



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

Update prepared by
Climate Prediction Center / NCEP
April 24, 2006



Outline

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



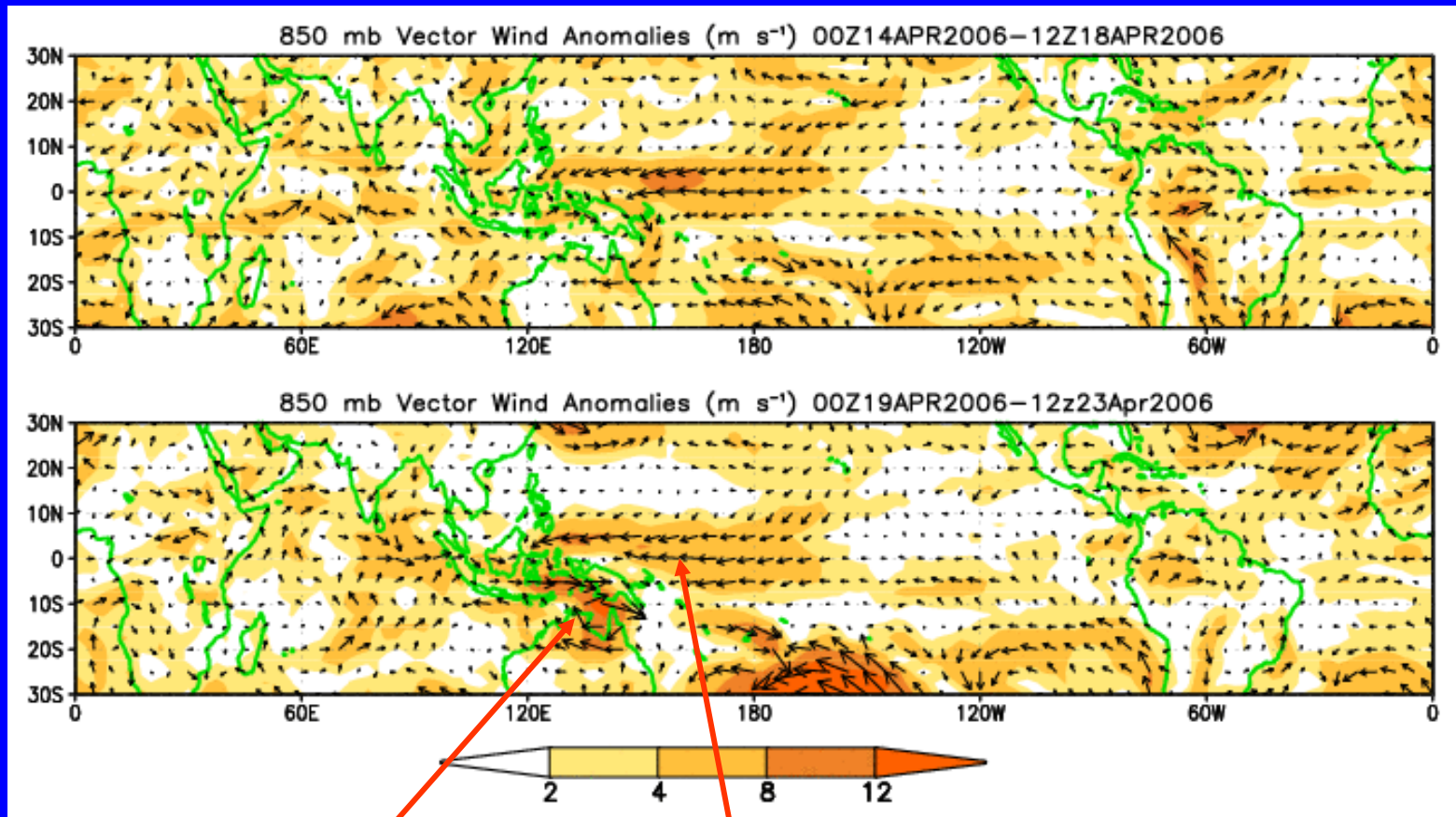
Overview

- The latest observations indicate the MJO remains weak with the continuation of weak 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 a weak La Nina and include increased chances of above normal rainfall across Southeast Asia, Indonesia, the western Pacific Ocean, and parts of the south Pacific. During week 1, the remnants of Tropical Cyclone Monica will impact northern Australia while an increased chance of tropical cyclogenesis exists for the Bay of Bengal.
- Other notable features include possible tropical cyclone development northwest of Australia during week 1 and more favorable conditions for tropical cyclone development in the western Pacific during week 2.



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

Note that shading denotes the magnitude of the anomalous wind vectors



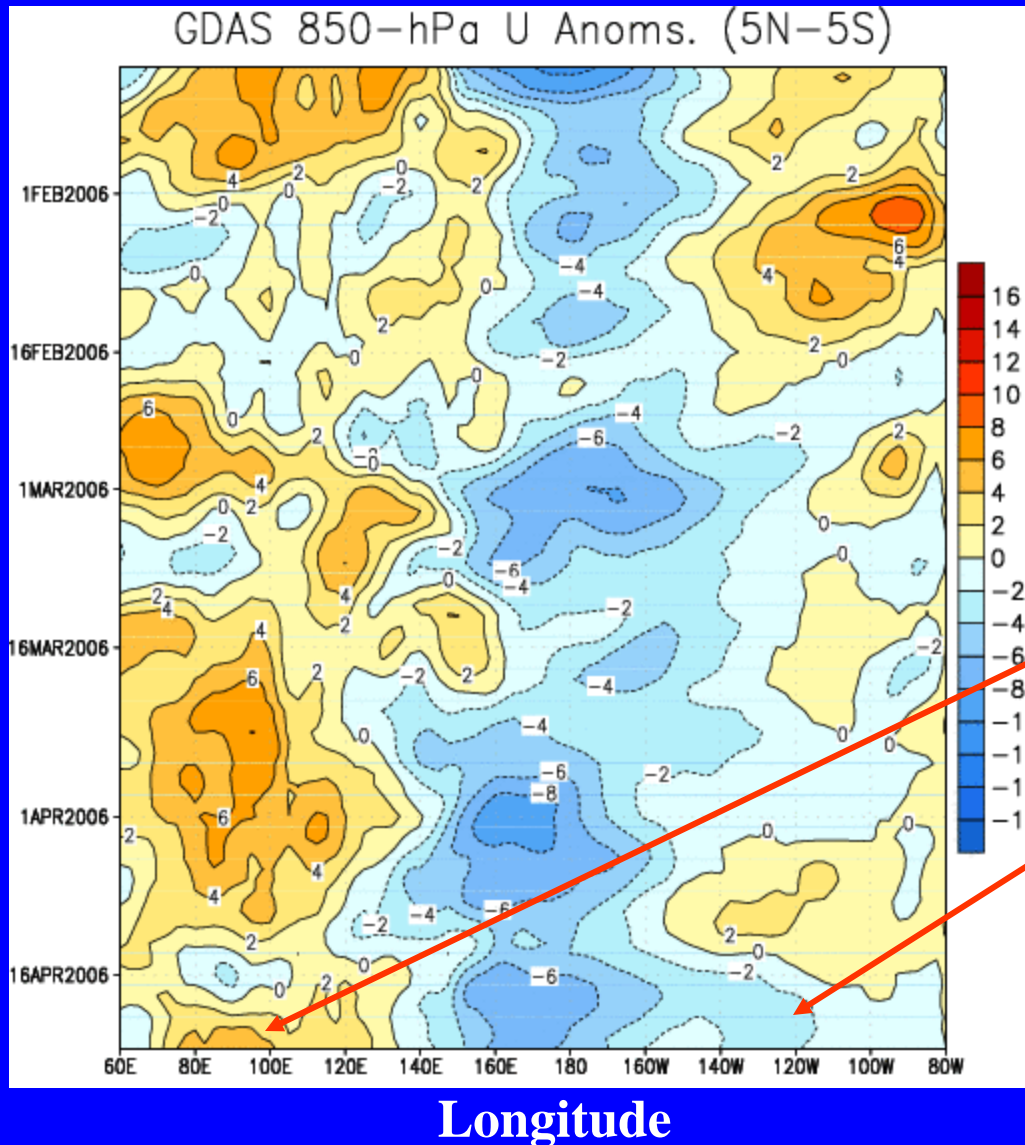
Low-level cyclonic circulation associated with Tropical Cyclone Monica

Easterlies persist in the western Pacific



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

Time



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

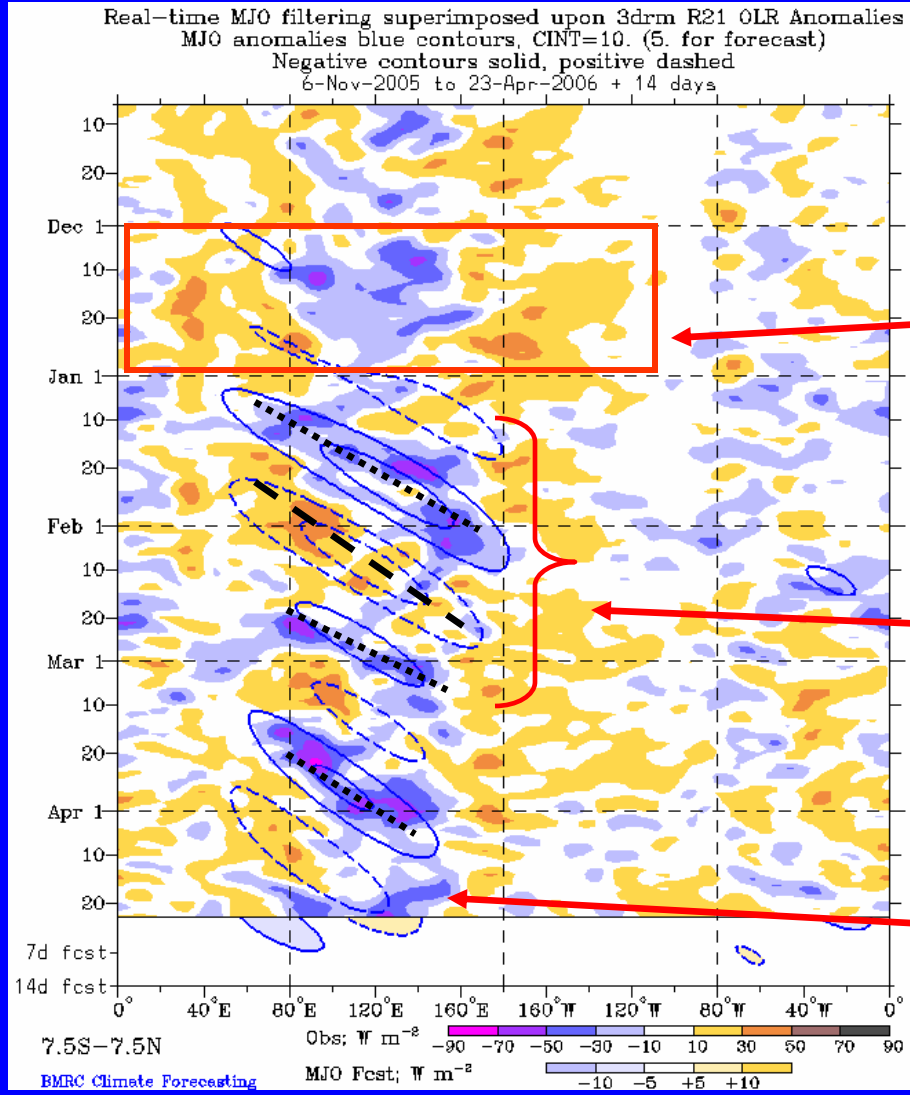
Stronger-than-average easterlies (blue shading)

Equatorial low-level westerly anomalies have returned to the Indian Ocean

Strong equatorial low-level easterly anomalies have expanded across the Pacific



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



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

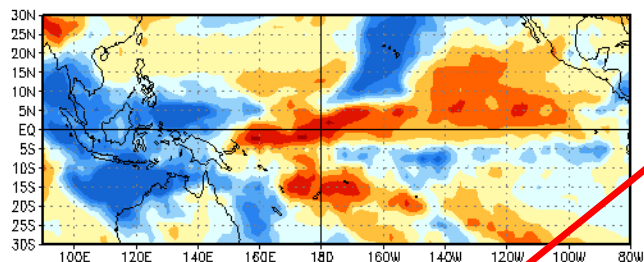
Enhanced convection has returned to the eastern Indian Ocean and western Pacific



Anomalous OLR and 850-hPa Wind

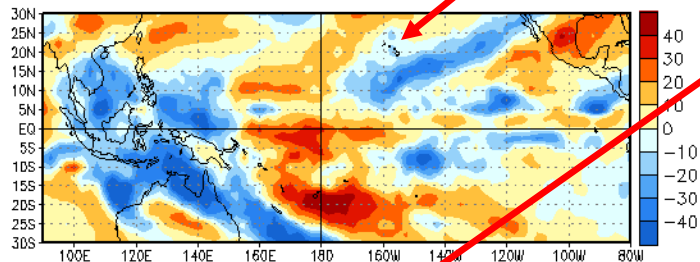
Wind: Last 30 days

OLR Anomalies
22 MAR 2006 to 31 MAR 2006



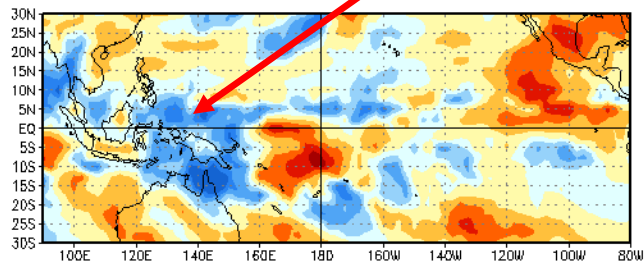
Enhanced convection in the vicinity of Hawaii diminished during early April.

1 APR 2006 to 10 APR 2006



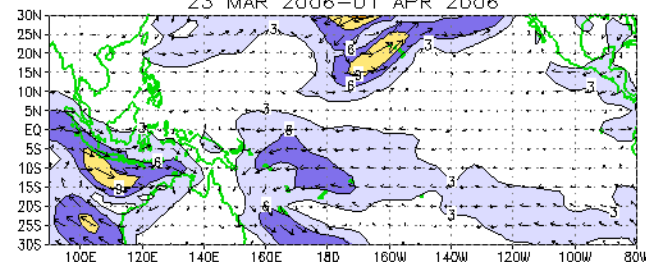
From late March into mid April, enhanced convection persisted in the western Pacific.

11 APR 2006 to 20 APR 2006

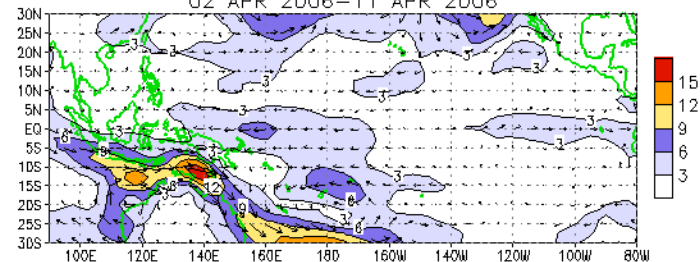


During early to mid April, low-level wind anomalies significantly decreased.

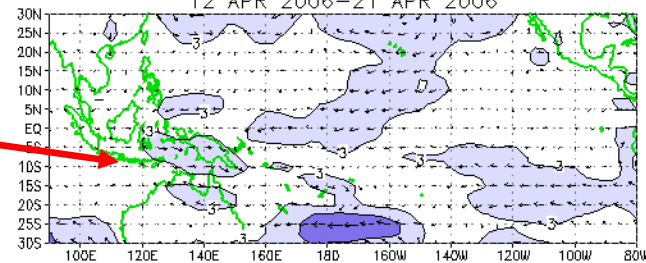
CDAS 850-hPa Wind Anoms
23 MAR 2006-01 APR 2006



02 APR 2006-11 APR 2006



12 APR 2006-21 APR 2006

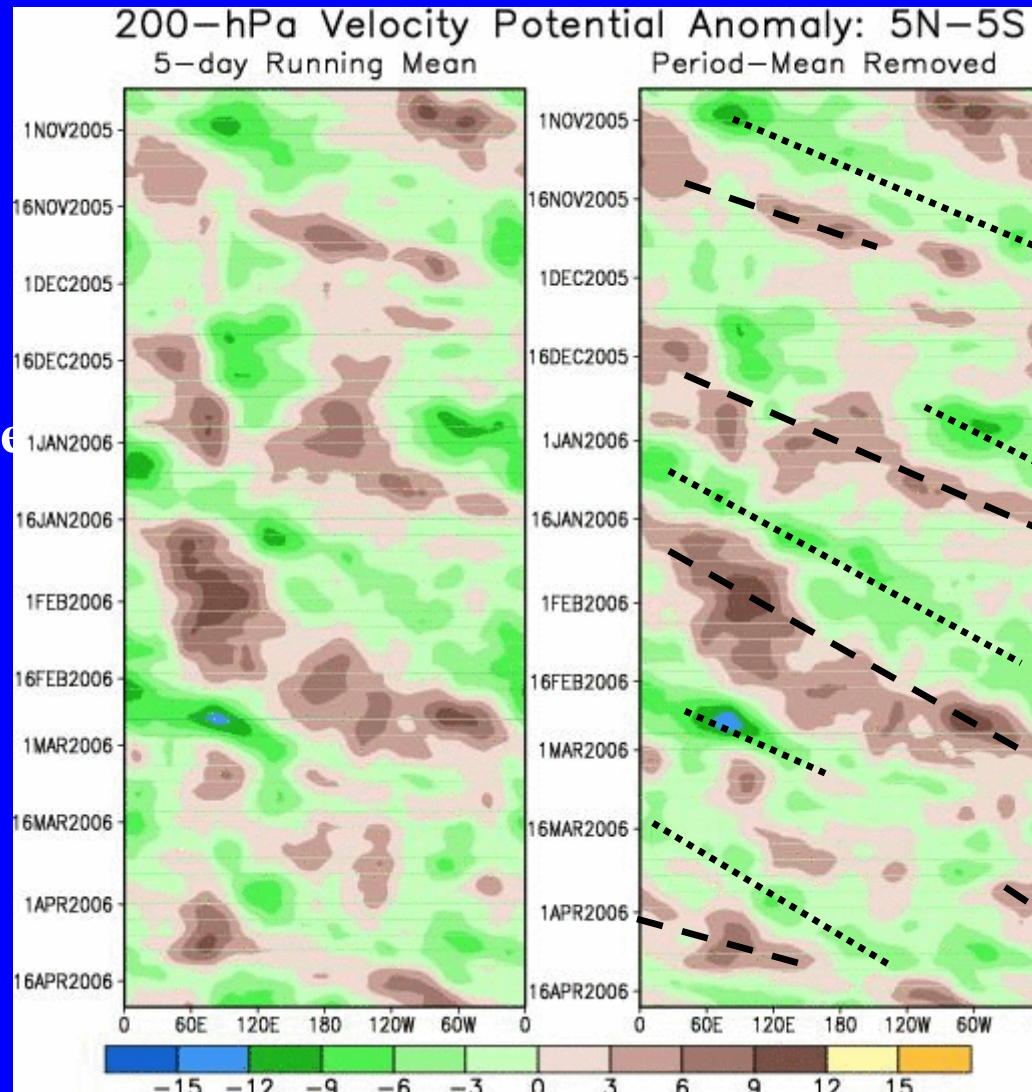




200-hPa Velocity Potential Anomalies (5°S-5°N)

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 November and January-February time periods.

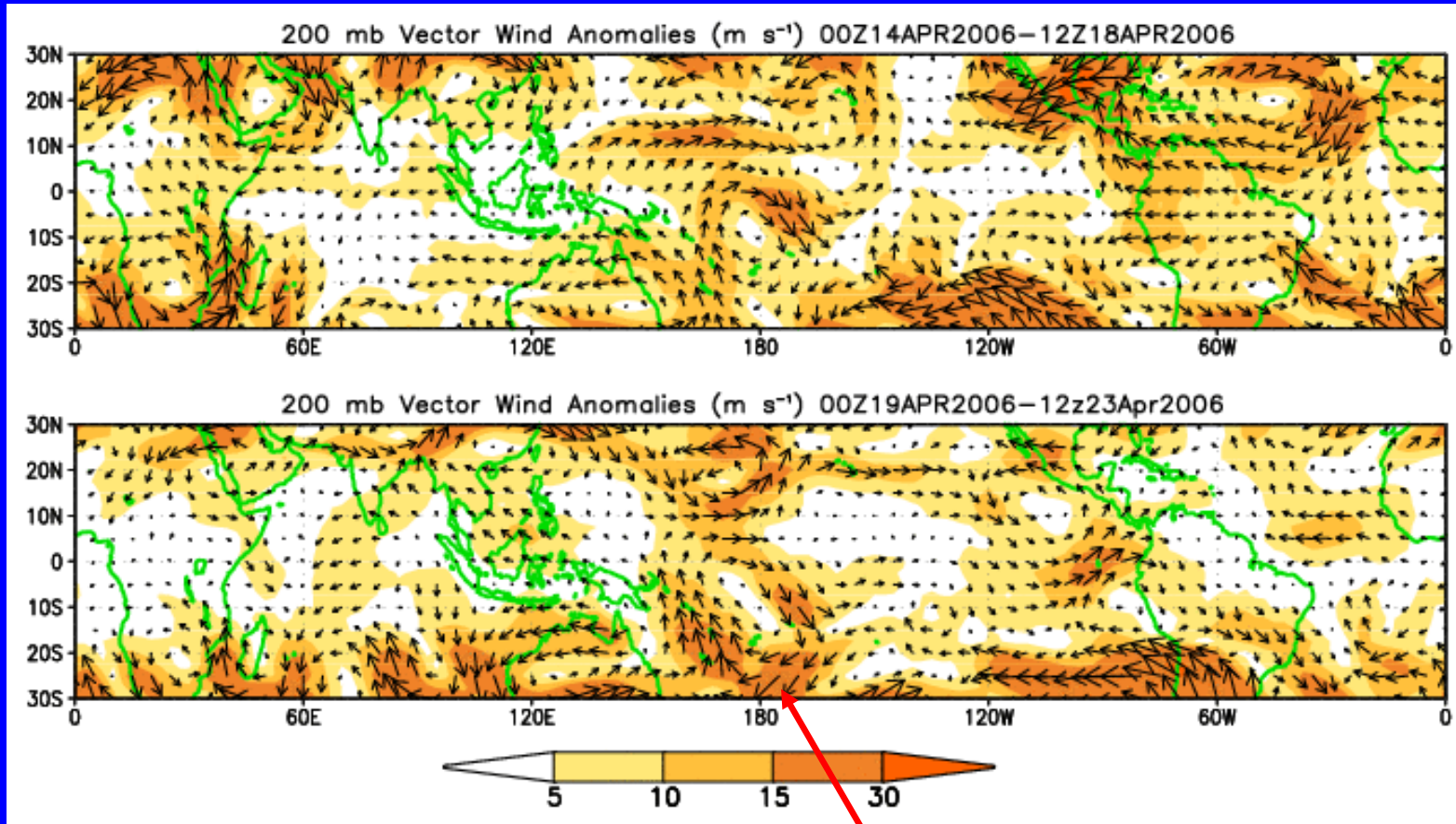
MJO activity remains weak.

Longitude



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

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

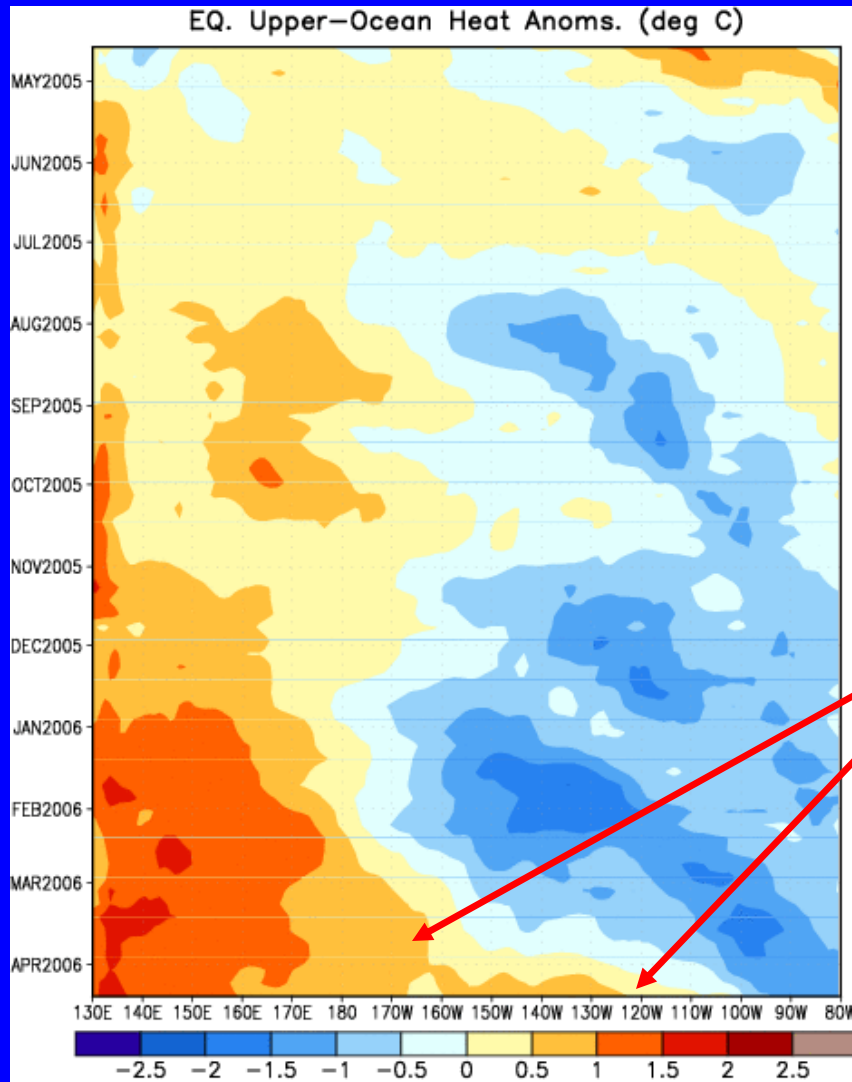


Cyclonic circulation evident in the south Pacific



Heat Content Evolution in the Eq. Pacific

Time



Longitude

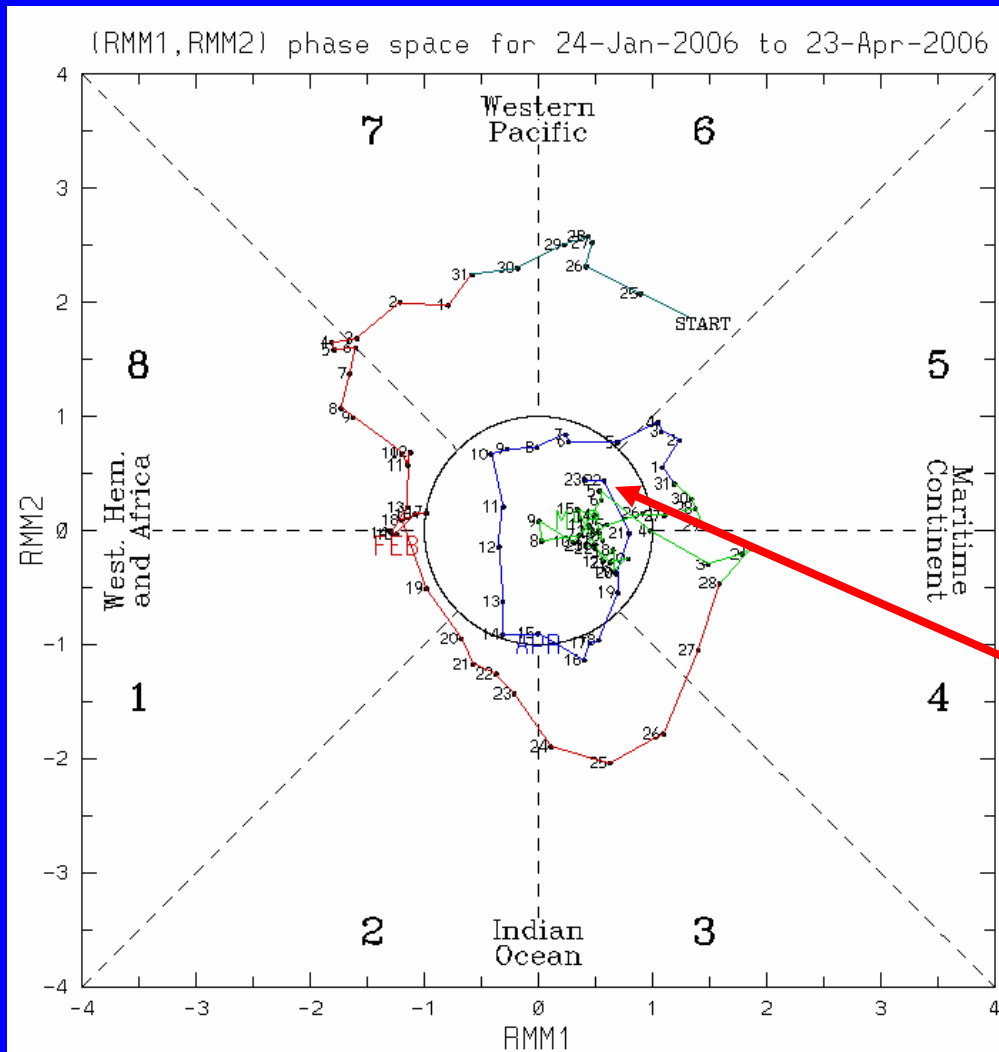
Heat content has been above average in the western Pacific since June while cooler water has been observed across the central and eastern Pacific. Warmer water in the western Pacific has recently shifted east towards 110W.



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.

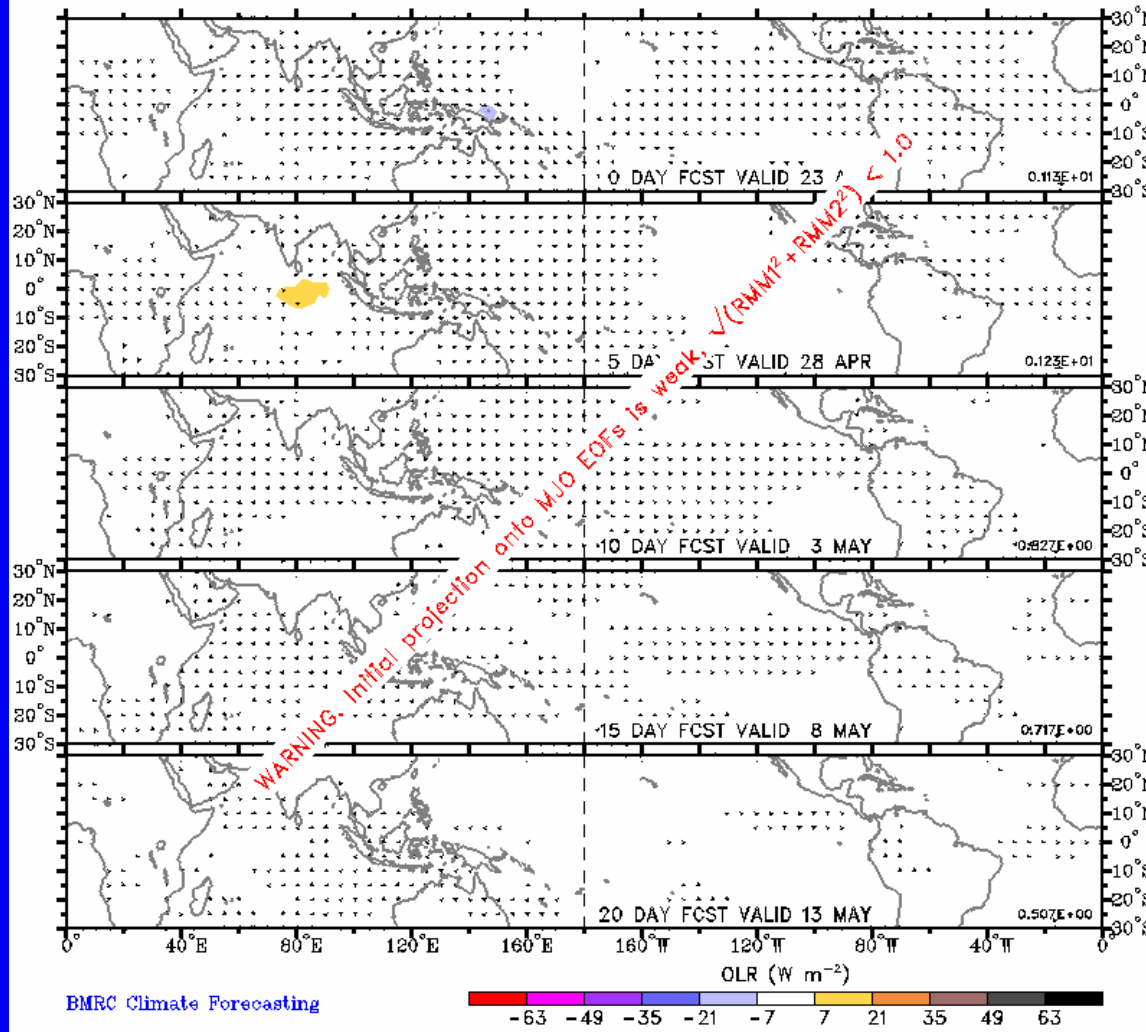


The MJO signal remains weak.



Statistical OLR MJO Forecast

Prediction of MJO-associated anomalies using lagged linear regression
Predictors are RMM1 and RMM2 on 23 Apr 2006
Shading for OLR anomalies (scale below). Vectors for 850-hPa wind

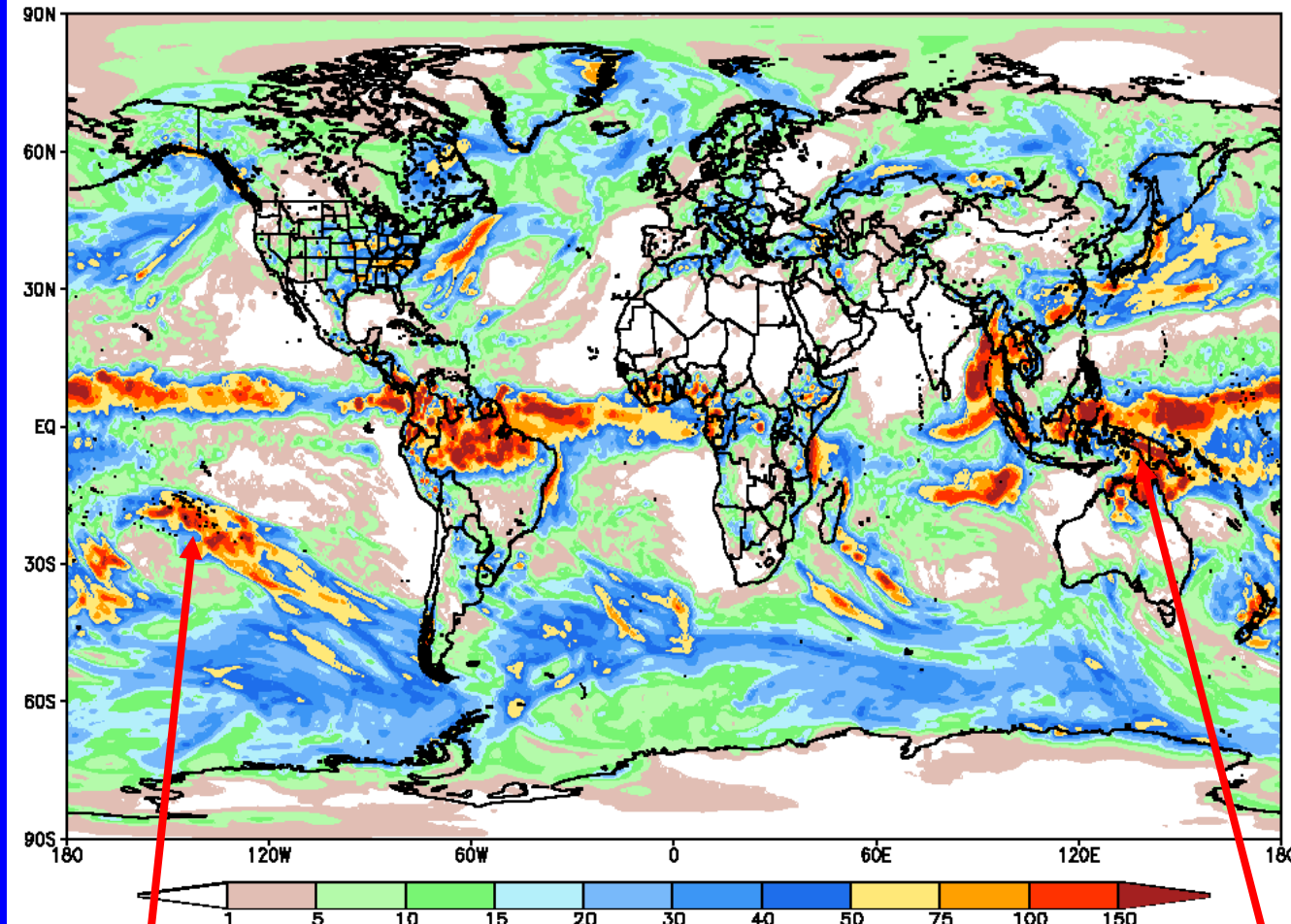


A statistical MJO forecast indicates that the MJO will remain weak during the next two weeks.



Global Forecast System (GFS) Week 1 Precipitation Forecast

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



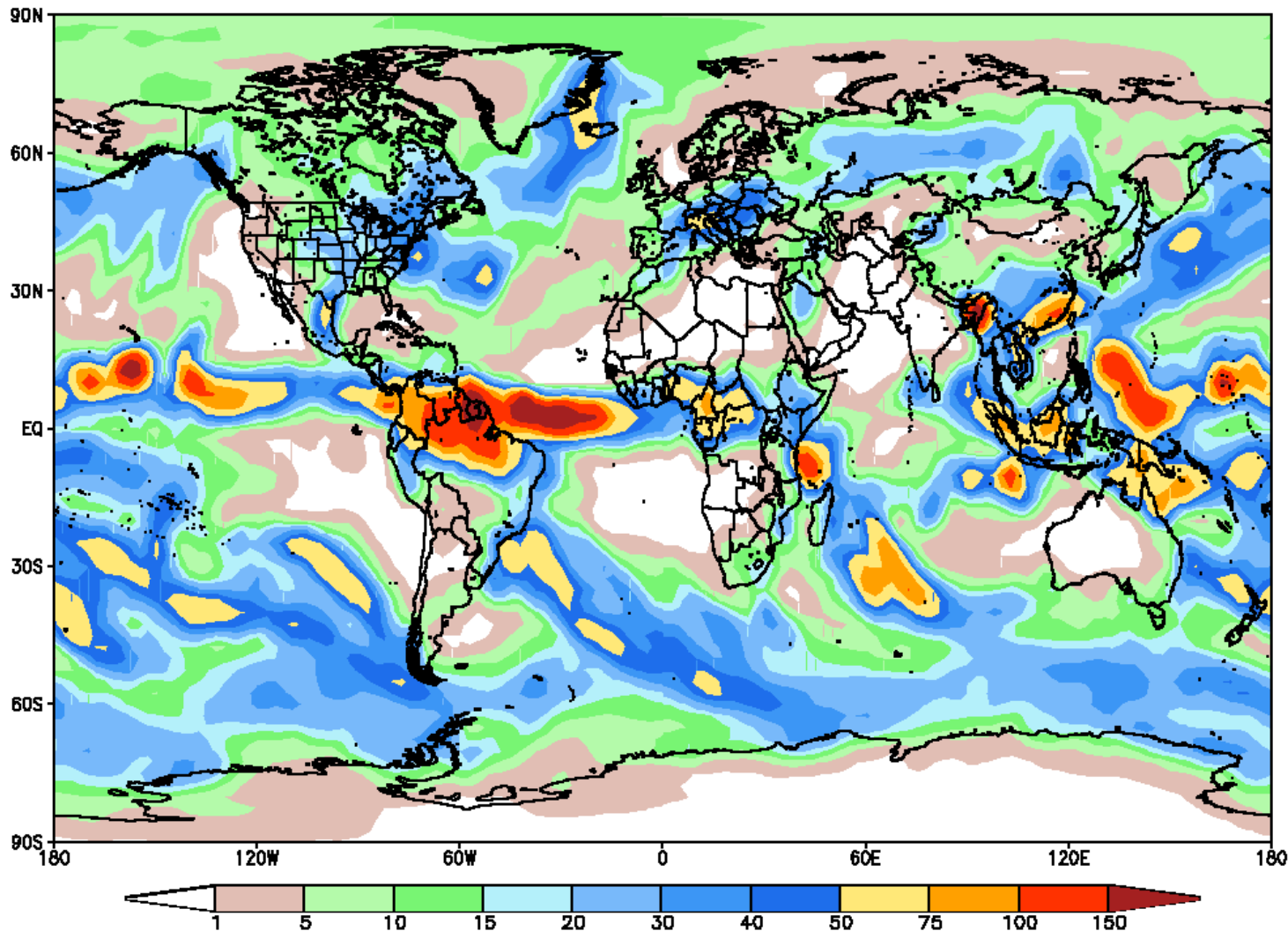
Heavy rainfall stretches into the south Pacific

Abundant rainfall persists across Indonesia and the western Pacific



Global Forecast System (GFS) Week 2 Precipitation Forecast

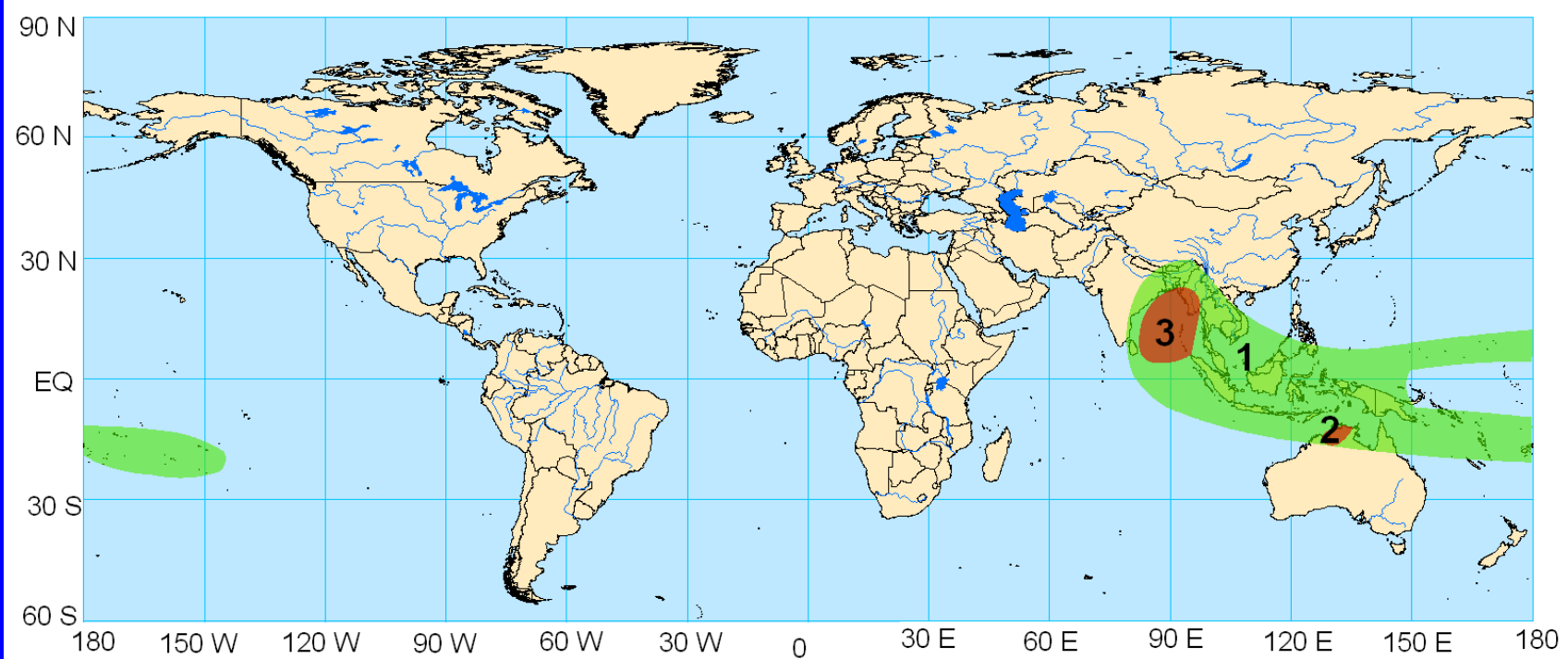
GFS 100 km Week 2 Total Precipitation (mm)
Issued Apr 24 2006 00Z for the period ending at May 7 2006 00Z





Potential Benefits/Hazards – Week 1

Valid April 18 - 24, 2006

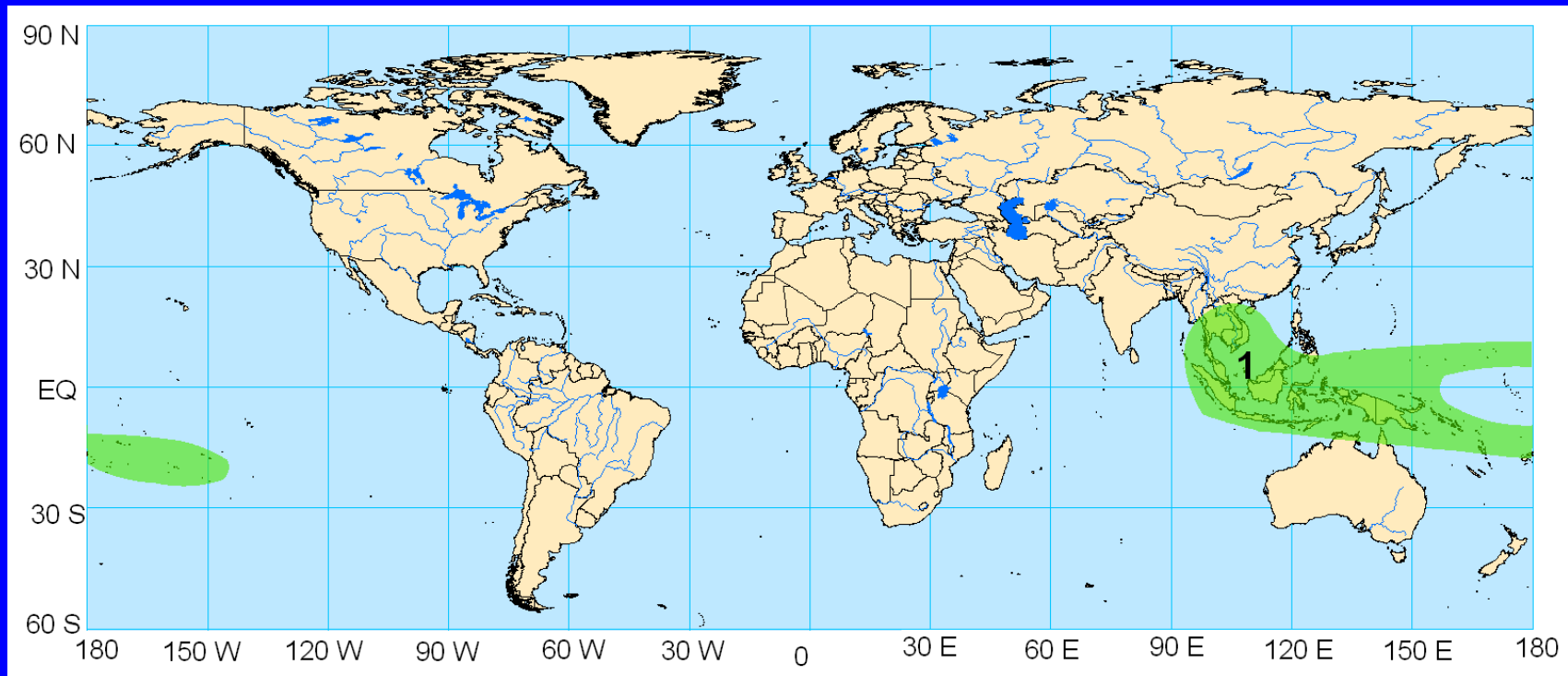


1. An increased chance for above normal rainfall across parts of South Asia, Southeast Asia, Indonesia, the western Pacific Ocean, and the south Pacific due to convection typical during a weak La Nina and areas of above average SSTs.
2. Powerful Tropical Cyclone Monica will impact northern Australia.
3. An increased chance of tropical cyclogenesis exists for the Bay of Bengal due to favorable upper-level conditions.



Potential Benefits/Hazards – Week 2

Valid April 25 – May 1, 2006



1. An increased chance for above normal rainfall across parts of Southeast Asia, Indonesia, the western Pacific Ocean, and the south Pacific due to convection typical during a weak La Niña and areas of above average SSTs.



Summary

- The latest observations indicate the MJO remains weak with the continuation of weak 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 a weak La Nina and include increased chances of above normal rainfall across Southeast Asia, Indonesia, the western Pacific Ocean, and parts of the south Pacific. During week 1, the remnants of Tropical Cyclone Monica will impact northern Australia while an increased chance of tropical cyclogenesis exists for the Bay of Bengal.
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