



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

Update prepared by
Climate Prediction Center / NCEP
May 29, 2006



Outline

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



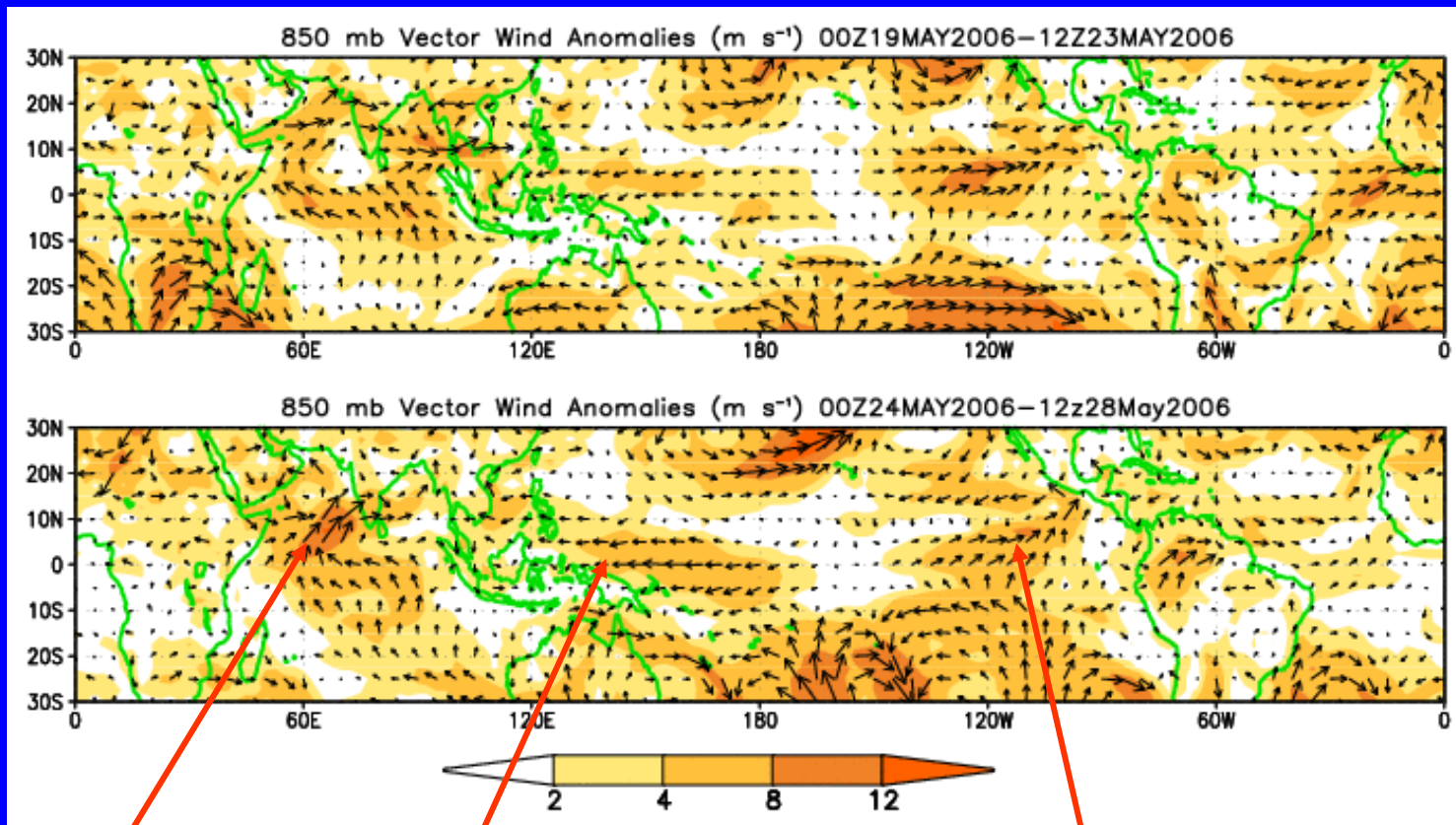
Overview

- 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/benefits across the global tropics during week 1 include increased chances of above (below) normal rainfall across southern Asia from the Arabian Sea into Southeast China (equatorial Indian Ocean).
- Increased chances of above normal rainfall is expected to shift to the maritime continent during week 2. The threat of above normal rainfall, however, remains across sections of western India.



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

Note that shading denotes the magnitude of the anomalous wind vectors



An enhanced Somali jet indicative of early onset to the Indian Monsoon.

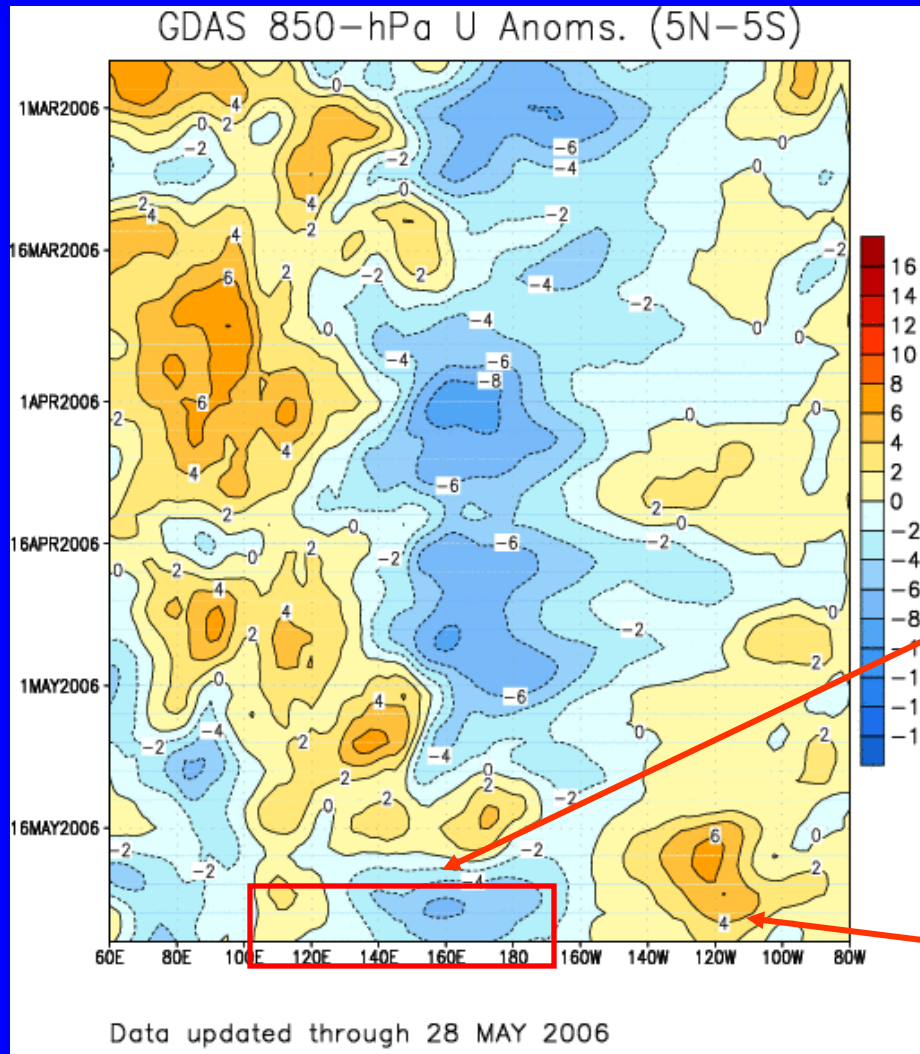
Equatorial easterly anomalies strengthened in the western Pacific.

Westerly anomalies remained strong in the eastern Pacific associated with anomalous convection.



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 anomalies over the maritime continent and western Pacific developed in association with enhancement of local convection during the last several days.

Westerly anomalies over the eastern Pacific remained strong.

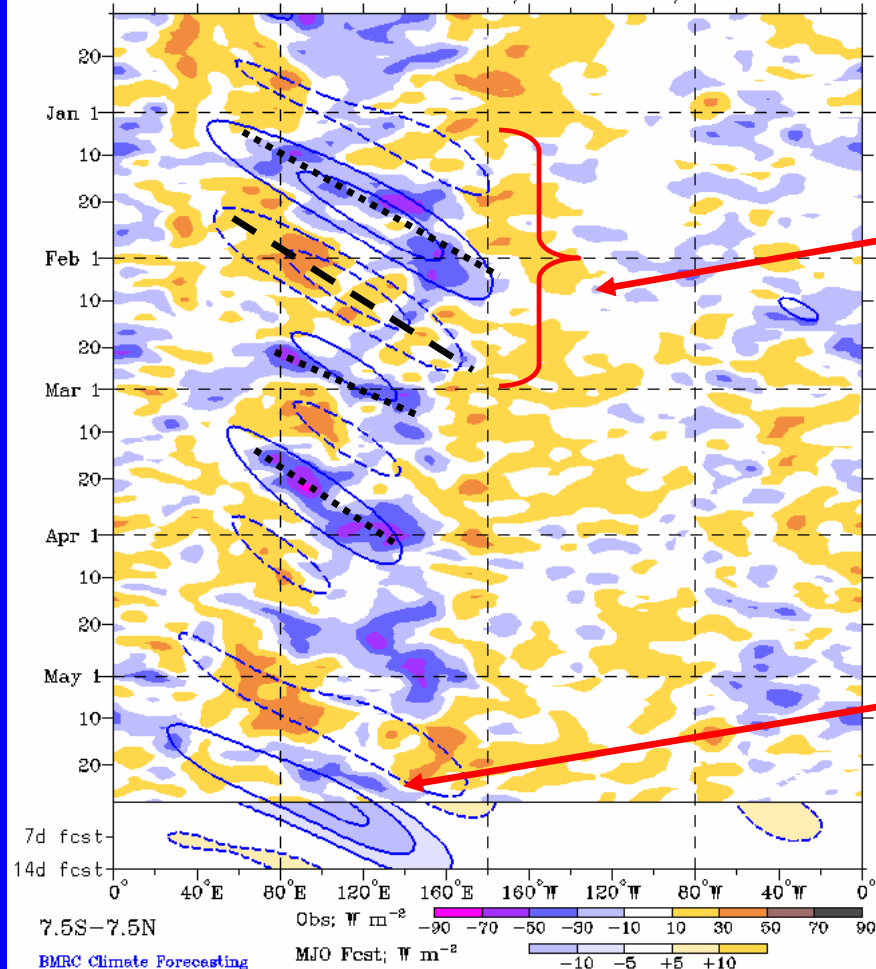
Longitude



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
11-Dec-2005 to 28-May-2006 + 14 days

Time
↓



Drier-than-average conditions (/red shading)
Wetter-than-average conditions (blue shading)

Eastward propagation of OLR anomalies associated with the MJO was evident from mid-January through late February

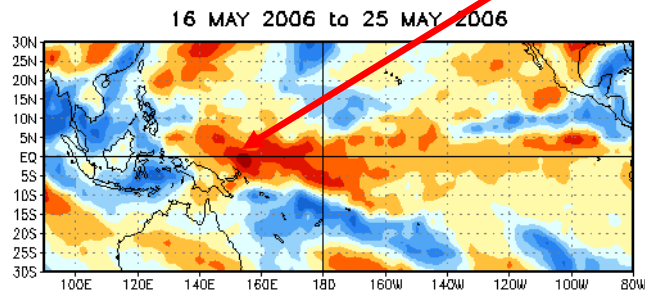
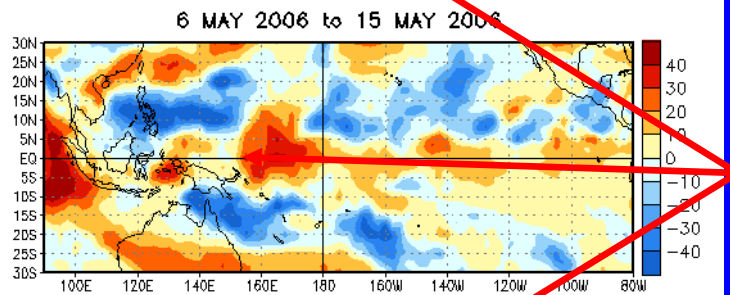
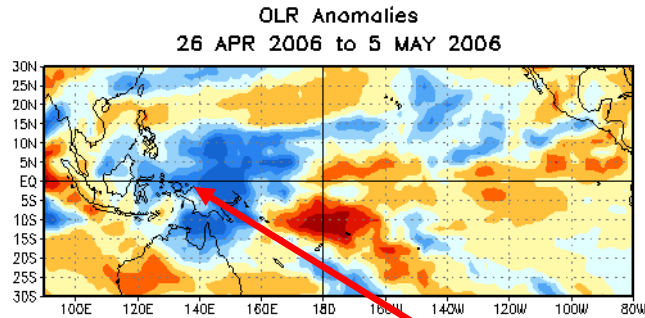
Enhanced convection over the maritime continent during the past several days

Longitude

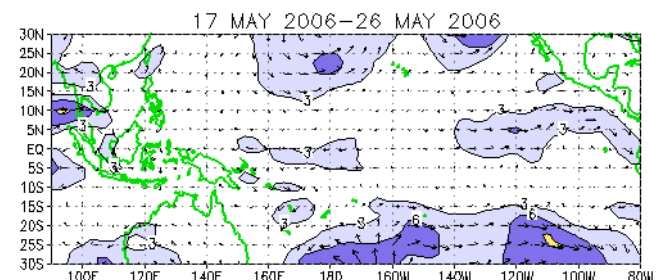
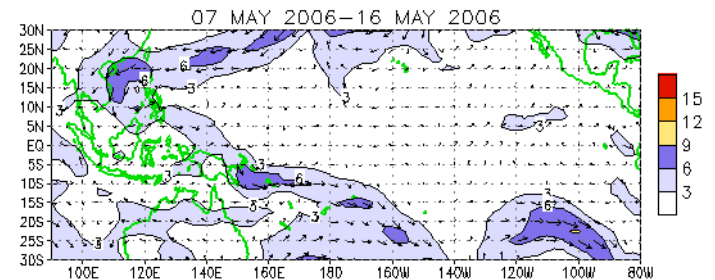
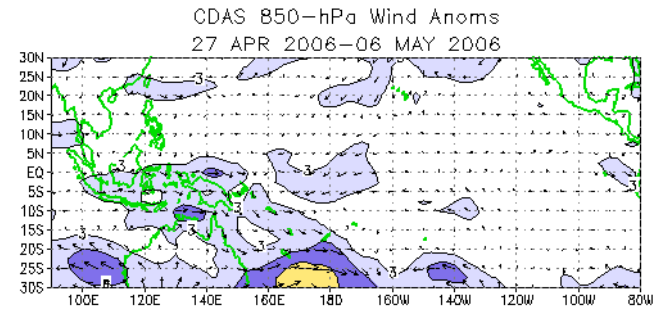


Anomalous OLR and 850-hPa Wind

Wind: Last 30 days



Enhanced convection in the western Pacific in late-April to early-May has been replaced with drier than normal conditions.



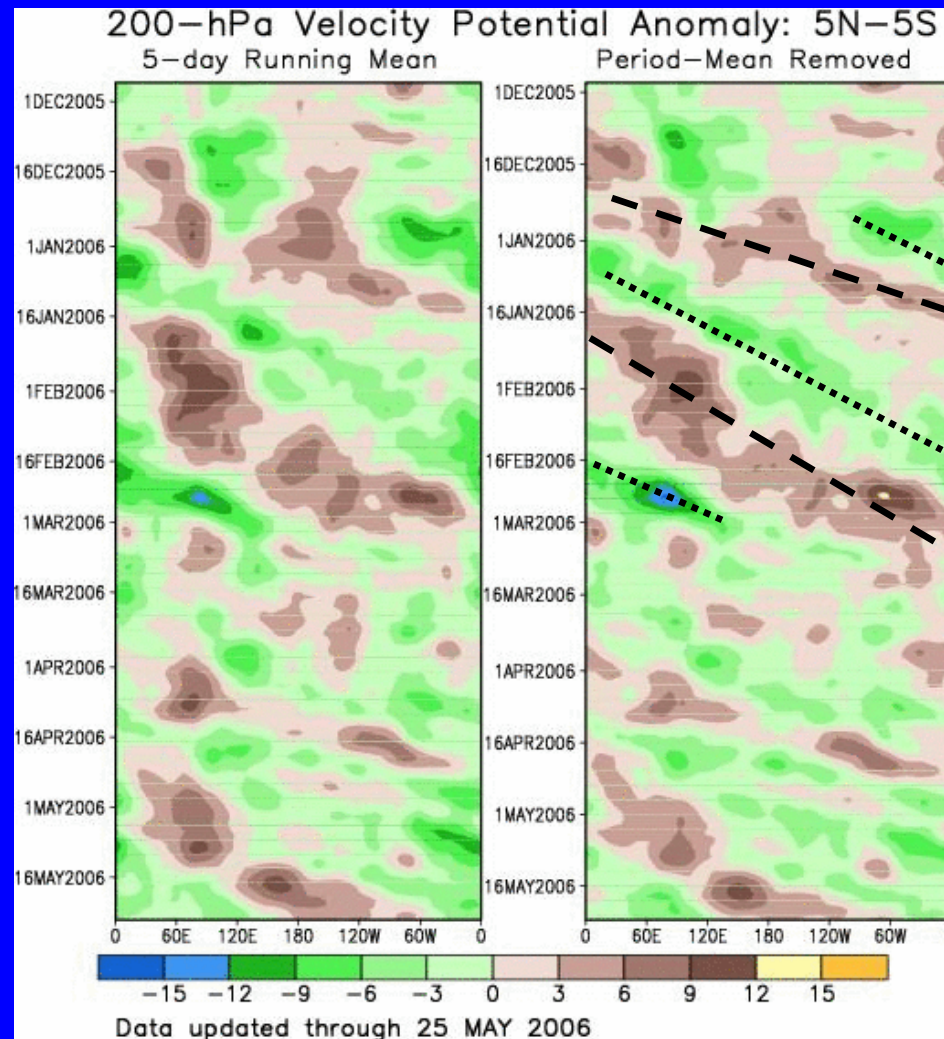


200-hPa Velocity Potential Anomalies (5°S-5°N)

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 January and February.

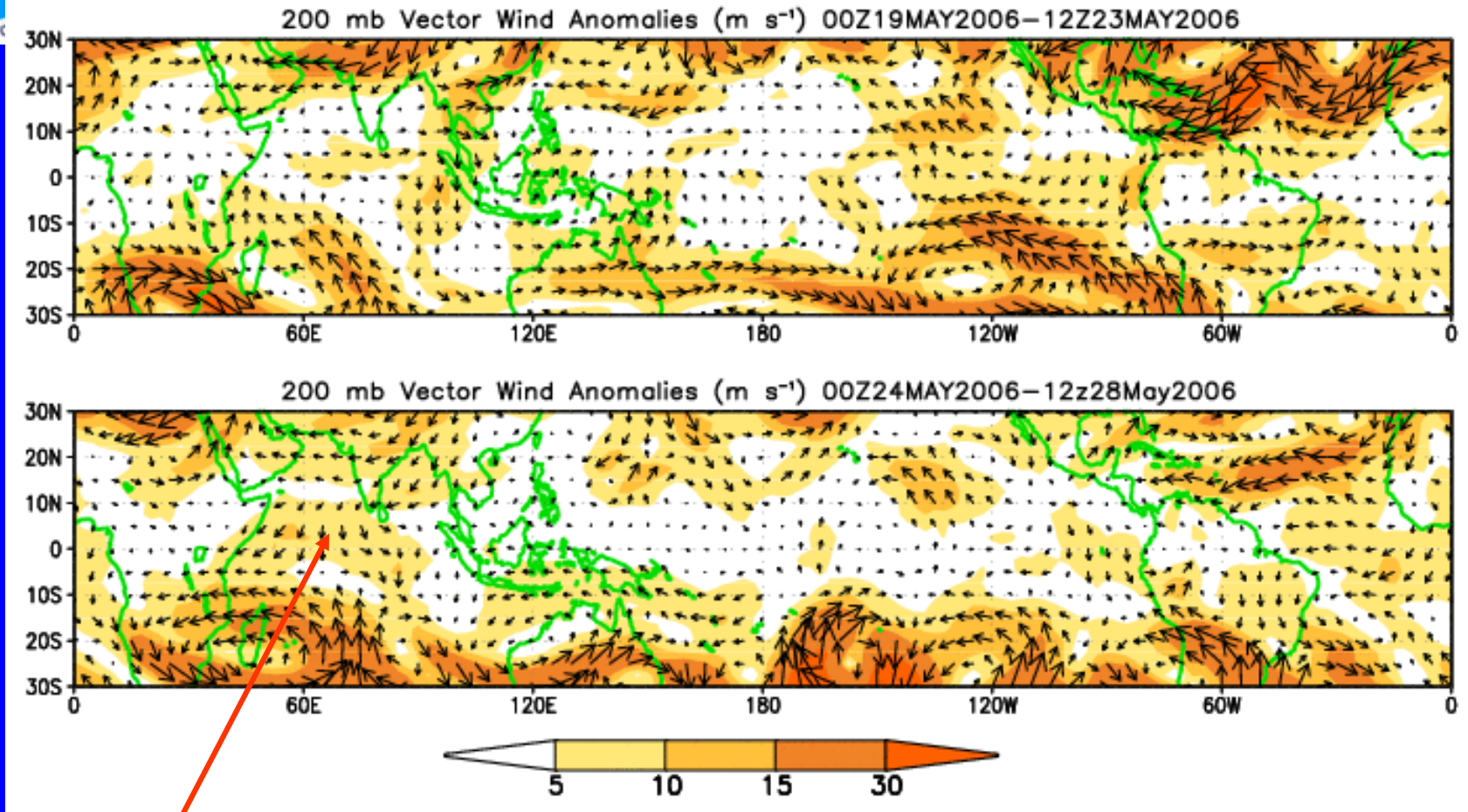
The MJO has generally been weak since early March.

Longitude



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

Note that shading denotes the magnitude of the anomalies

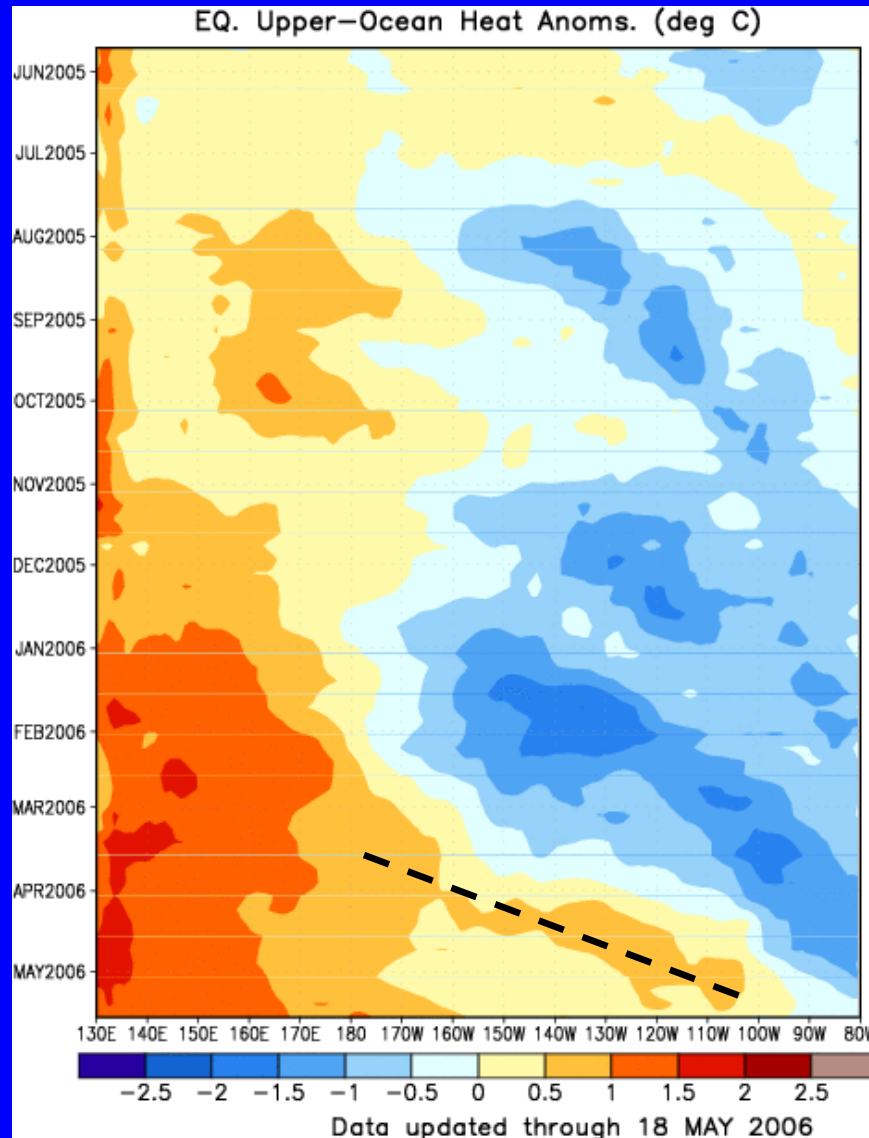


Northerly anomalies in the Indian Ocean consistent with the early onset of the Indian monsoon.



Heat Content Evolution in the Eq. Pacific

Time



Longitude

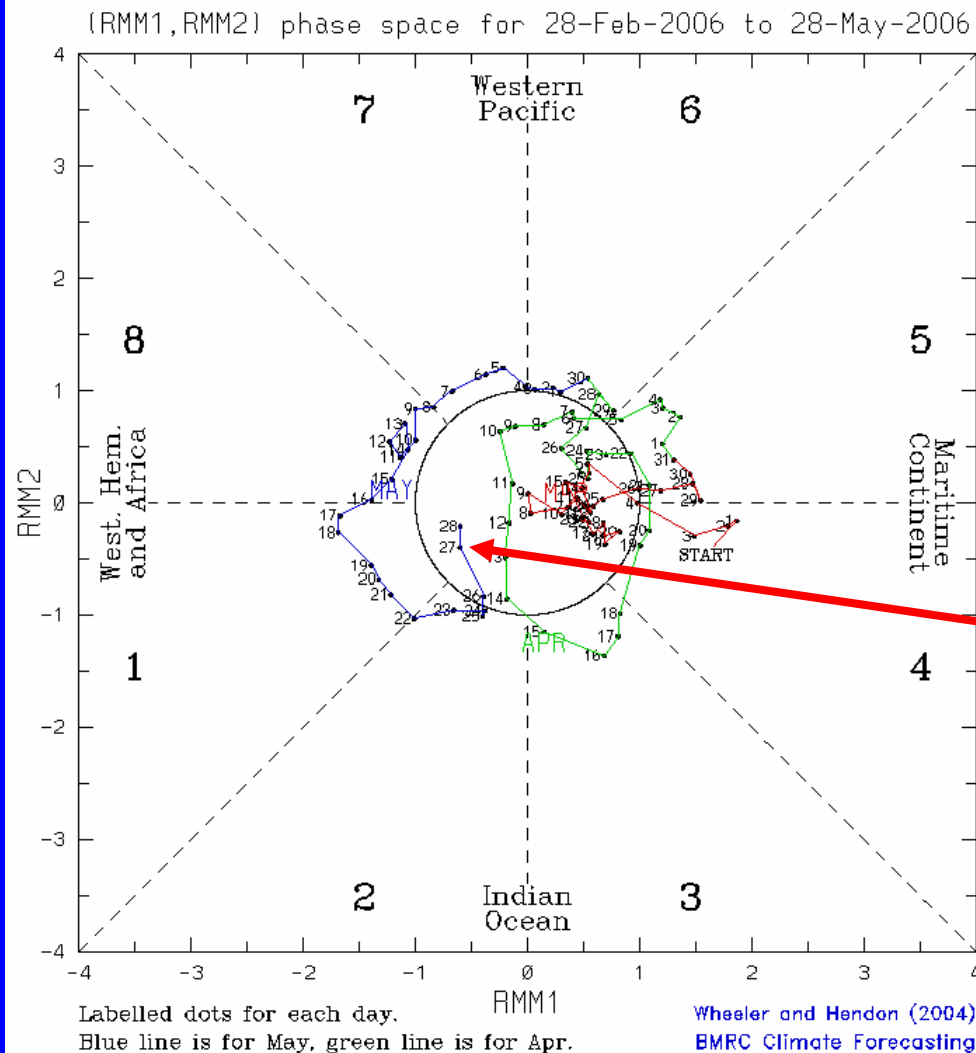
Above normal heat content expanded into the eastern Pacific during April and May 2006 associated with the latest Kelvin wave.



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.



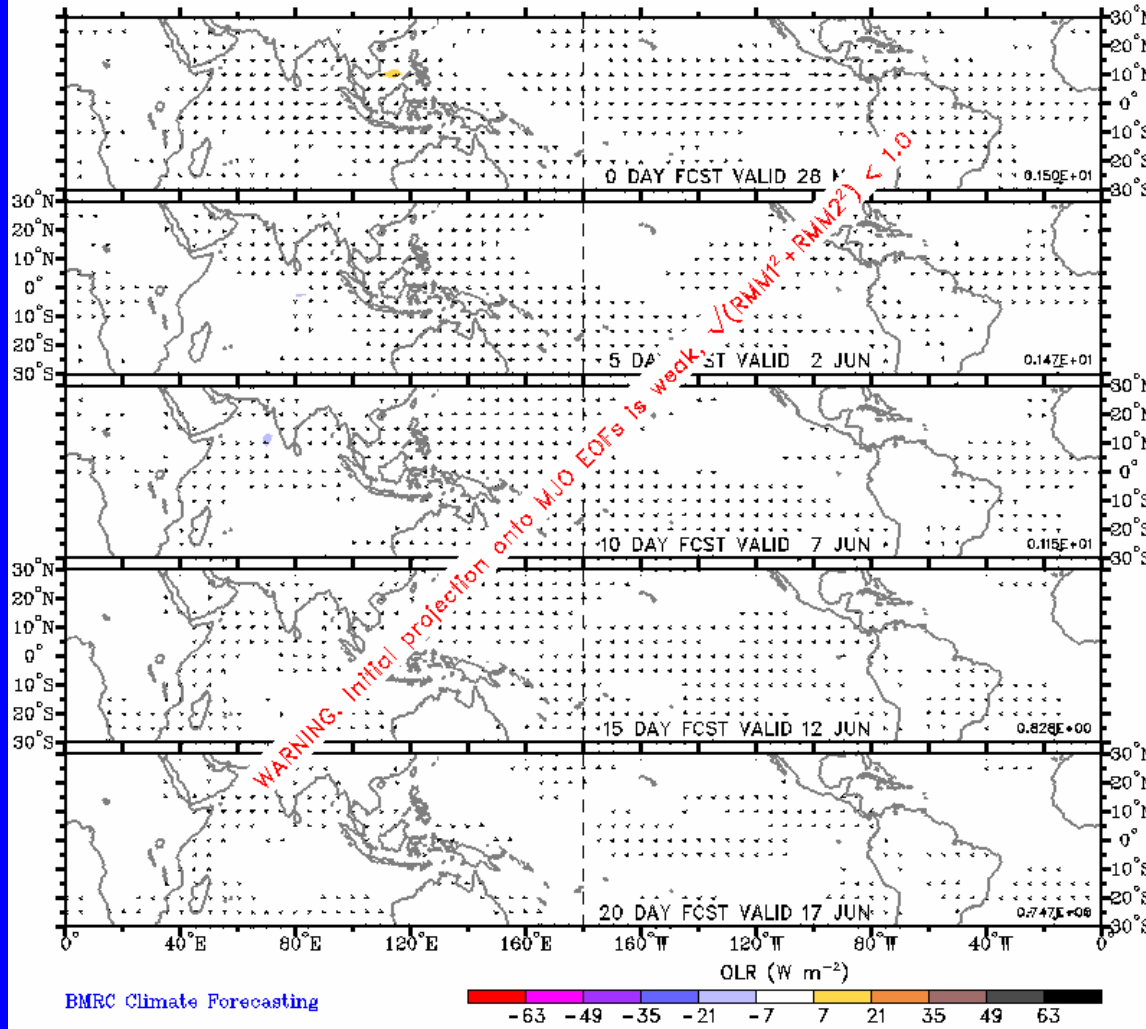
The MJO signal weakened substantially during the last few days.



Statistical OLR MJO Forecast

Prediction of MJO-associated anomalies using lagged linear regression
Predictors are RMM1 and RMM2 on 28 May 2006

Shading for OLR anomalies (scale below). Vectors for 850-hPa wind



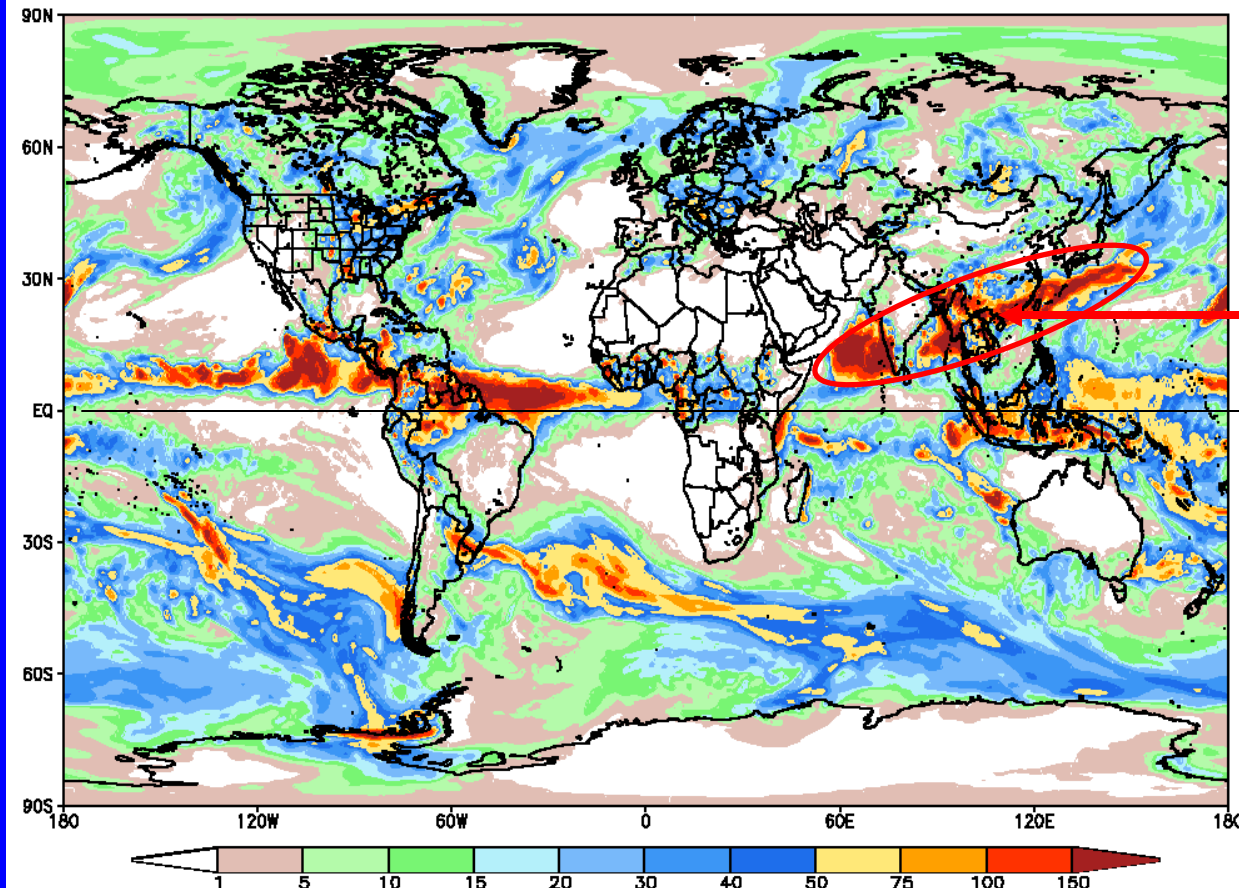
BMRC Climate Forecasting

A statistical MJO forecast indicates a very weak signal during next two weeks.



Global Forecast System (GFS) Week 1 Precipitation Forecast

GFS 37.5 km Week 1 Total Precipitation (mm)
Issued at May 29 2006 00Z for the period ending at Jun 5 2006 00Z



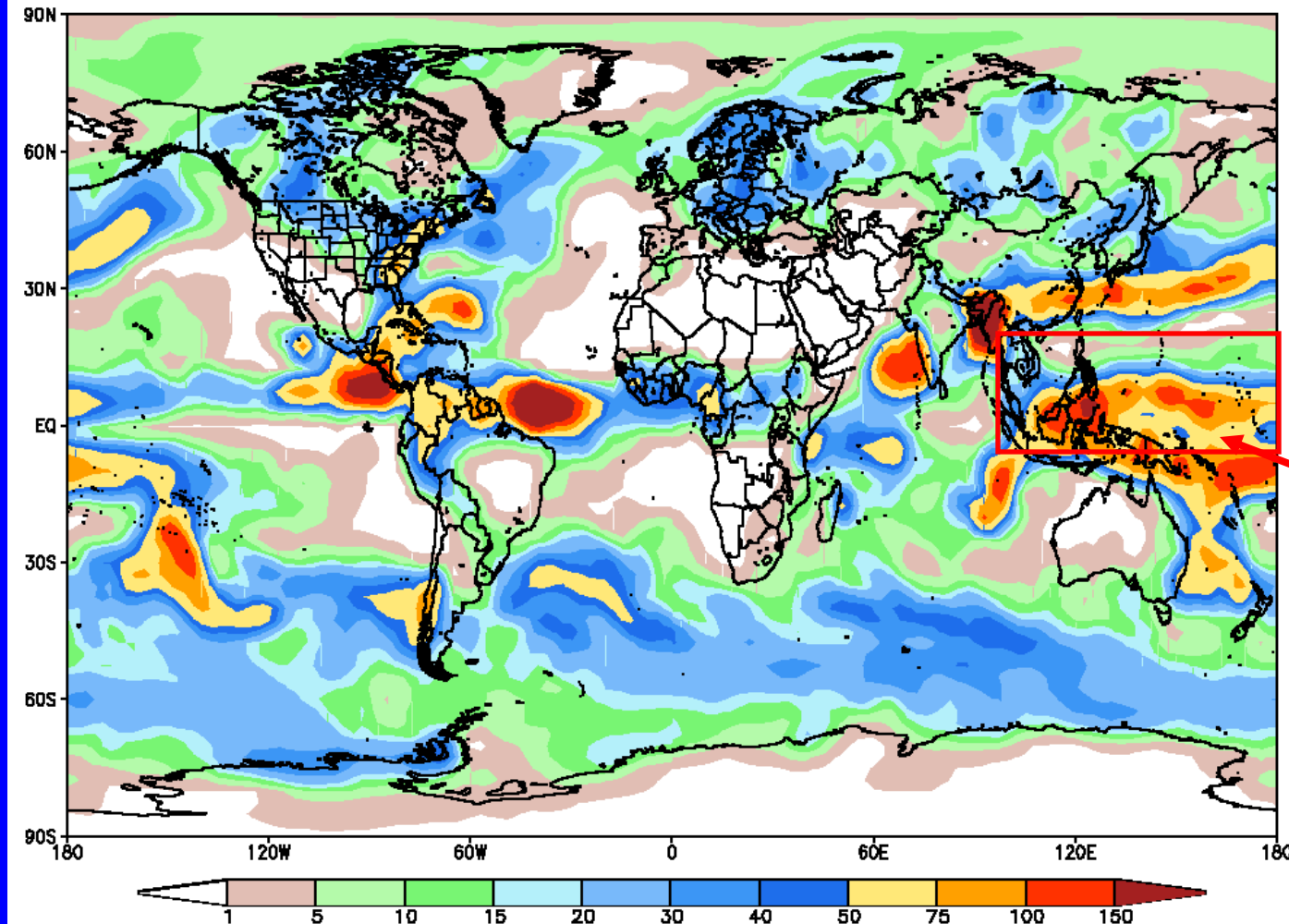
**Heavy rainfall
extending from the
Arabian Sea to just
south of Japan.**



Global Forecast System (GFS) Week 2

Precipitation Forecast

GFS 100 km Week 2 Total Precipitation (mm)
Issued May 29 2006 00Z for the period ending at Jun 11 2006 00Z

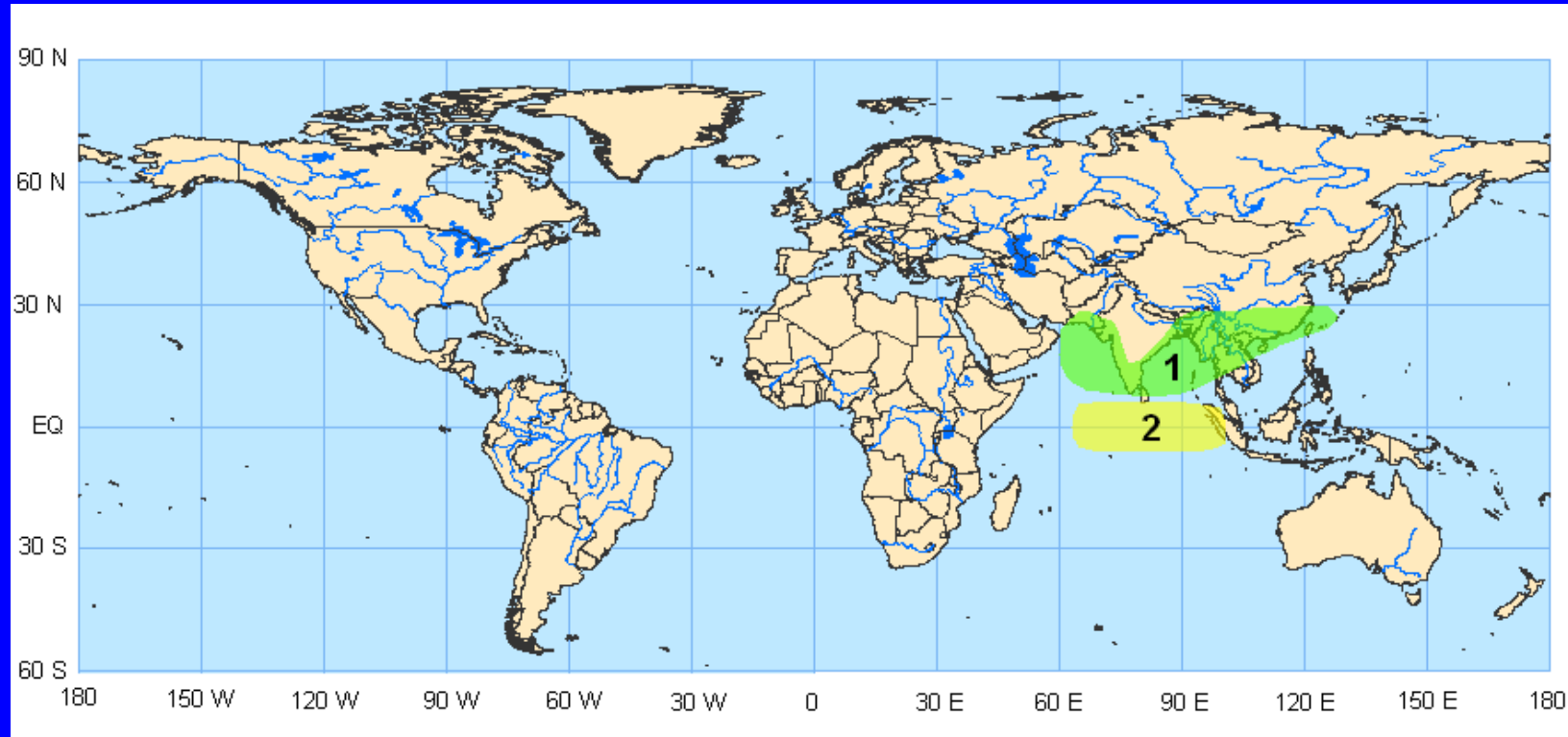


Heavy rainfall
across the
maritime continent
and sections of the
western Pacific.



Potential Benefits/Hazards – Week 1

Valid May 30 – June 5, 2006

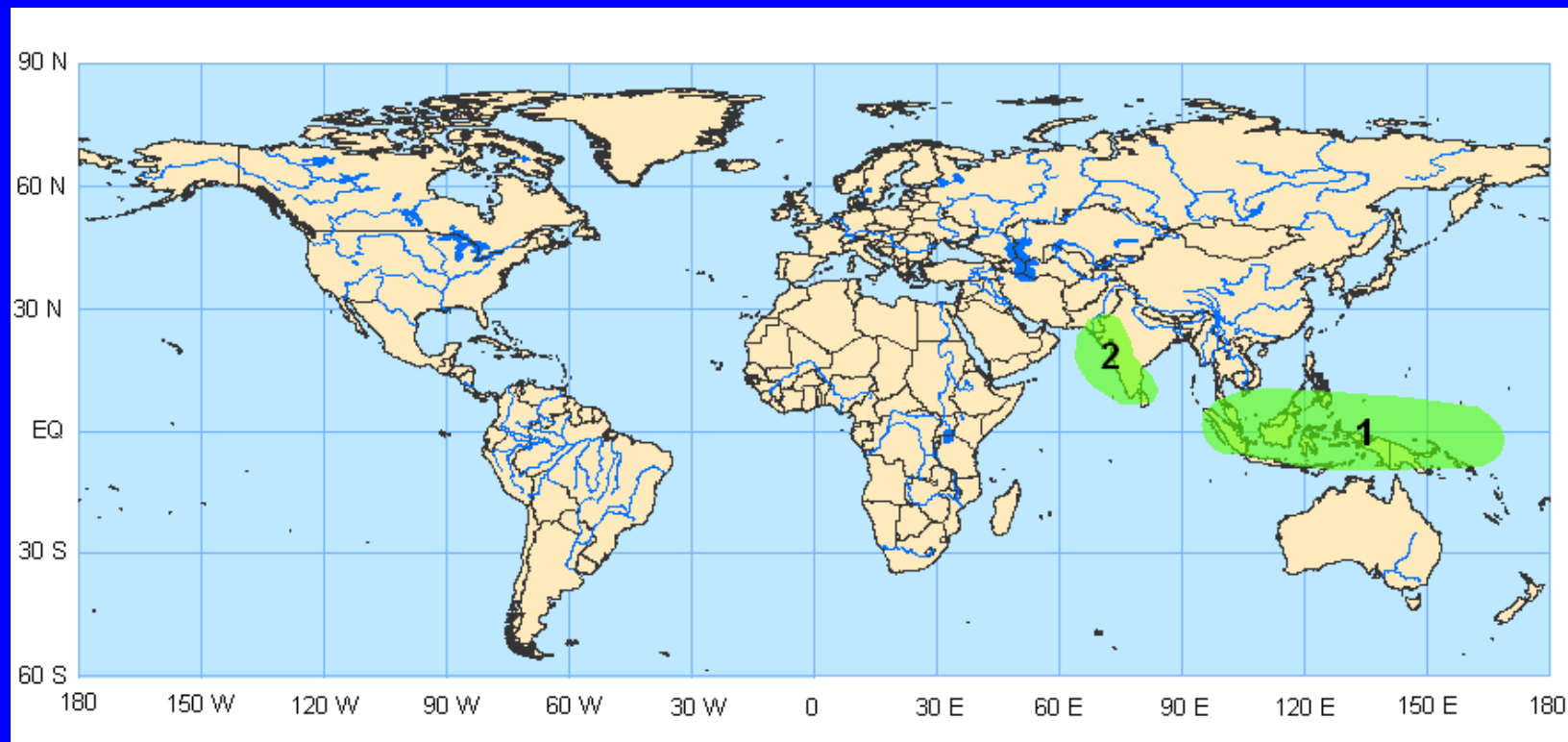


1. Increased chances of above normal rainfall extending from the Arabian Sea to sections of southeast Asia associated with the continued development of the monsoon and intraseasonal variability
2. Increased chances of below normal rainfall in the equatorial Indian Ocean associated with the continued development of the monsoon and intraseasonal variability



Potential Benefits/Hazards – Week 2

Valid June 6 – June 12, 2006



1. Increased chances of above normal rainfall across the maritime continent and the western Pacific Ocean associated with the continued evolution of intraseasonal variability and local positive SST anomalies
2. Increased chances of above normal rainfall in the eastern Arabian Sea and western India associated with the continued evolution of the monsoon.



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