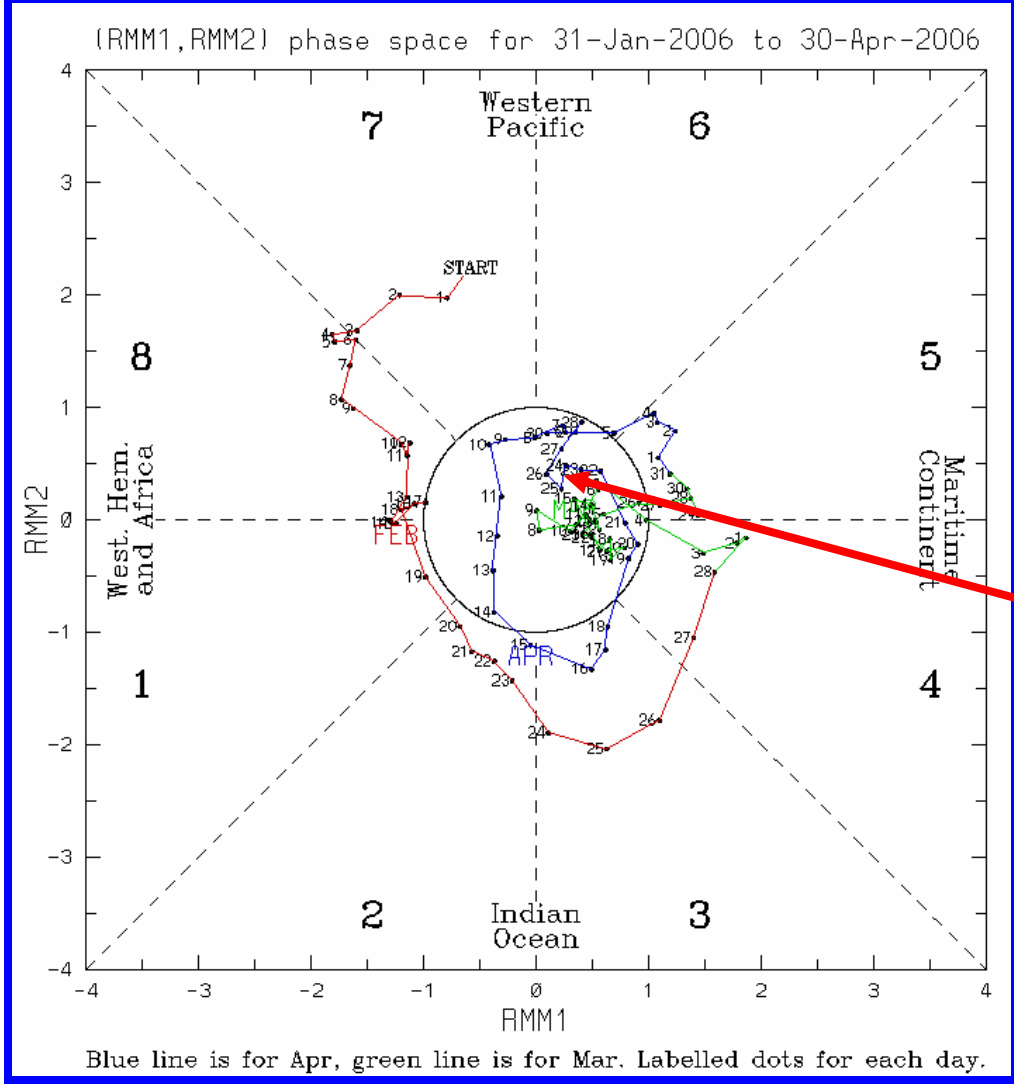
Longitude

Above normal heat content expanded into the eastern Pacific during April 2006.

MJO Index (Magnitude and Phase)

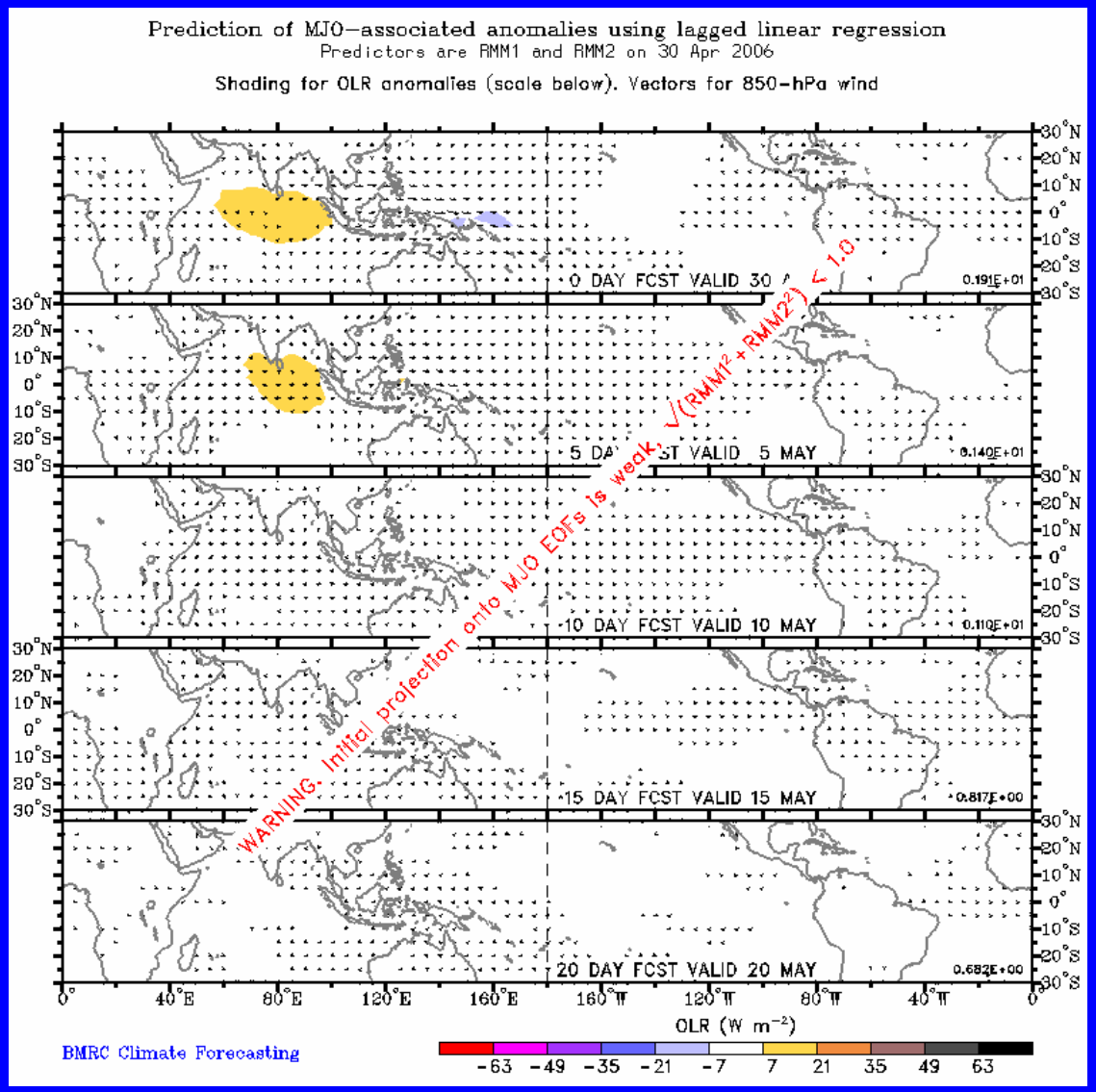
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850 hPa zonal wind, 200 hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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.



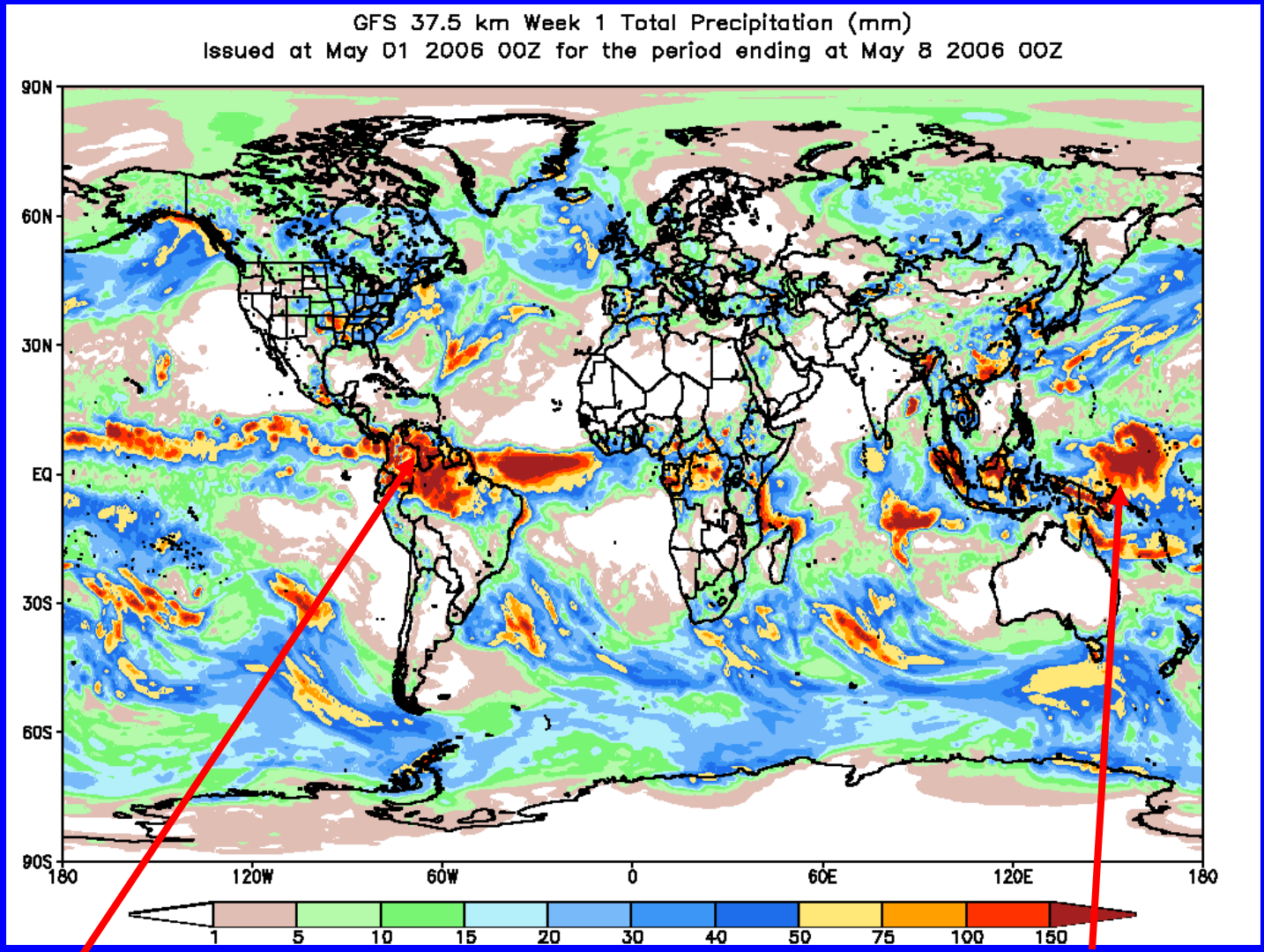
The MJO signal was weak during April.

Statistical OLR MJO Forecast



A statistical MJO forecast indicates that the MJO will remain weak during the next two weeks.

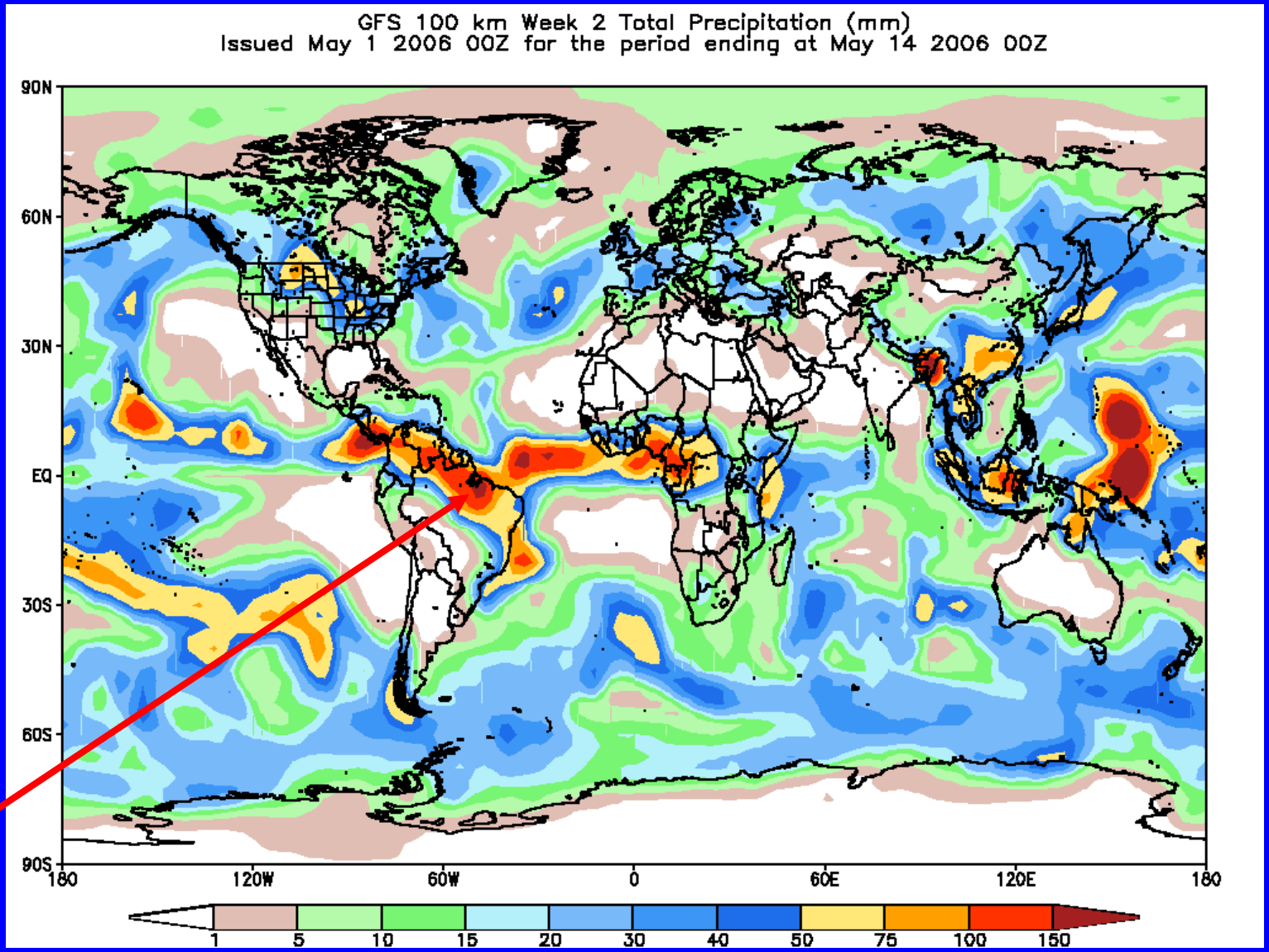
Global Forecast System (GFS) Week 1 Precipitation Forecast



Heavy rainfall across equatorial South America and Atlantic

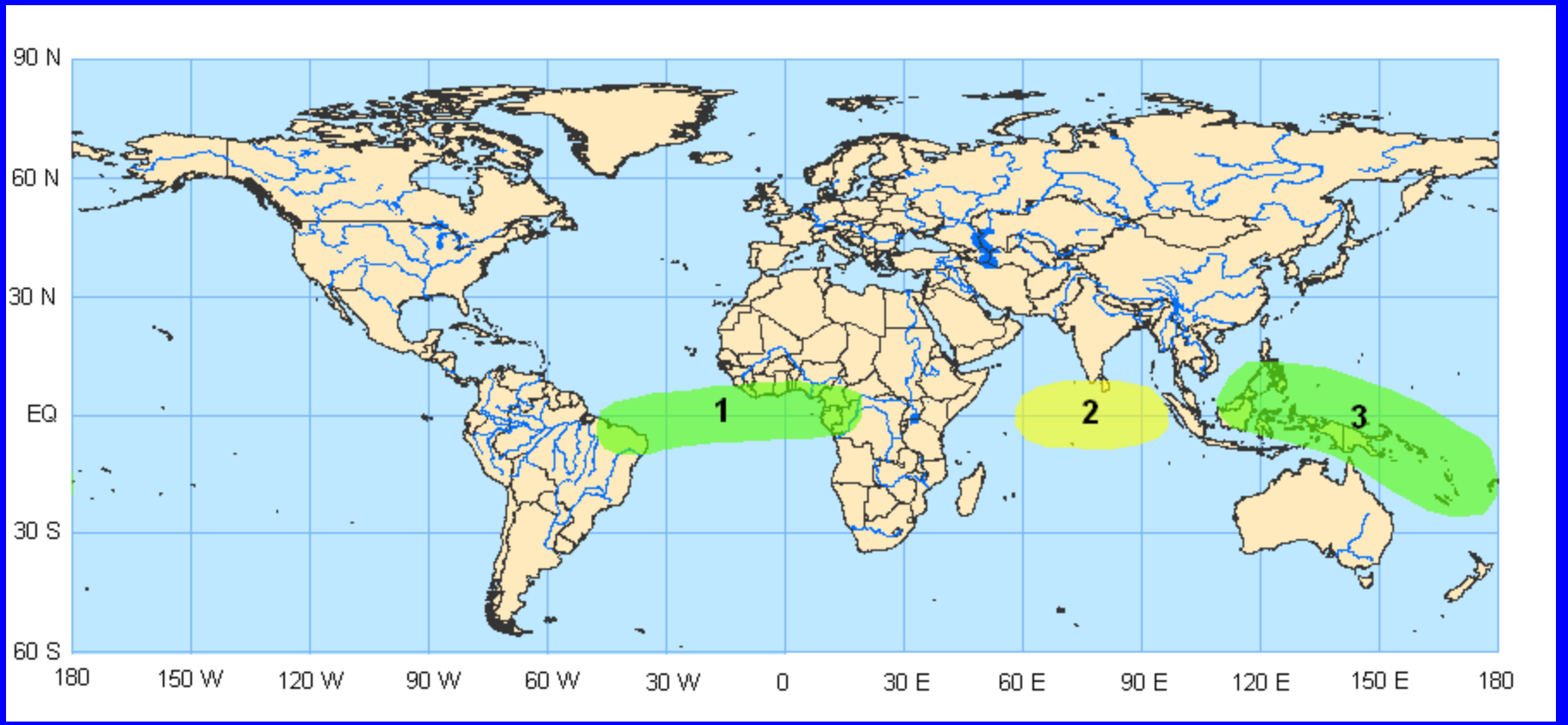
Abundant rainfall persists in the western Pacific

Global Forecast System (GFS) Week 2 Precipitation Forecast



Heavy rainfall across the equatorial Atlantic, northeast South America, and west-central Africa.

Potential Benefits/Hazards – Week 1
Valid May 2 - 8, 2006

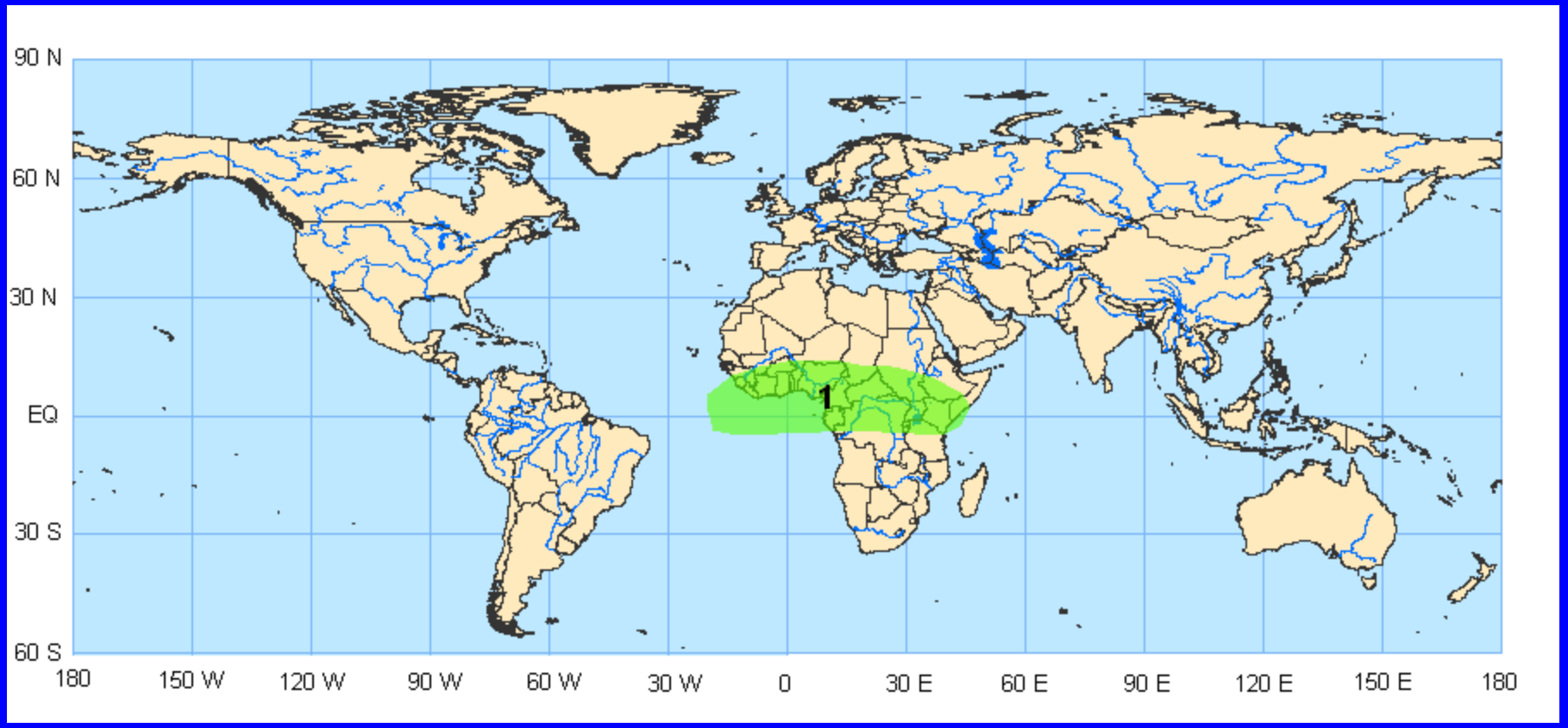


1. Increased chances of above normal rainfall in the equatorial Atlantic, northeast Brazil, and sections of western Africa associated with the continued evolution of intraseasonal variability and localized above normal SSTs.

2. Increased chances of below normal rainfall in the Indian Ocean associated with the continued evolution of intraseasonal variability

3. Increased chances of above normal rainfall in the western Pacific Ocean and sections of Indonesia associated with the weakening La Nina signal, continued evolution of intraseasonal variability, and localized above normal SSTs.

Potential Benefits/Hazards – Week 2
Valid May 9 – May 15, 2006



1. Above normal rainfall in the equatorial eastern Atlantic and Africa regions associated with continued evolution of intraseasonal variability and localized above normal SSTs.

Summary

- The latest observations indicate that the MJO remains weak with a lessening impact from the decaying La Nina.
- Based on the latest observational evidence, the MJO is expected to remain weak during the next 1-2 weeks.
- Potential hazards/benefits across the global tropics during week 1 include increased chances of above normal rainfall in the equatorial Atlantic, northeast Brazil, western Africa, and sections of Indonesia and the western Pacific Ocean. Also, an increased chance of below normal rainfall exists across the equatorial Indian Ocean.
- During week 2, there is an increased chance of above normal rainfall across Africa and the equatorial eastern Atlantic. Although more uncertain, the threat of above average rainfall will remain across sections of eastern Indonesia and the far western Pacific Ocean.