



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

Update prepared by
Climate Prediction Center / NCEP
April 17, 2006



Outline

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



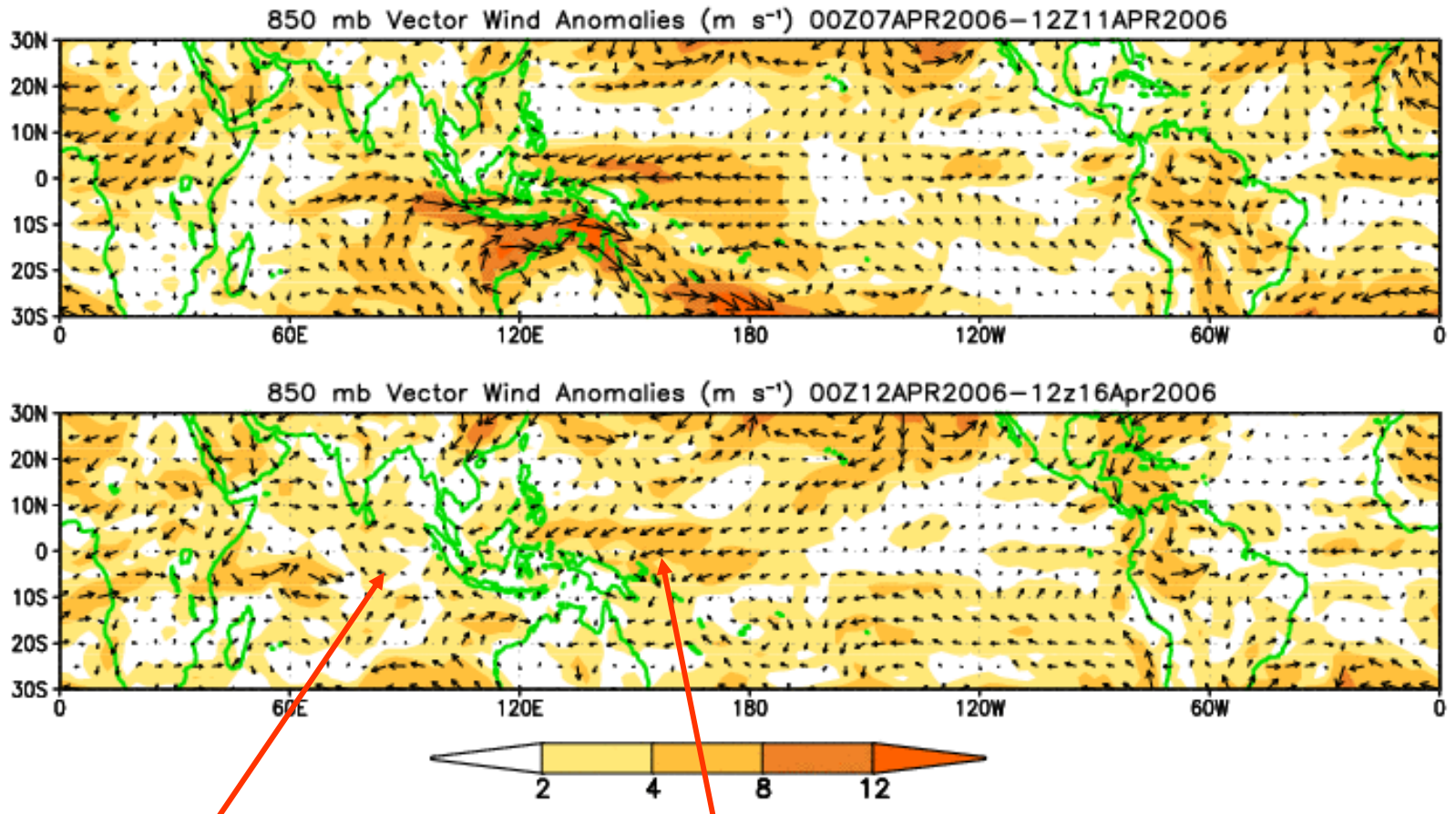
Overview

- The latest observations indicate the MJO remains weak with the continuation of La Nina conditions.
- Based on the latest observational evidence, the MJO is expected to remain weak during the upcoming 1-2 week period.
- Potential hazards/benefits across the global tropics during the upcoming period are consistent with the continuation of La Nina and include increased chances of above normal rainfall across Indonesia, the western Pacific Ocean, and parts of the south Pacific. Drier than average conditions are expected in the equatorial central Pacific Ocean. During Week 1, an increased chance of above normal rainfall also exists for parts of South Asia and northern South America.



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

Note that shading denotes the magnitude of the anomalous wind vectors



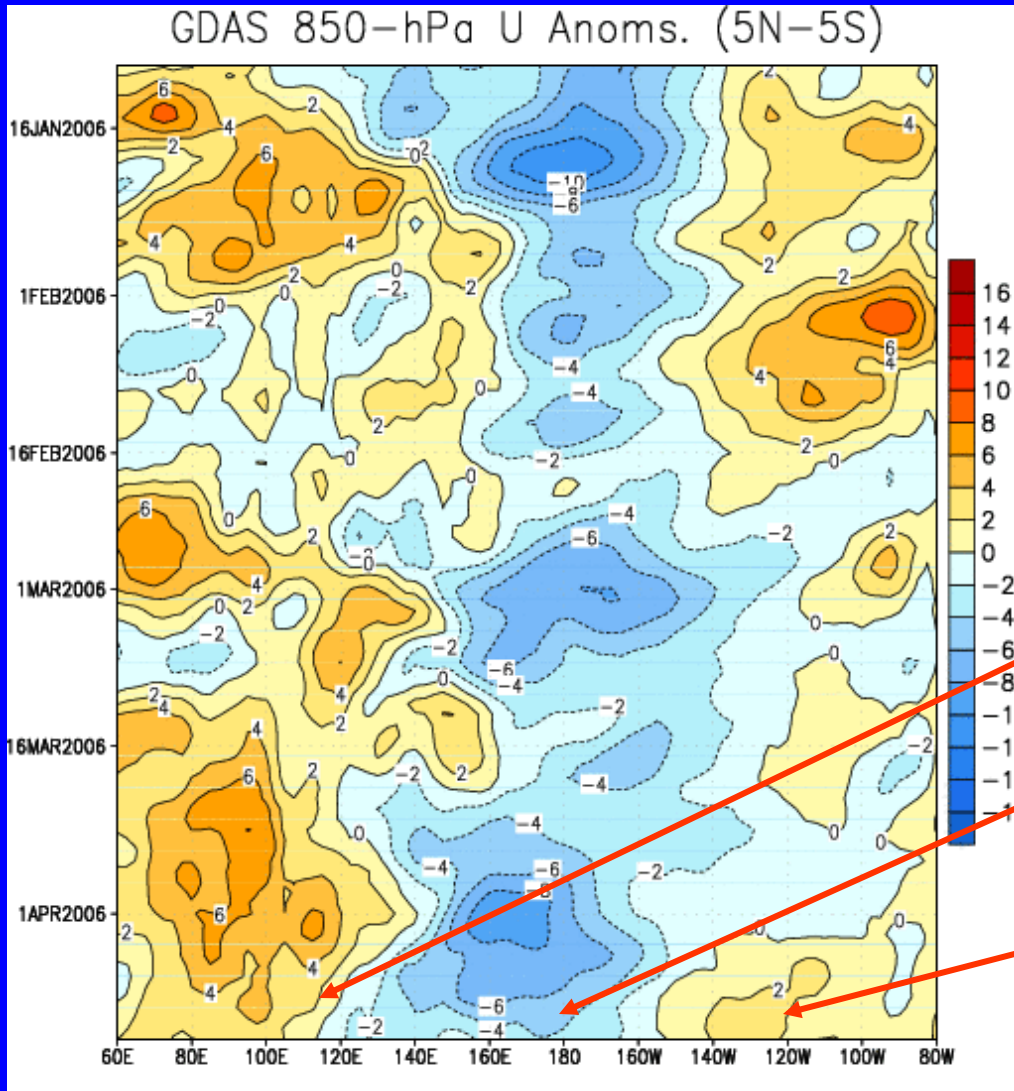
Westerlies in the equatorial Indian Ocean have weakened

Easterlies persist west of Date Line



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)

Equatorial low-level westerly anomalies persist across Indonesia

Equatorial low-level easterly anomalies remain strong near the Date Line

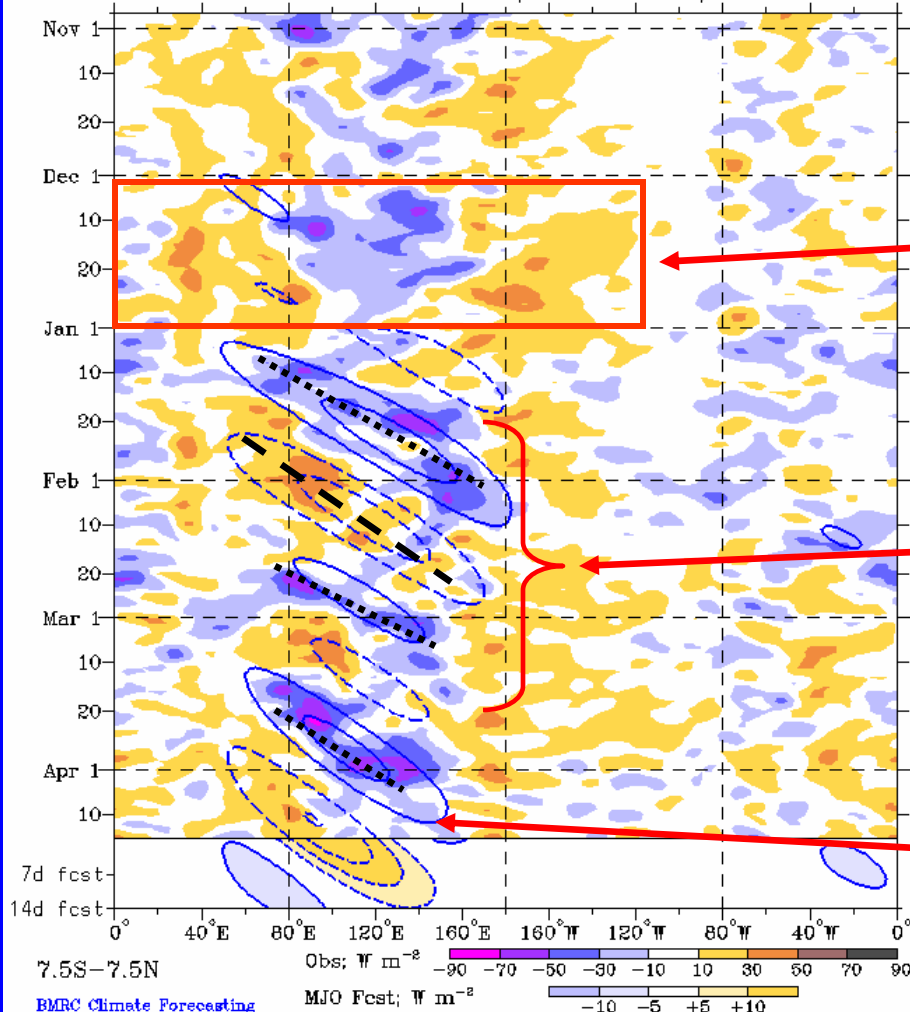
Equatorial low-level westerly anomalies have developed in the east Pacific



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

Real-time MJO filtering superimposed upon 3drmm R21 OLR Anomalies
 MJO anomalies blue contours, CINT=10. (5. for forecast)
 Negative contours solid, positive dashed
 29-Oct-2005 to 15-Apr-2006 + 14 days

Time
 ↓



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

During the past two weeks, enhanced convection has weakened in the western Pacific

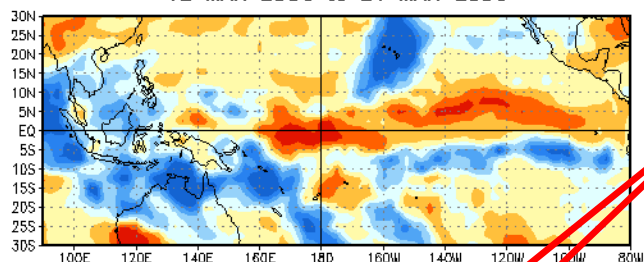
Longitude



Anomalous OLR and 850-hPa Wind

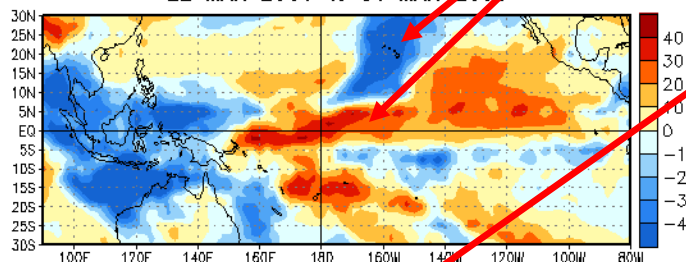
Wind: Last 30 days

OLR Anomalies
12 MAR 2006 to 21 MAR 2006



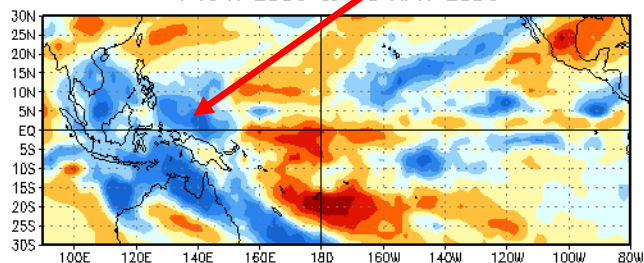
Enhanced convection in the vicinity of Hawaii has diminished but suppressed convection persists in the equatorial central Pacific Ocean.

22 MAR 2006 to 31 MAR 2006



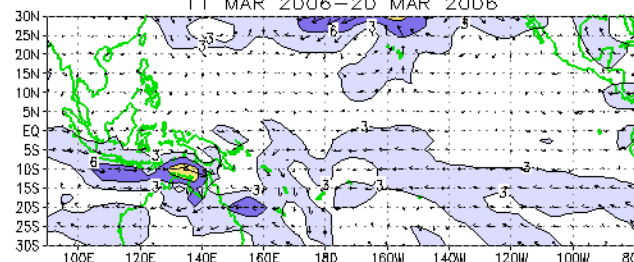
Enhanced convection persisted across Indonesia from mid March into early April.

1 APR 2006 to 10 APR 2006

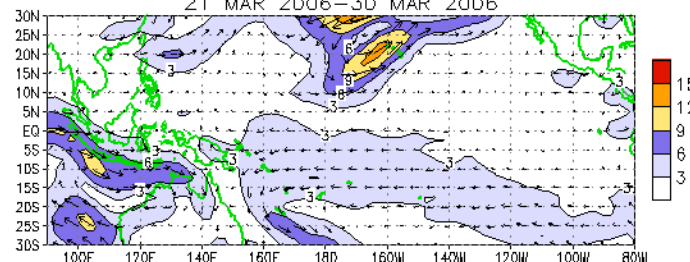


During early April, westerly anomalies have strengthened south of the equator.

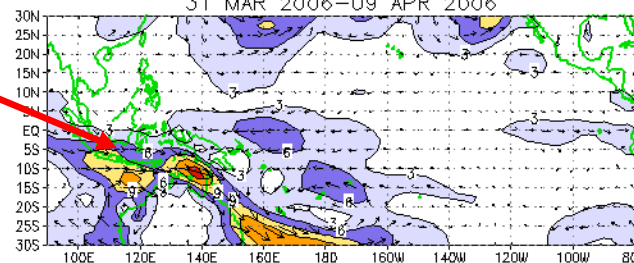
CDAS 850-hPa Wind Anoms
11 MAR 2006-20 MAR 2006



21 MAR 2006-30 MAR 2006



31 MAR 2006-09 APR 2006

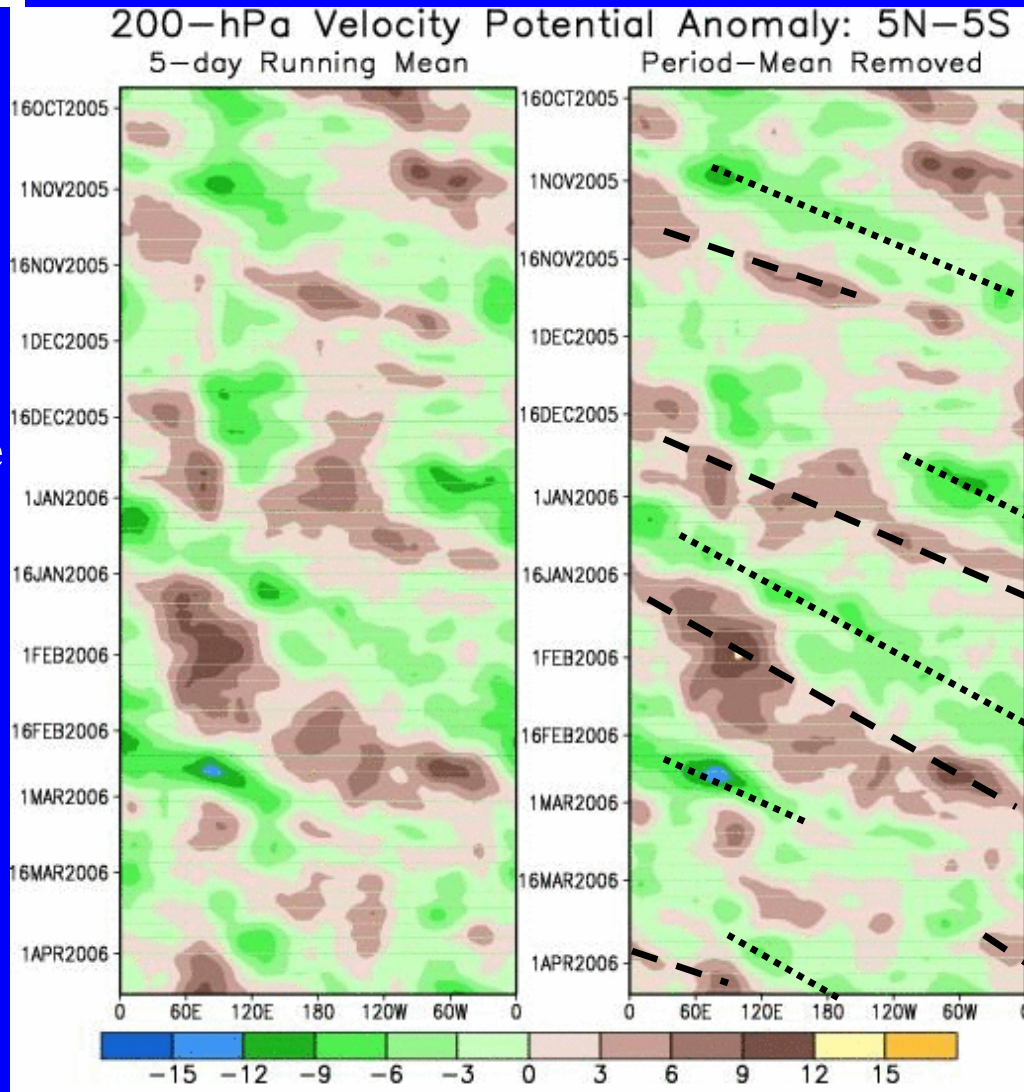




200-hPa Velocity Potential Anomalies (5°S-5°N)

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 the September-November and January-February time periods.

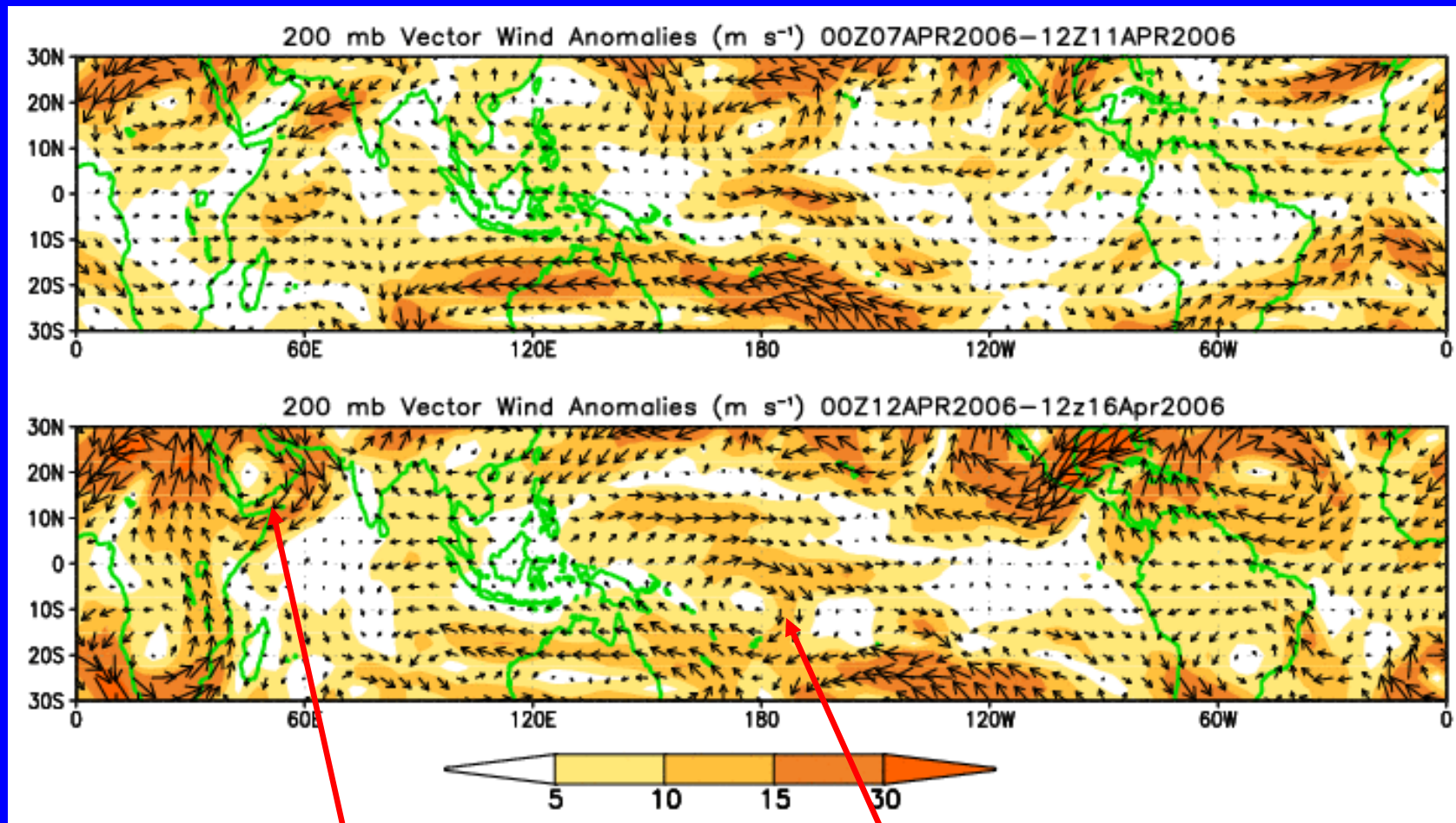
Thru April 9, MJO activity remained weak.

Longitude



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

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



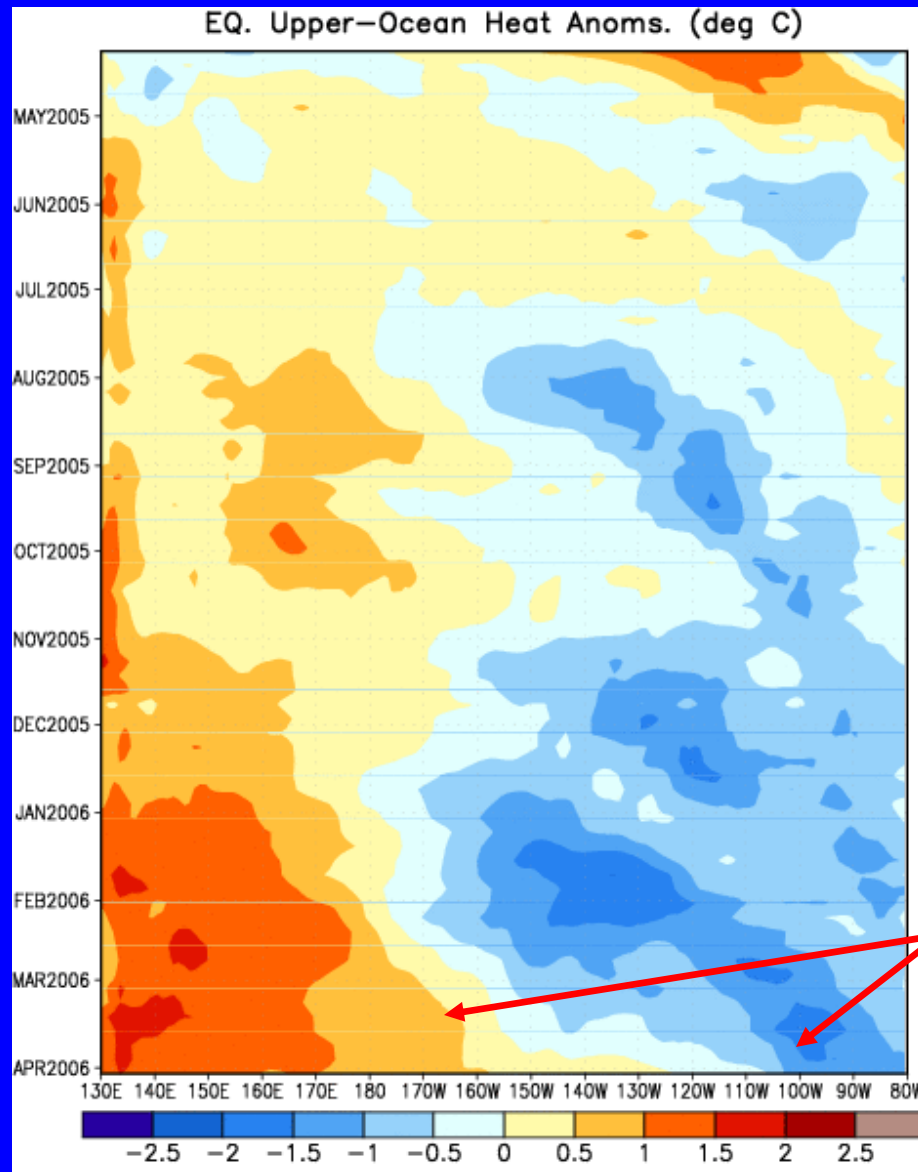
Anticyclonic circulation
observed over Arabian Sea

Cyclonic circulation evident in
the south Pacific



Heat Content Evolution in the Eq. Pacific

Time



Longitude

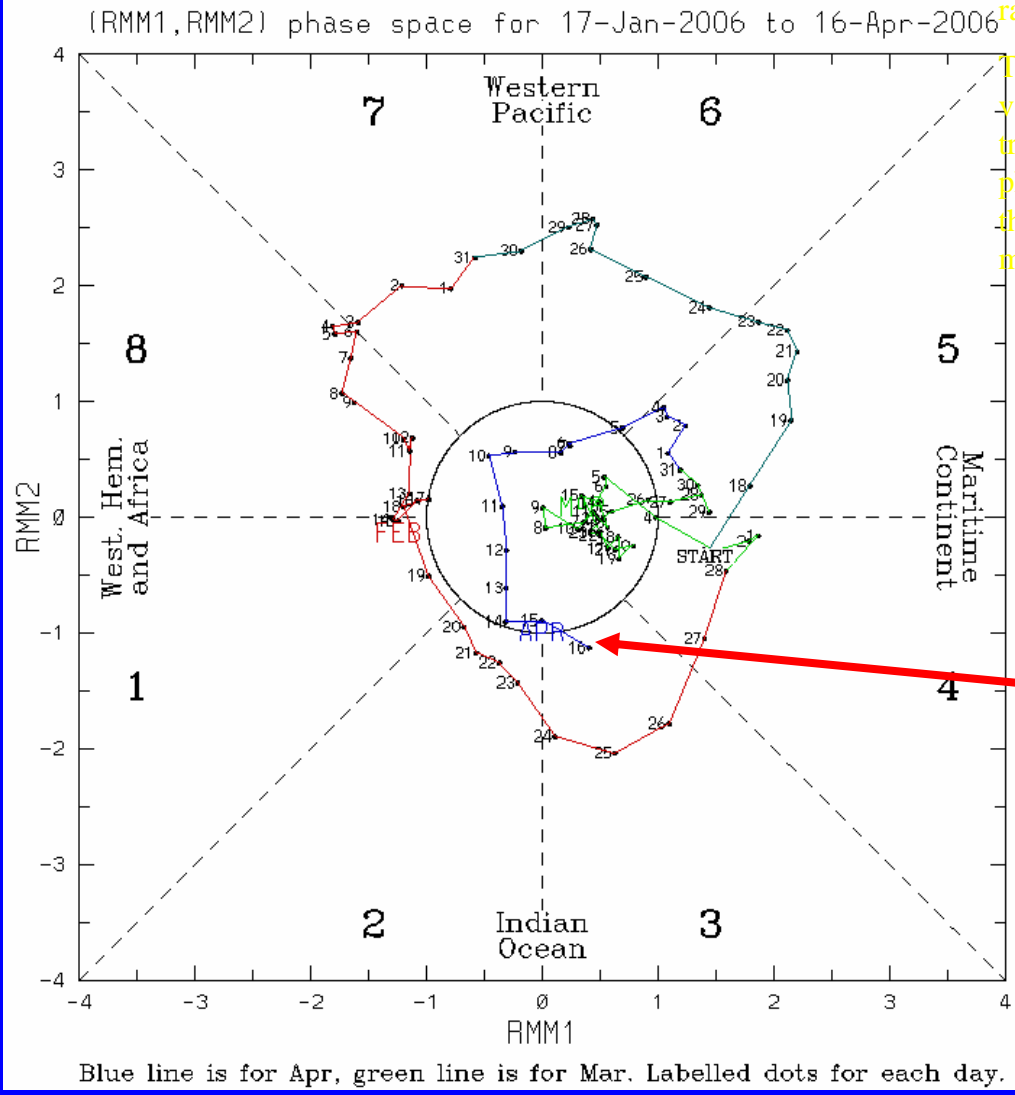
Heat content has been above average in the western Pacific since June while cooler water has been observed across the central and eastern Pacific. Warmer water in the western Pacific has recently expanded east towards 130W.



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).

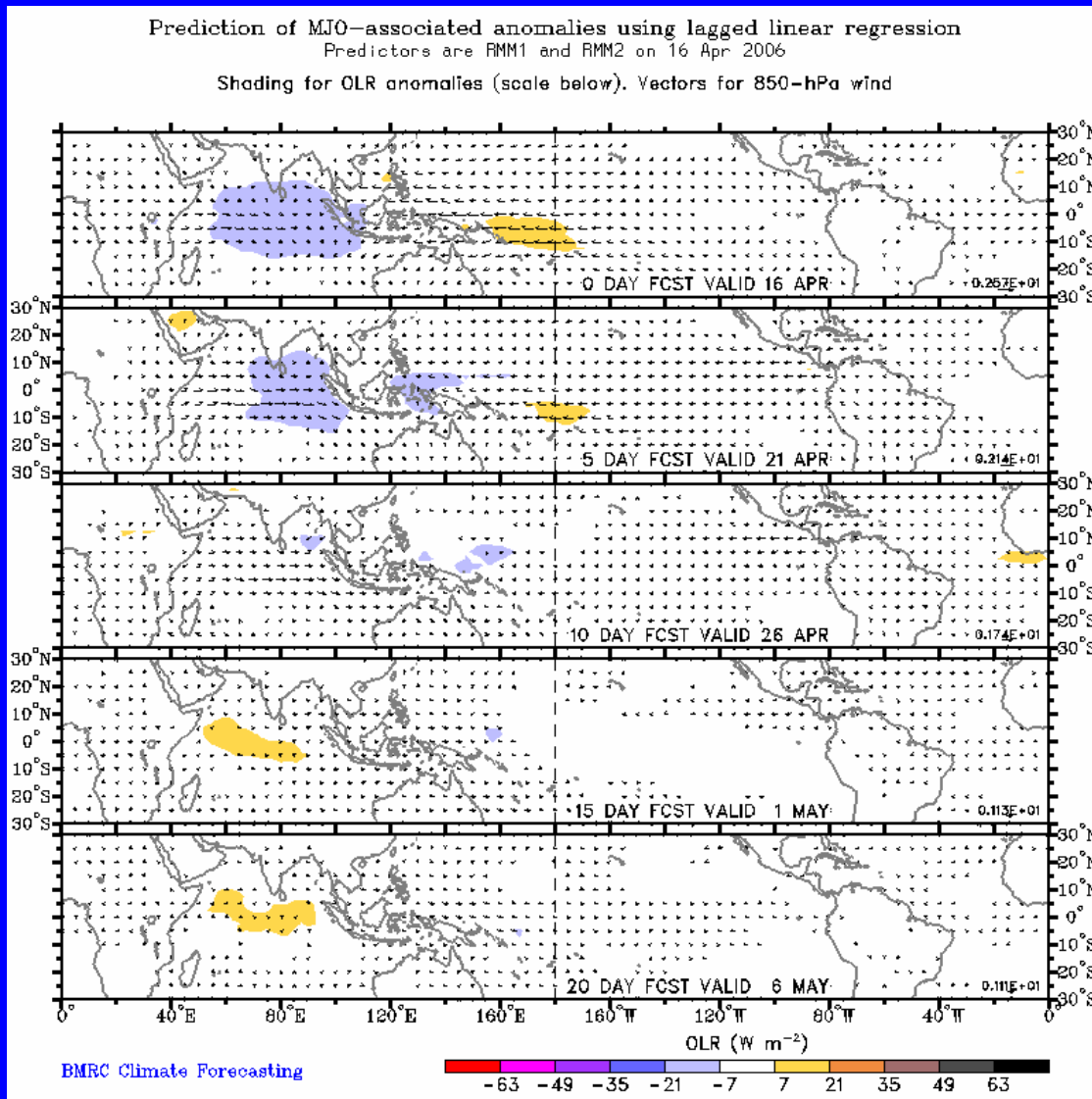
The axes represent the time series of the two leading modes of variability and are used to measure the amplitude while the triangular areas indicate the phase or location of the enhanced phase of the MJO. The farther away from the center of the circle the stronger the MJO. Different color lines indicate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



The MJO signal remains relatively weak.



Statistical OLR MJO Forecast

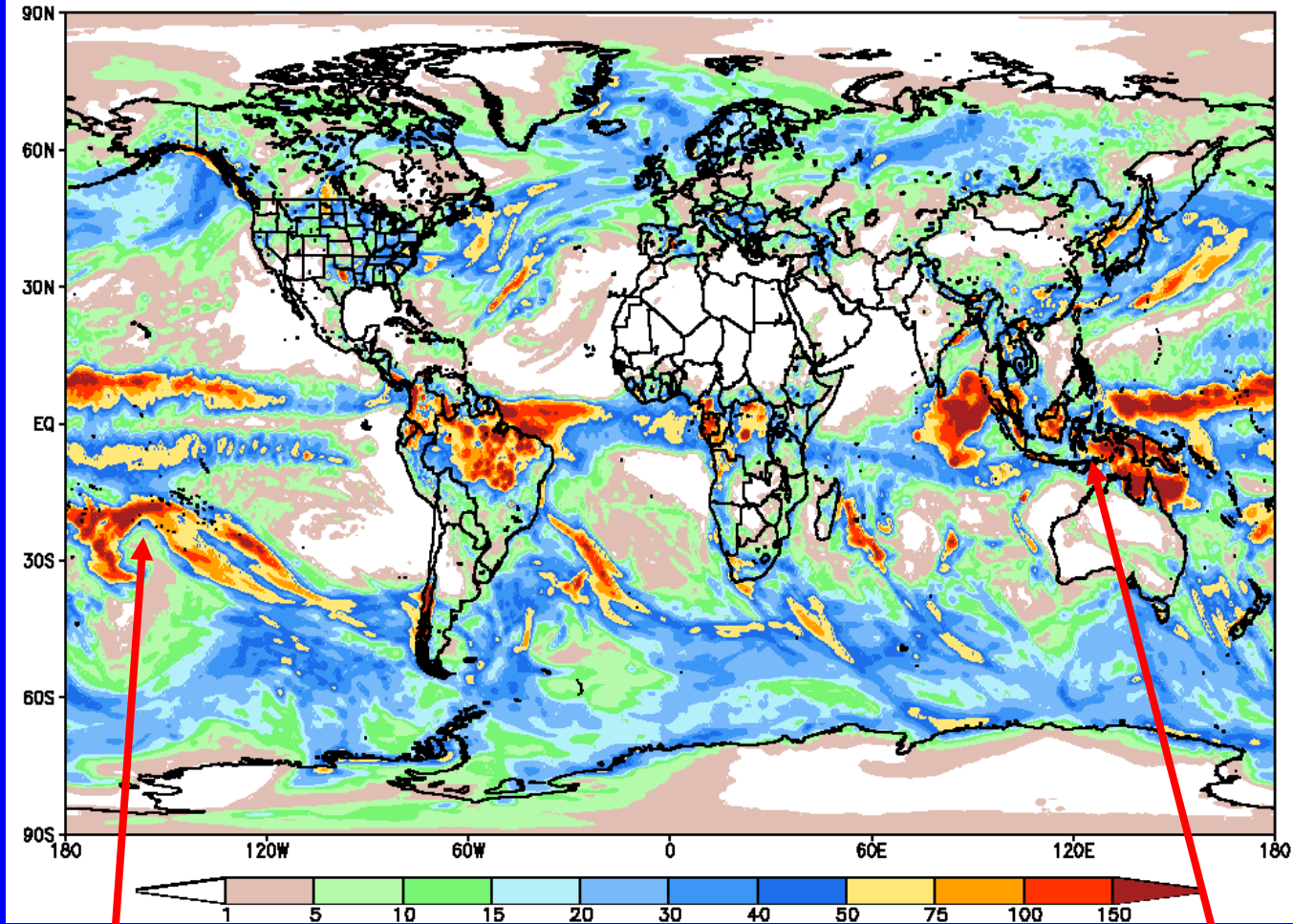


A statistical MJO forecast indicates that the MJO will remain weak during the next two weeks.



Global Forecast System (GFS) Week 1 Precipitation Forecast

GFS 37.5 km Week 1 Total Precipitation (mm)
Issued at Apr 17 2006 00Z for the period ending at Apr 24 2006 00Z



Heavy rainfall stretches into the south Pacific

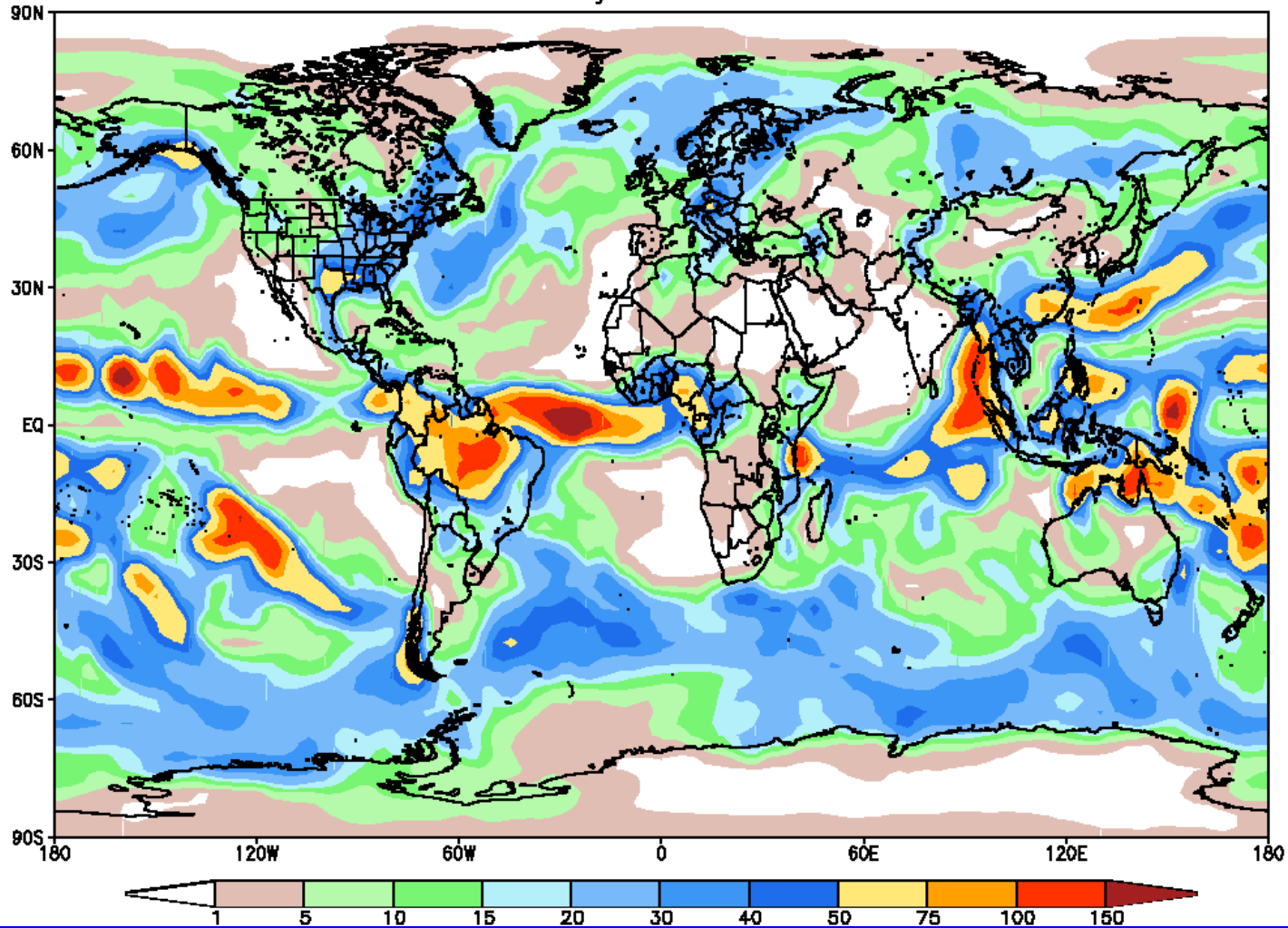
Abundant rainfall persists across Indonesia and the western Pacific



Global Forecast System (GFS) Week 2

Precipitation Forecast

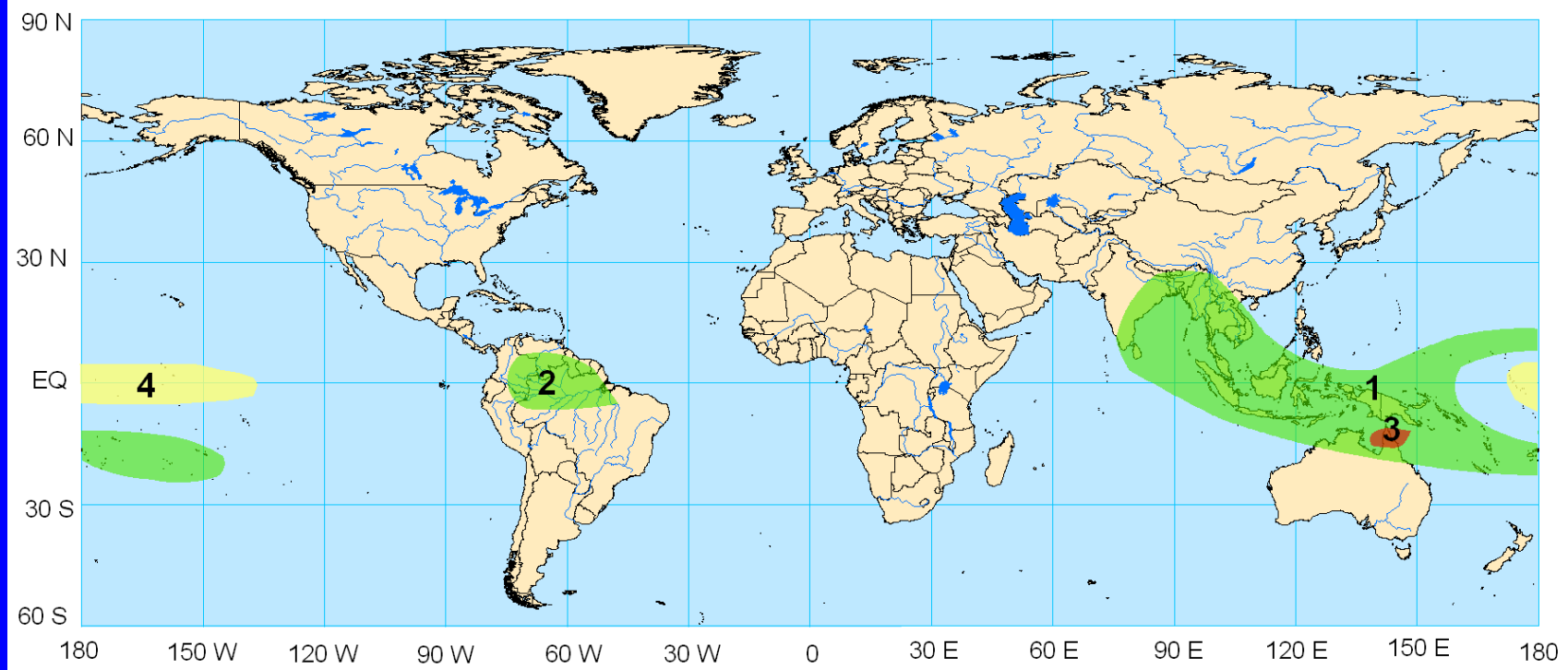
GFS 100 km Week 2 Total Precipitation (mm)
Issued Apr 17 2006 00Z for the period ending at Apr 30 2006 00Z
NOAA Day 14 GFS Forecast





Potential Benefits/Hazards – Week 1

Valid April 18 - 24, 2006

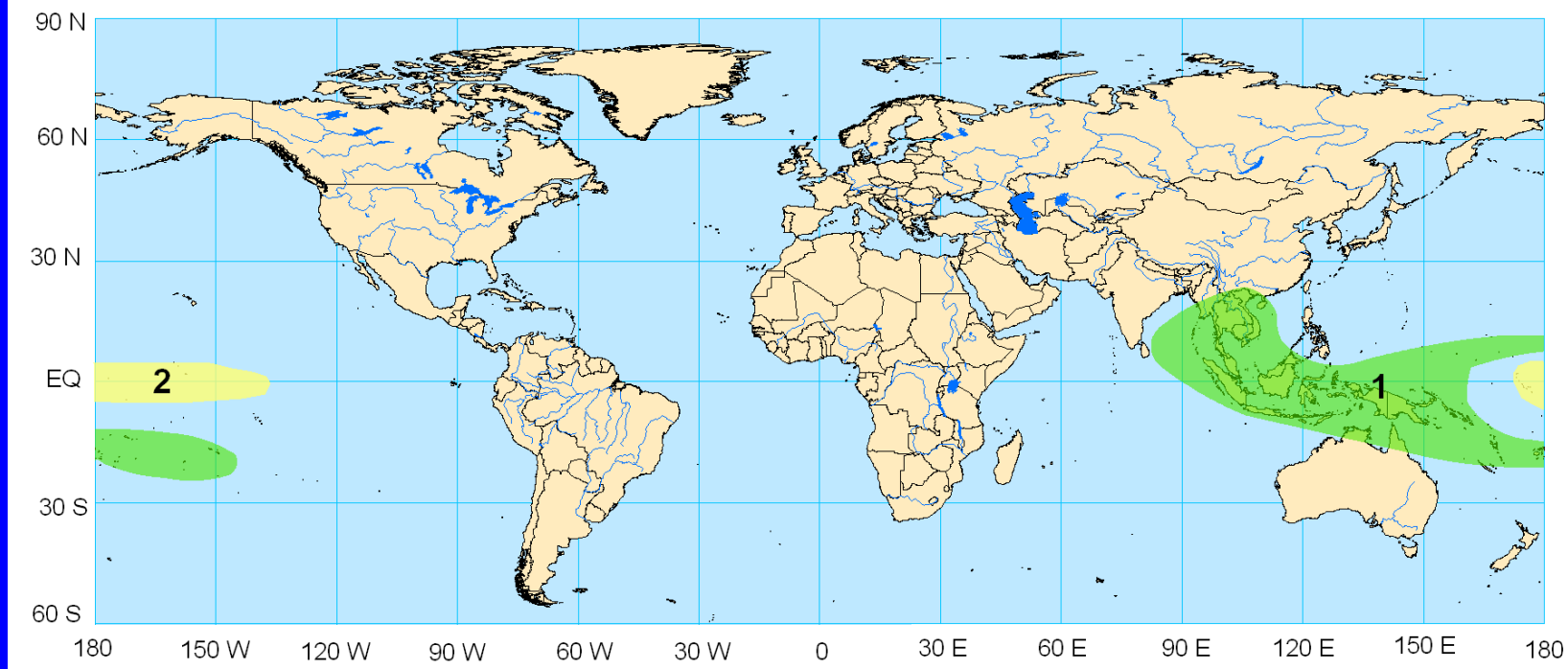


- 1. An increased chance for above normal rainfall across parts of South and Southeast Asia, Indonesia, the western Pacific Ocean, and the south Pacific due to convection typical during La Nina and areas of above average SSTs.**
- 2. An increase chance for above normal rainfall across the Amazon Basin of northern South America.**
- 3. Tropical Storm Monica is forecast to make landfall in northeast Australia on April 18.**
- 4. An increased chance for below normal rainfall due to the cool sea surface temperatures associated with La Nina.**



Potential Benefits/Hazards – Week 2

Valid April 25 – May 1, 2006



- 1. An increased chance for above normal rainfall across Indonesia, the western Pacific Ocean, and the south Pacific due to convection typical during La Nina and areas of above average SSTs.**
- 2. An increased chance for below normal rainfall due to the cool sea surface temperatures associated with La Nina.**



Summary

- The latest observations indicate the MJO remains weak with the continuation of La Nina conditions.
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