



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

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



Outline

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



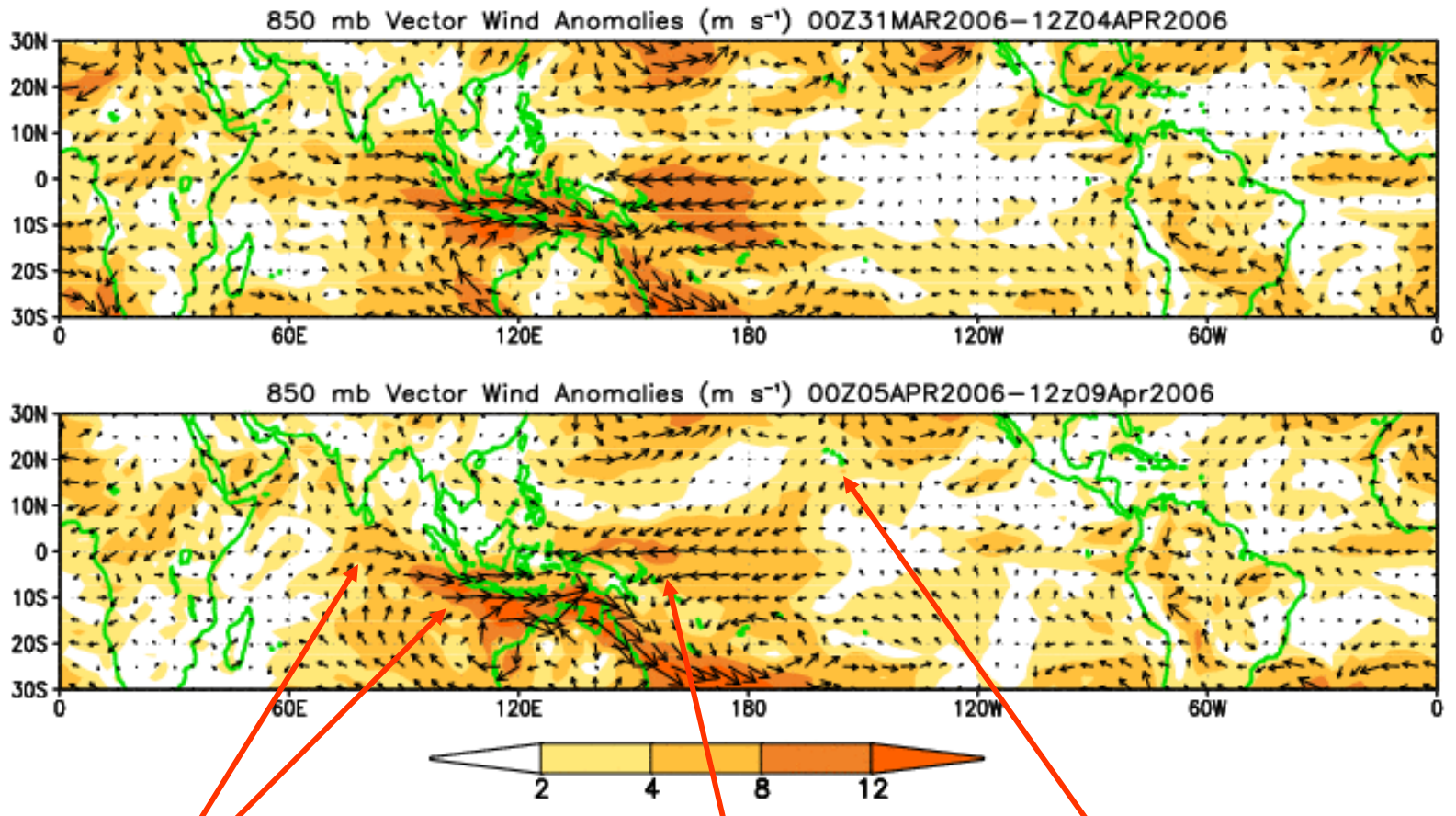
Overview

- The latest observations indicate the MJO remains inactive 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 and the western Pacific Ocean. Drier than average conditions are expected in the equatorial central Pacific Ocean. During Week 1, increased chances of above normal rainfall also exist for California and northern Brazil. However, there are indications that California may experience a drying trend during late April.



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

Note that shading denotes the magnitude of the anomalous wind vectors



Westerlies remain in the equatorial Indian Ocean and across Indonesia

Easterlies persist west of Date Line

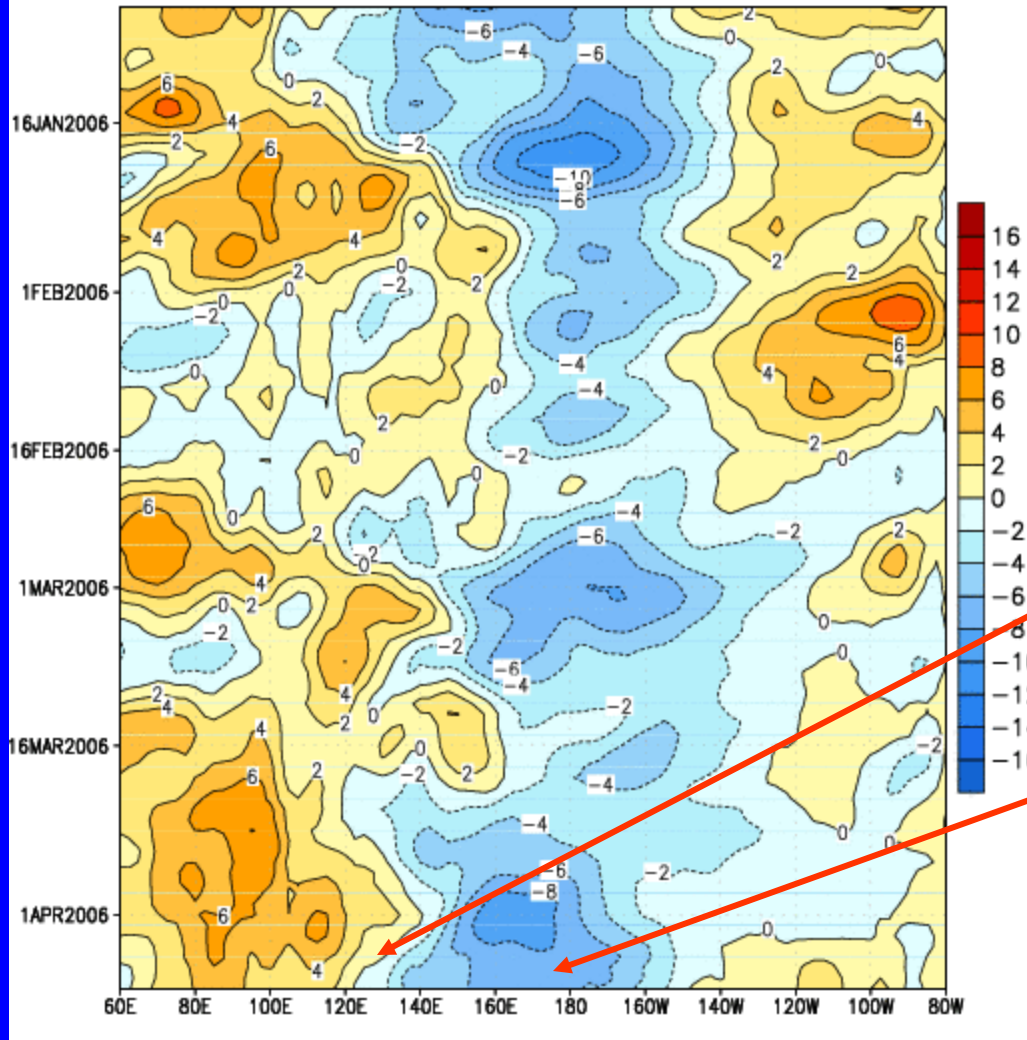
Low-level northerly flow resulted in a drying trend for Hawaii



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

GDAS 850-hPa U Anoms. (5N-5S)

Time



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

Stronger-than-average easterlies (blue shading)

Equatorial low-level westerly anomalies have retreated slightly to the west during the past week

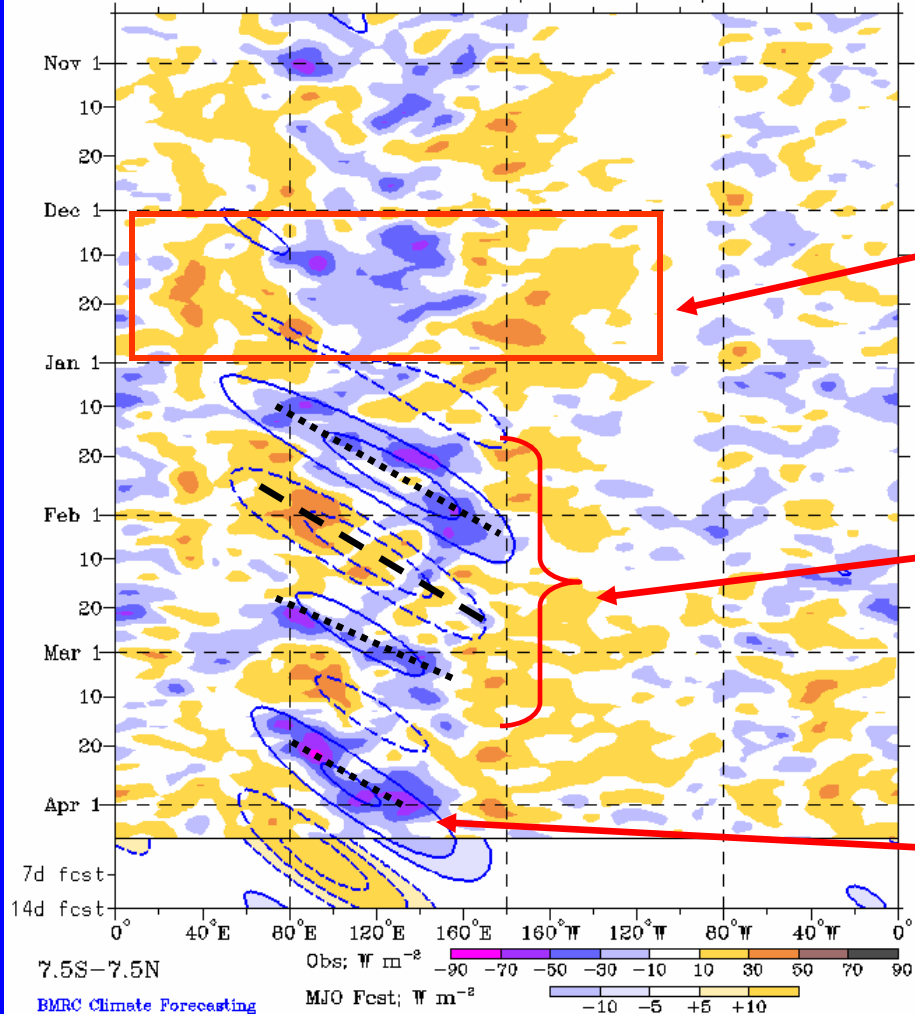
Equatorial low-level easterly anomalies remain strong near the Date Line

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, CINT=10. (5. for forecast)
Negative contours solid, positive dashed
22-Oct-2005 to 8-Apr-2006 + 14 days



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

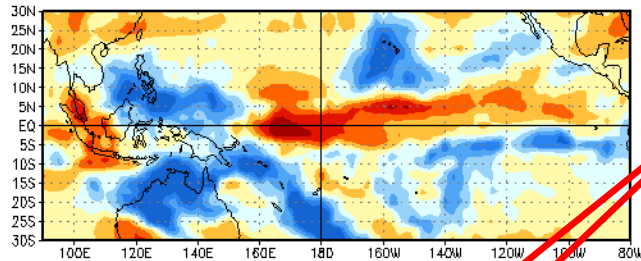
During the past week, enhanced convection has weakened in the western Pacific



Anomalous OLR and 850-hPa Wind

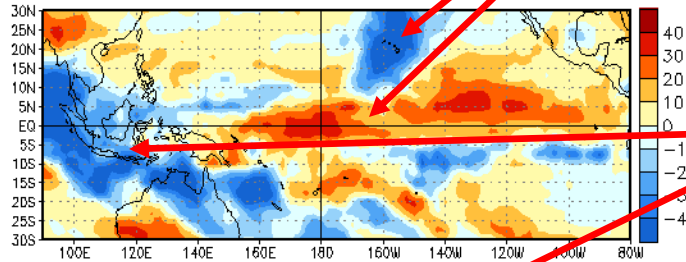
Wind: Last 30 days

OLR Anomalies
7 MAR 2006 to 16 MAR 2006



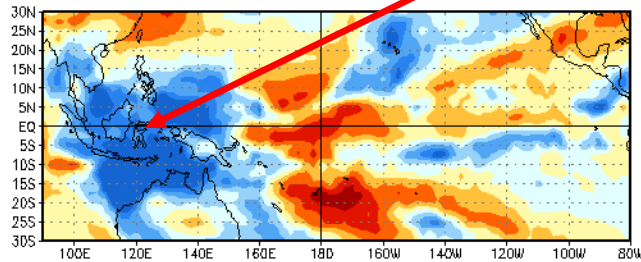
Enhanced convection in the vicinity of Hawaii is evident throughout the period as is suppressed convection in the equatorial central Pacific Ocean.

17 MAR 2006 to 26 MAR 2006



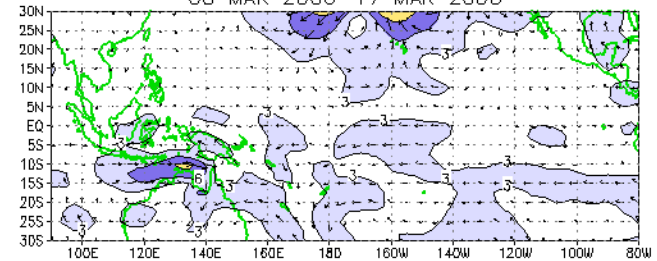
Enhanced convection persisted across Indonesia from mid-March into early April.

27 MAR 2006 to 5 APR 2006

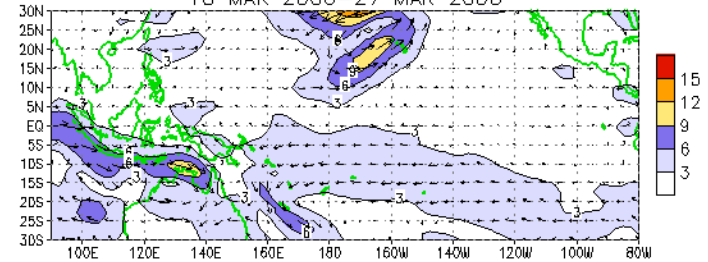


During the past 10 days, westerly anomalies have strengthened in western Indonesia.

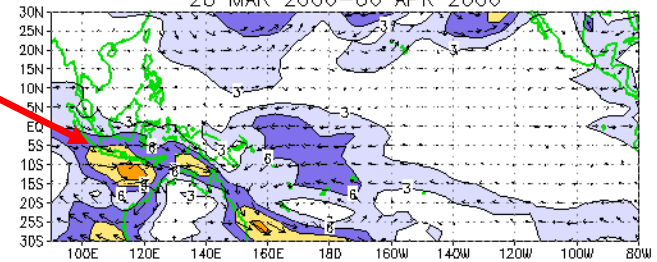
CDAS 850-hPa Wind Anoms
08 MAR 2006-17 MAR 2006



18 MAR 2006-27 MAR 2006



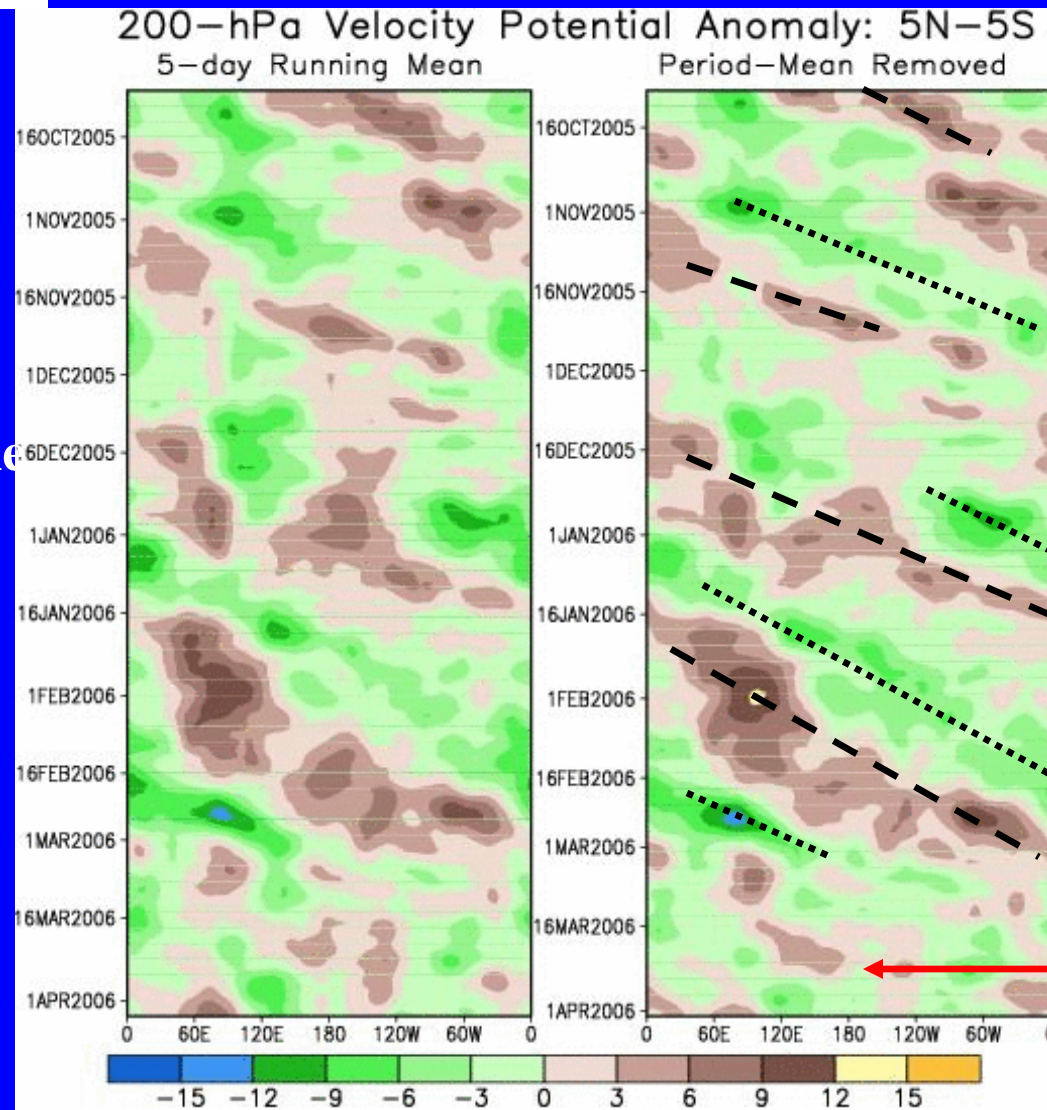
28 MAR 2006-06 APR 2006





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.

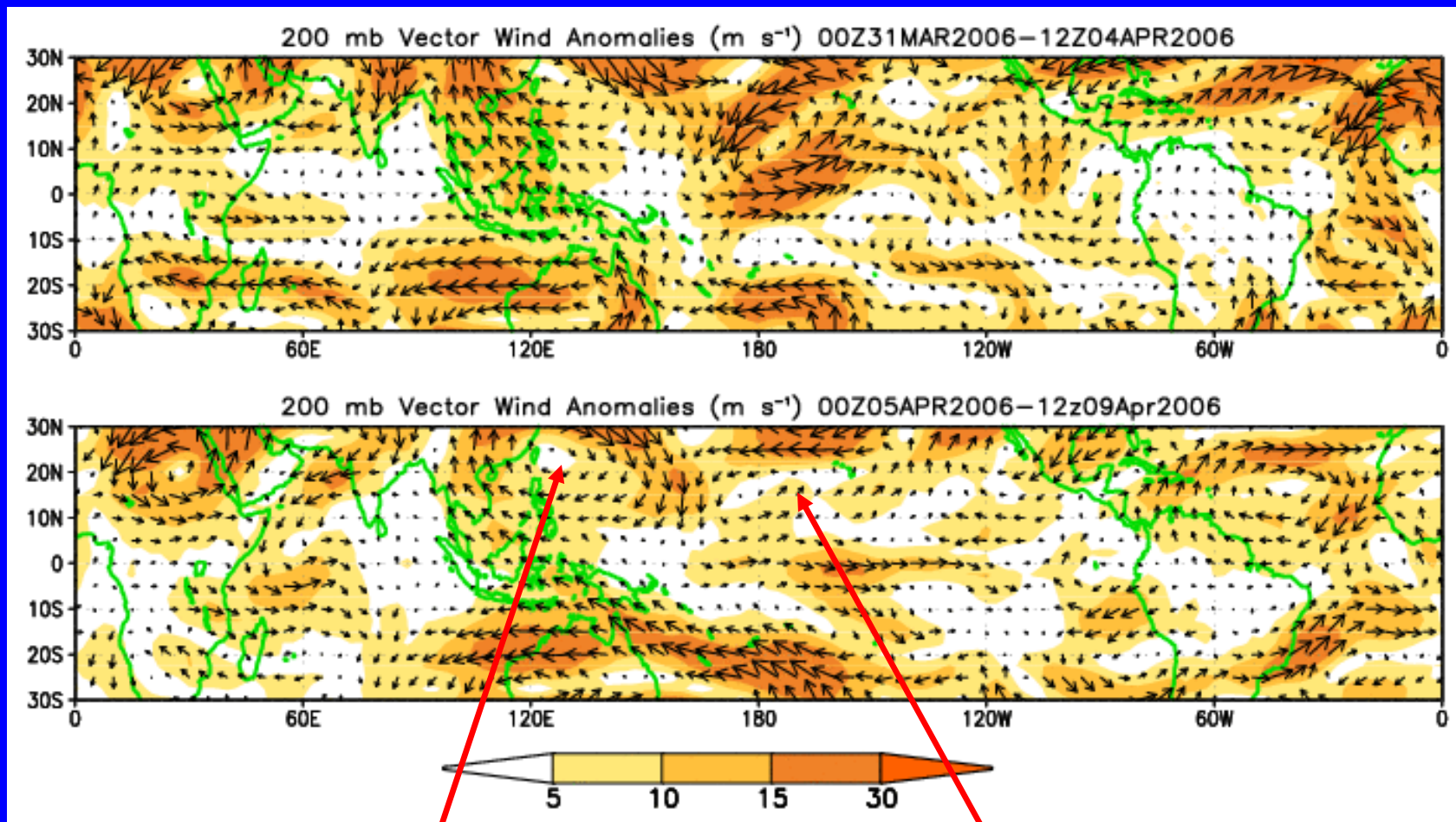
During the past month, the MJO signal has remained weak.

Longitude



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

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



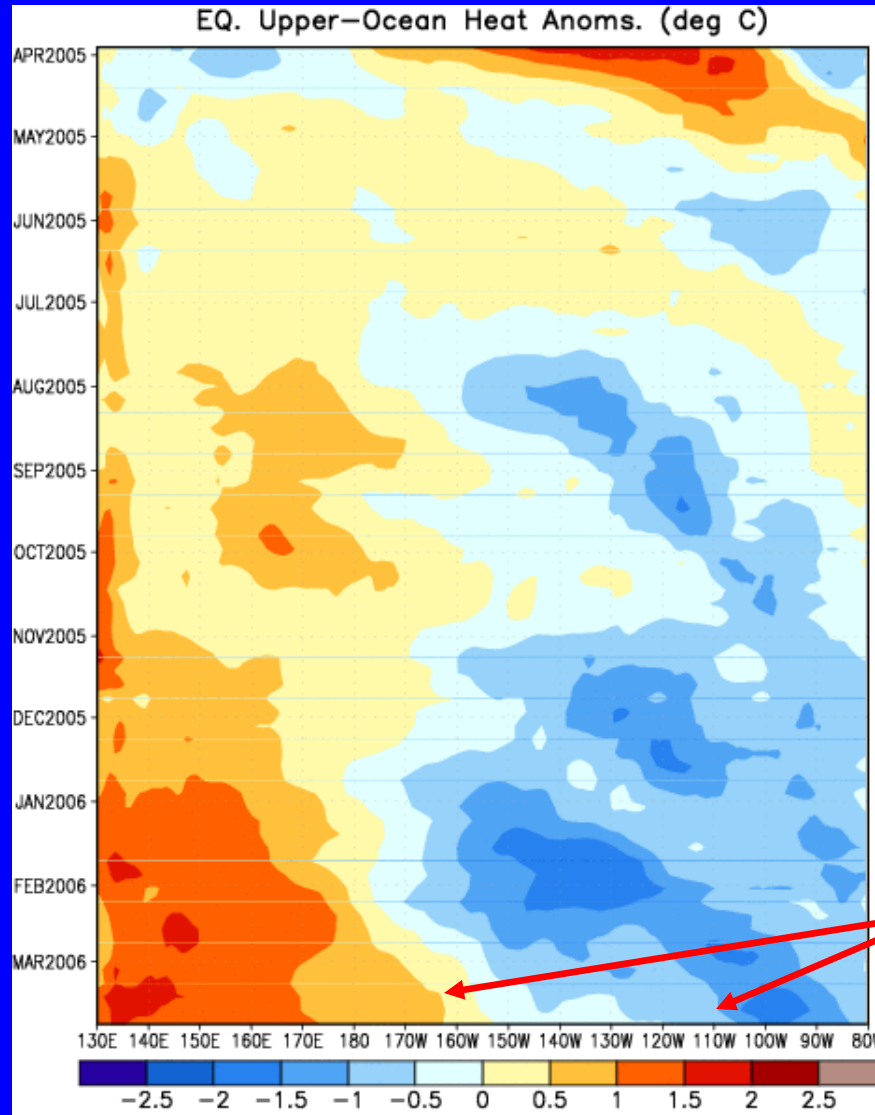
Anticyclonic circulation has developed in the East China Sea

Strong cyclonic circulation near Hawaii has weakened



Heat Content Evolution in the Eq. Pacific

Time



Longitude

During February 2005, a strong Kelvin wave developed and continued to strengthen during March and reached the South American coast during early April.

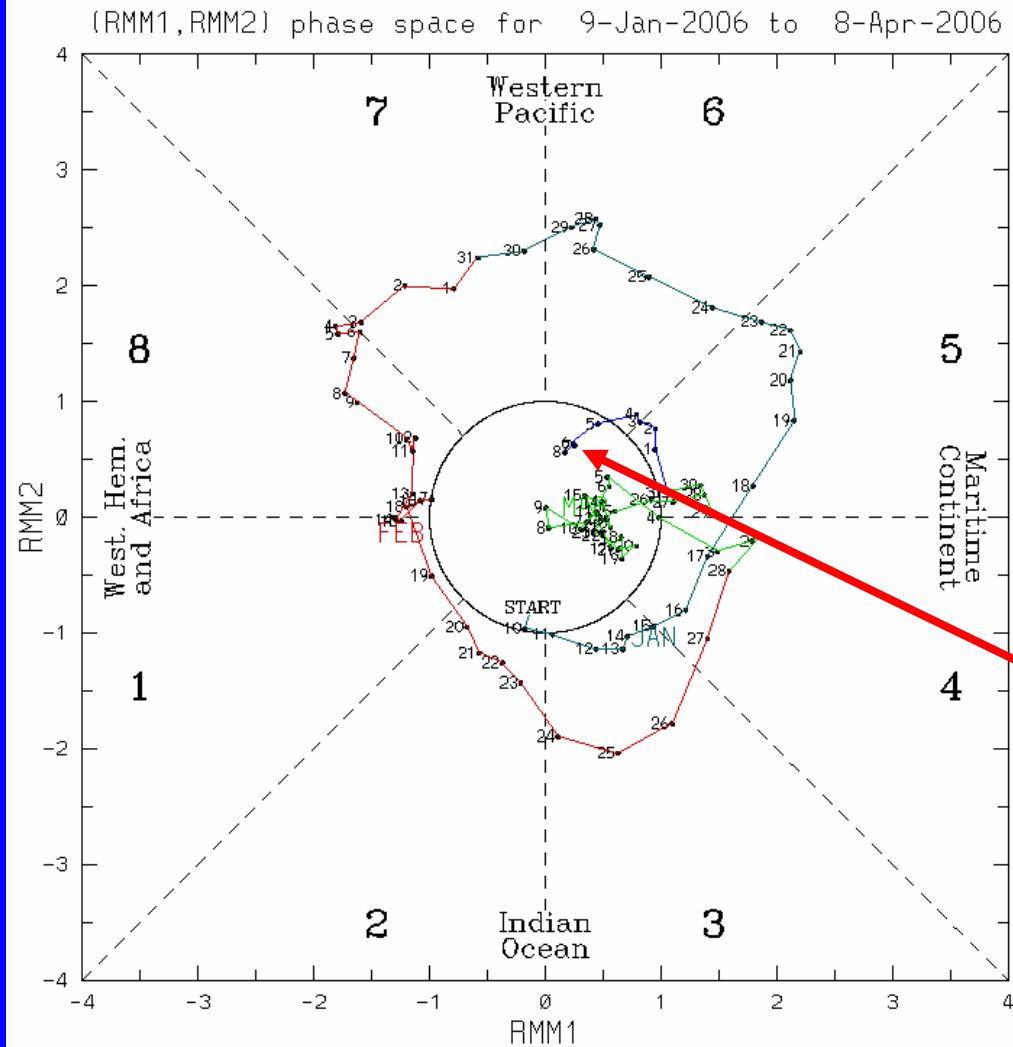
Heat content has been above average in the western Pacific since June while cooler water has been observed across the central and eastern Pacific. Warmer water in the western Pacific has expanded slightly east during late February and March.



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.



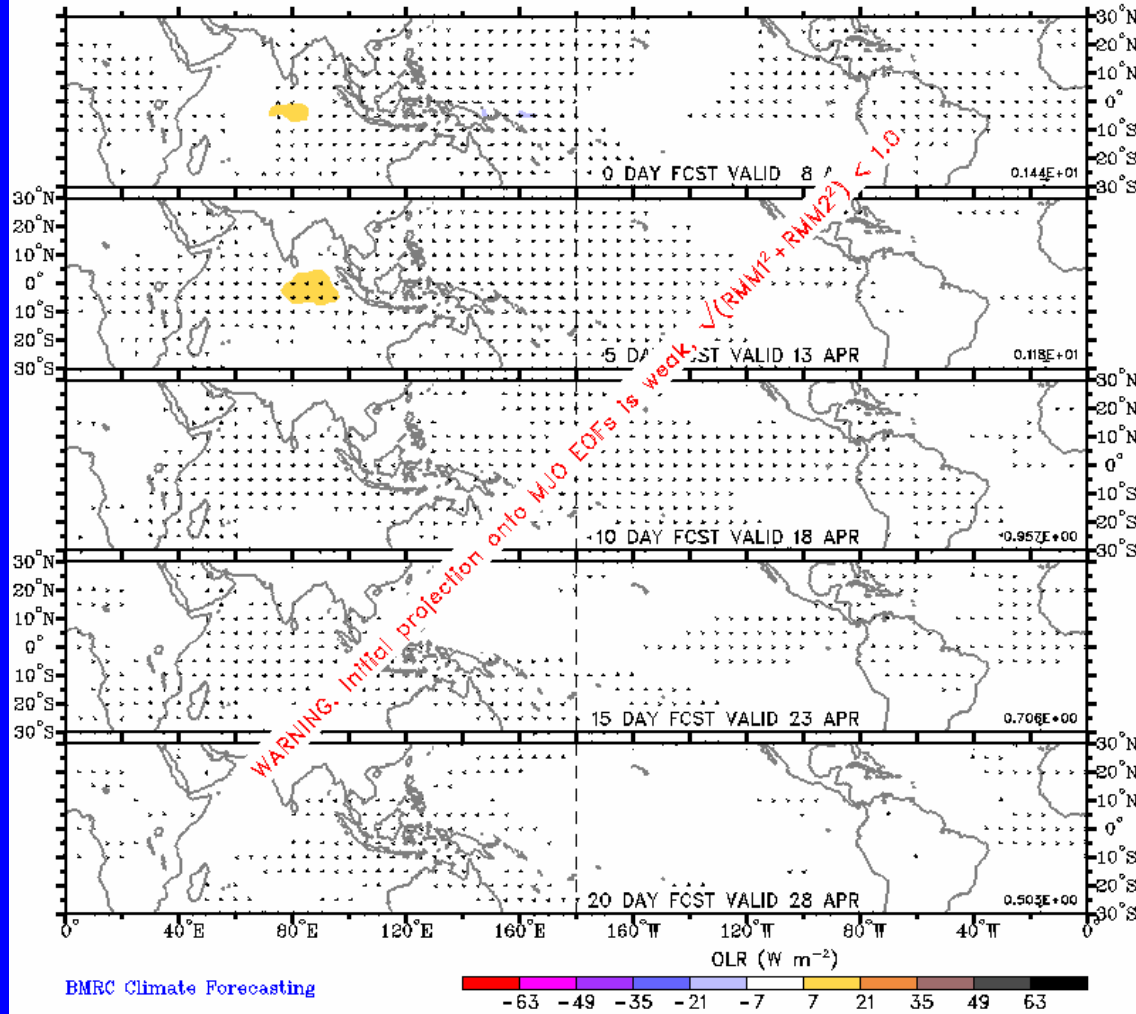
Blue line is for Apr, green line is for Mar. Labelled dots for each day.

The MJO signal remains weak.



Statistical OLR MJO Forecast

Prediction of MJO-associated anomalies using lagged linear regression
Predictors are RMM1 and RMM2 on 8 Apr 2006
Shading for OLR anomalies (scale below). Vectors for 850-hPa wind

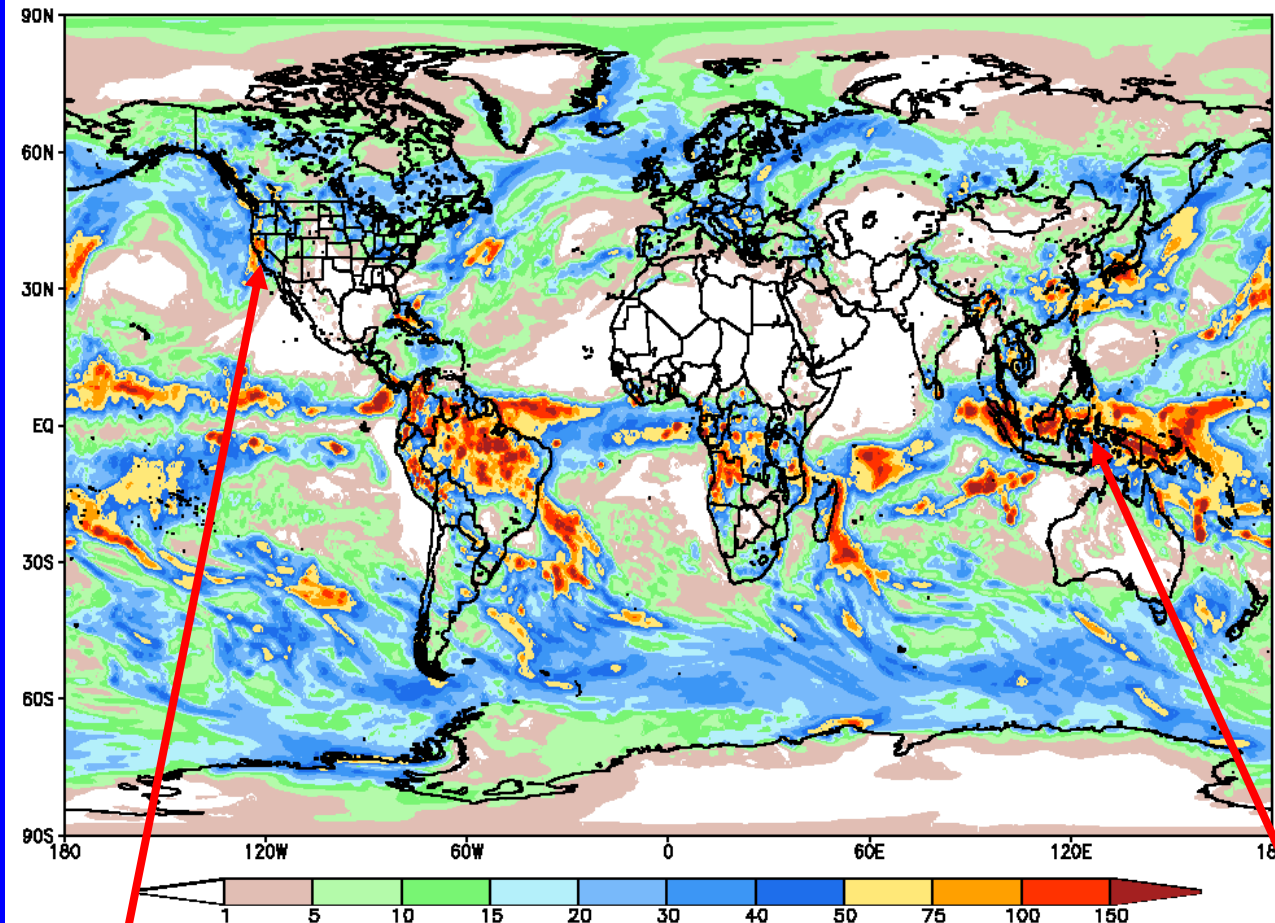


A statistical MJO forecast indicates that the MJO will remain weak during the next two weeks.



Global Forecast System (GFS) Week 1 Precipitation Forecast

GFS 37.5 km Week 1 Total Precipitation (mm)
Issued at Apr 10 2006 00Z for the period ending at Apr 17 2006 00Z



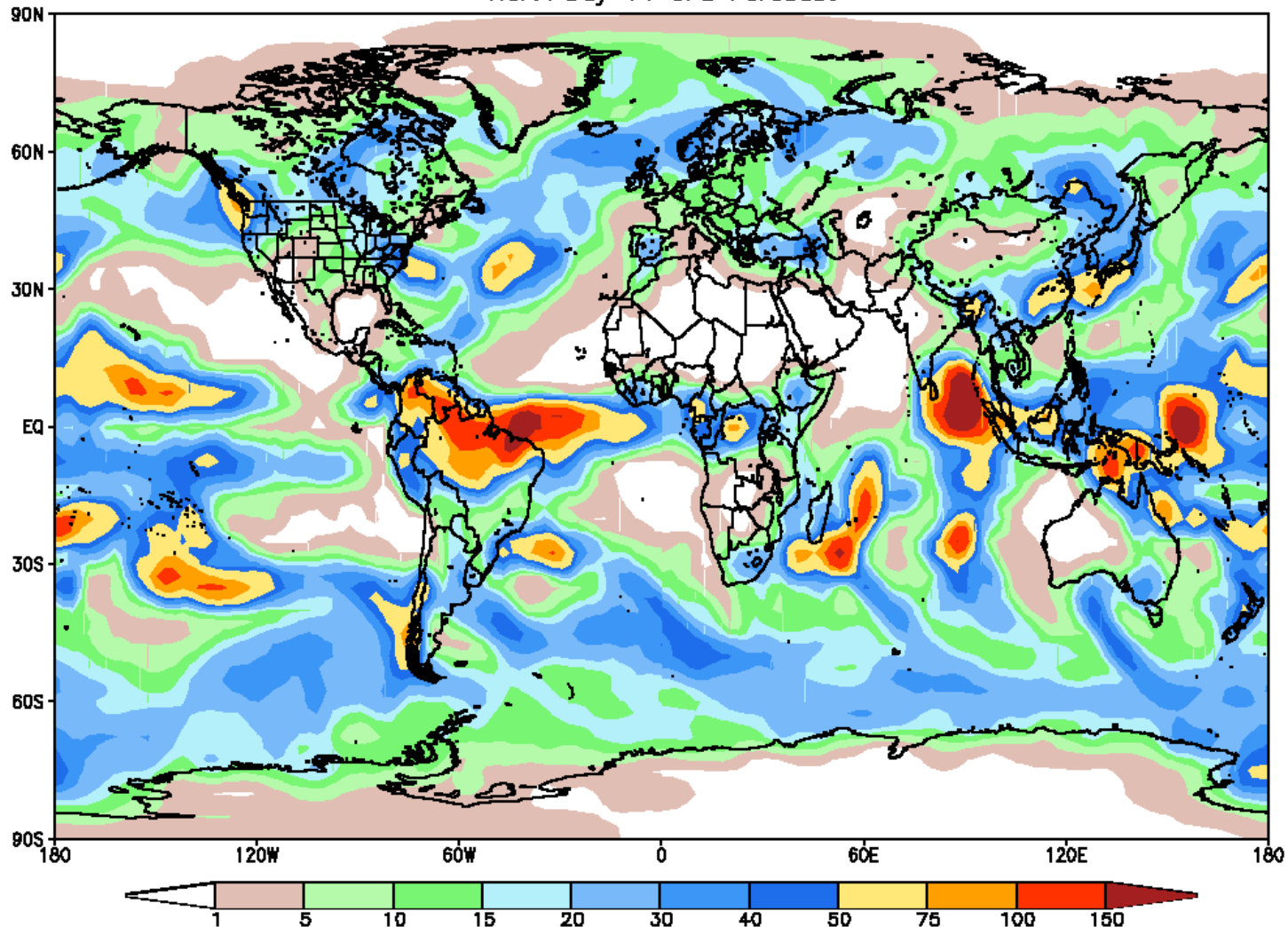
Heavy precipitation returns to California

Abundant rainfall persists across Indonesia and the western Pacific



Global Forecast System (GFS) Week 2 Precipitation Forecast

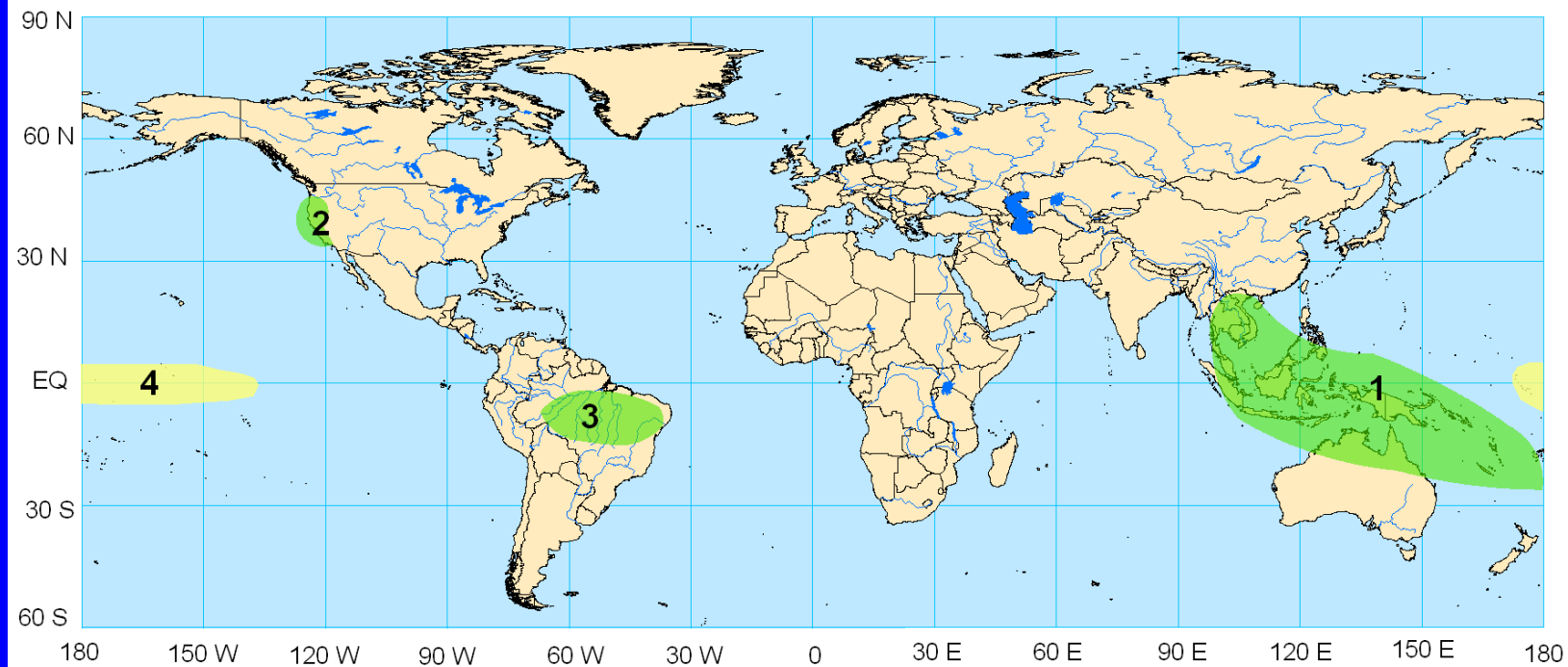
GFS 100 km Week 2 Total Precipitation (mm)
Issued Apr 10 2006 00Z for the period ending at Apr 23 2006 00Z
NOAA Day 14 GFS Forecast





Potential Benefits/Hazards – Week 1

Valid April 11 - 17, 2006

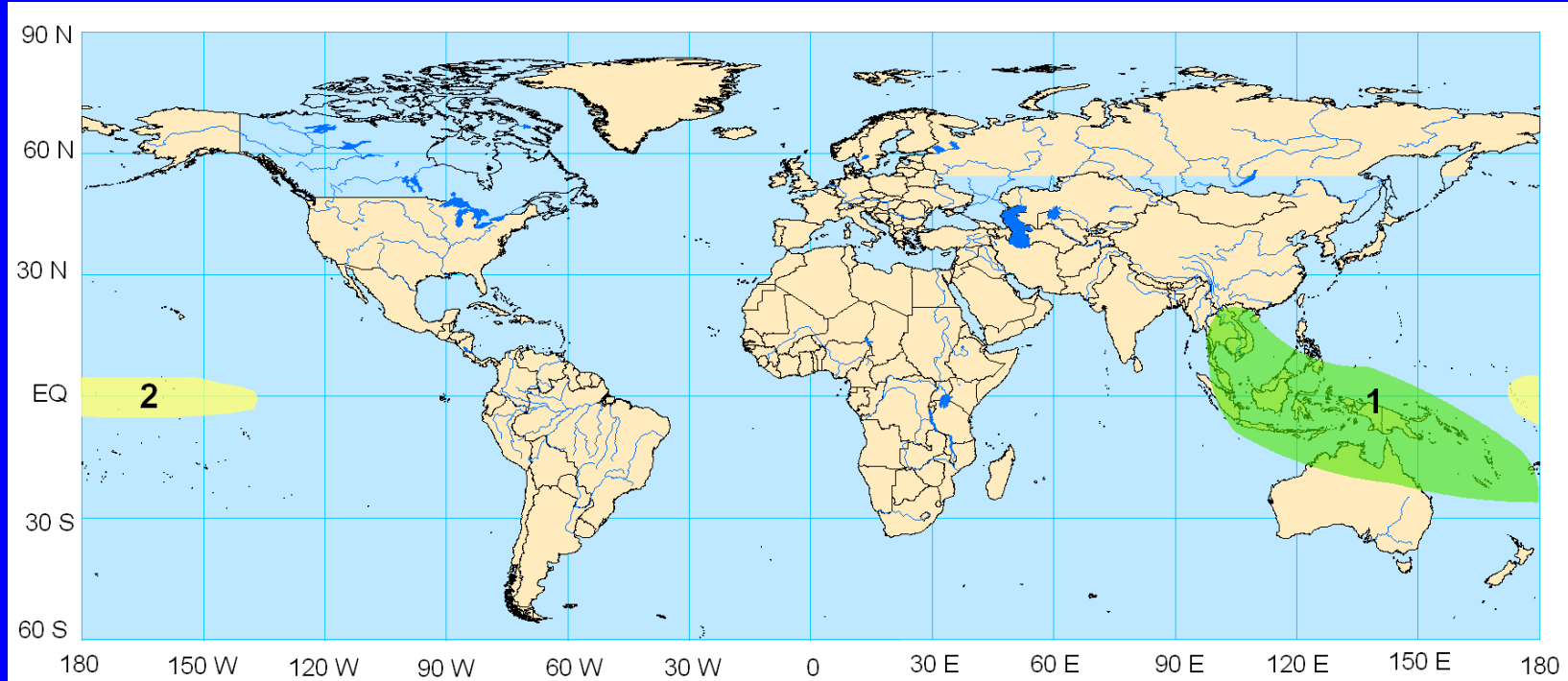


1. An increased chance for above normal rainfall across Indonesia and the western Pacific Ocean due to convection typical during La Nina and areas of above average SSTs.
2. An increased chance for above normal precipitation across California.
3. An increased chance for above normal precipitation across northern Brazil.
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 18 - 24, 2006



1. An increased chance for above normal rainfall across Indonesia and the western Pacific Ocean 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 inactive 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 and the western Pacific Ocean. Drier than average conditions are expected in the equatorial central Pacific Ocean. During Week 1, increased chances of above normal rainfall also exist for California and northern Brazil. However, there are indications that California may experience a drying trend during late April.