

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

**Update prepared by
Climate Prediction Center / NCEP
April 9, 2007**

Outline

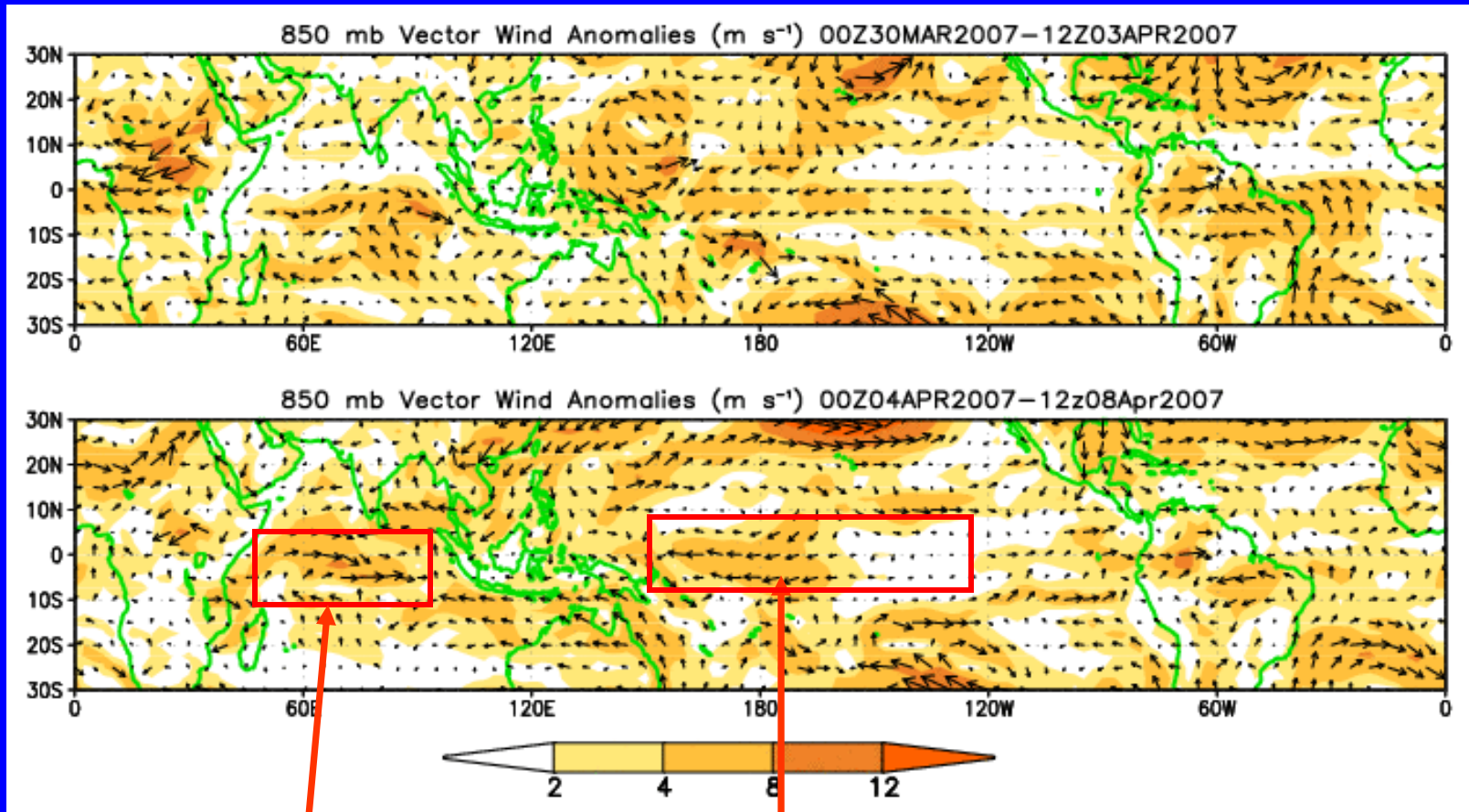
- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**

Overview

- **The MJO remains incoherent.**
- **During week 1, there exists an increased chance for above-average rainfall over extreme northern South America, parts of the Middle East, and across Sri Lanka and adjacent waters.**
- **There is an increased chance for below-average rainfall over Indo-China and the Philippines during week 1.**
- **Uncertainty is very high during week 2.**

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

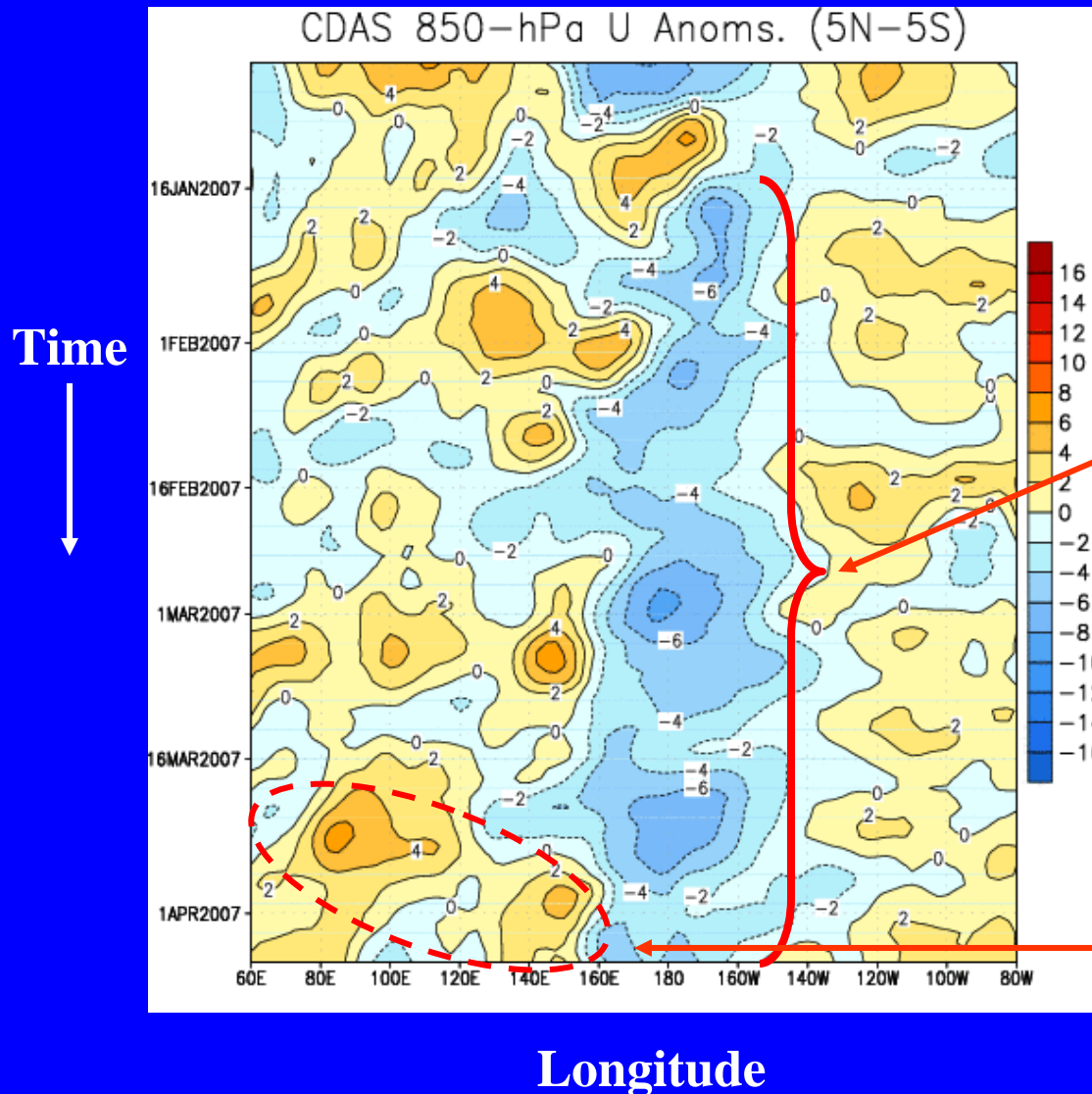
Note that shading denotes the magnitude of the anomalous wind vectors



Anomalous westerlies persisted across the equatorial Indian Ocean

Anomalous easterlies persisted in the western equatorial Pacific, but diminished over the central equatorial Pacific.

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



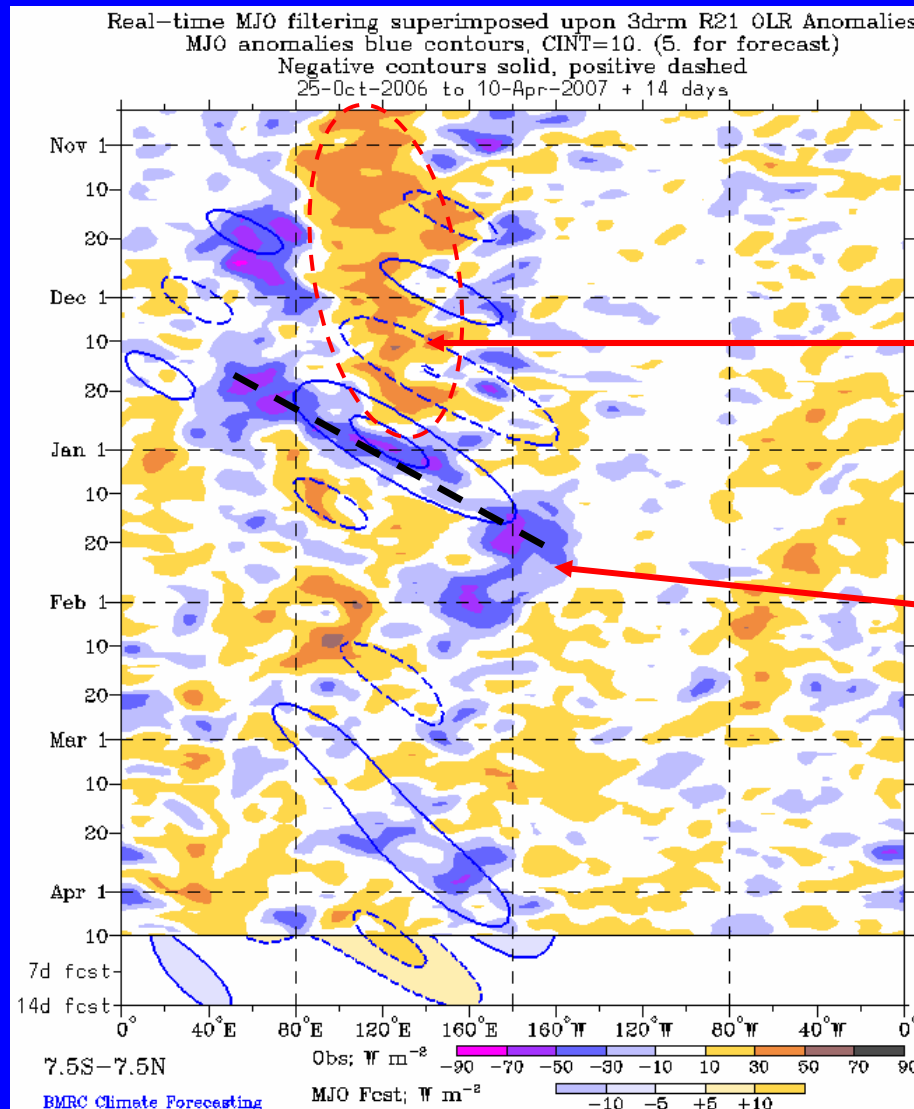
Westerly anomalies (orange/red shading) represent anomalous west-to-east flow.

Easterly anomalies (blue shading) represent anomalous east-to-west flow.

Easterly anomalies have been persistent near the Date Line since mid-January.

Westerly anomalies over the eastern Indian Ocean have shifted eastward towards the far western portions of the Pacific.

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



Drier-than-normal conditions, positive OLR anomalies (/red shading)

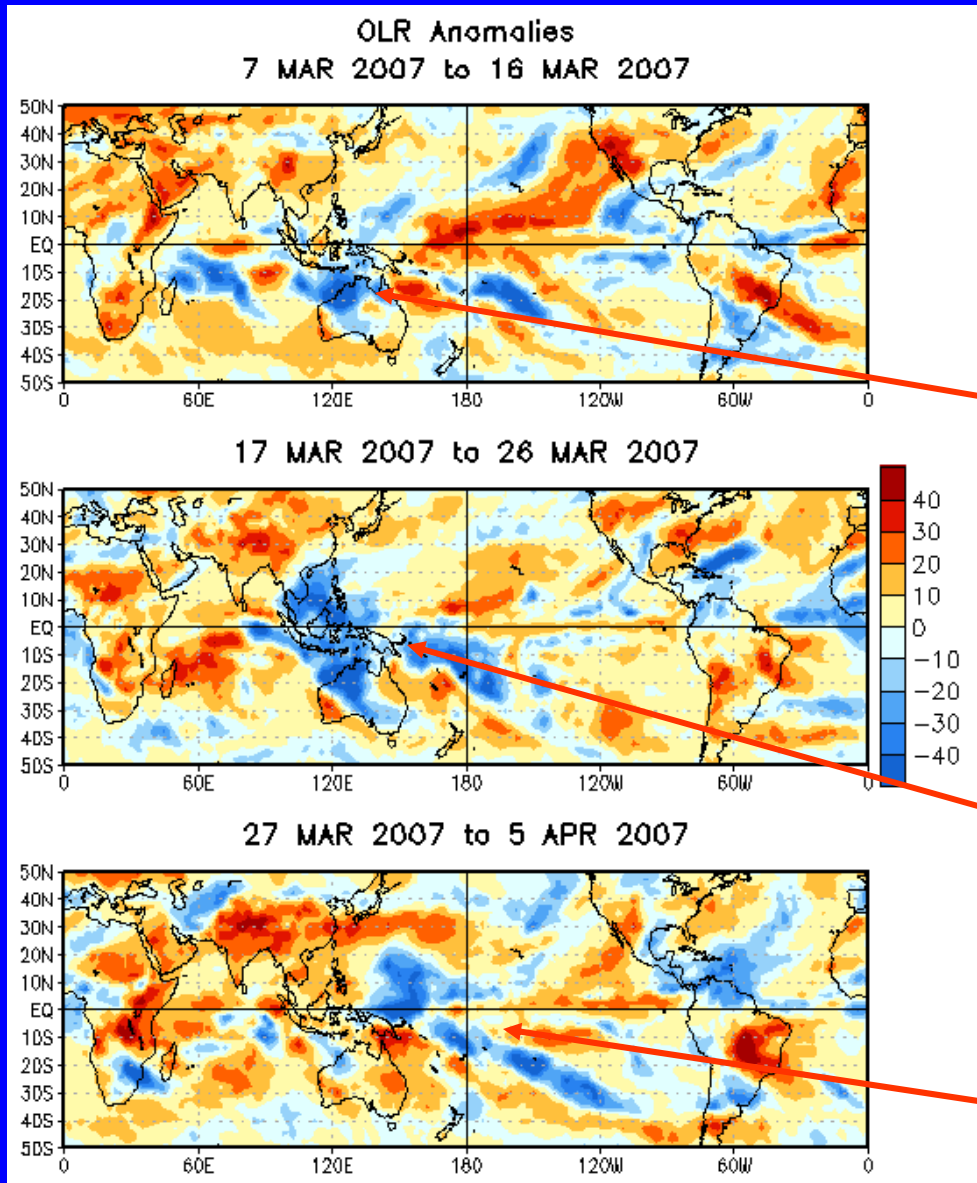
Wetter-than-normal conditions, negative OLR anomalies (blue shading)

Strong suppressed convection was evident across the Maritime Continent (100E-150E) from late October to mid-December.

Enhanced convection, associated with the MJO in late December and January, shifted eastward from the Indian Ocean across the Maritime Continent and western Pacific.

OLR anomalies along the equator remained small. However, some enhanced convection is evident over the western Pacific and the Gulf of Guinea during the first few days of April.

Anomalous OLR: Last 30 days



Drier-than-normal conditions, positive OLR anomalies (red shading)

Wetter-than-normal conditions, negative OLR anomalies (blue shading)

During early March, enhanced convection was evident across the south Indian Ocean, southern Maritime continent, northern Australia and adjacent waters and extended eastward to include the parts of the South Pacific Convergence Zone east of the Date Line.

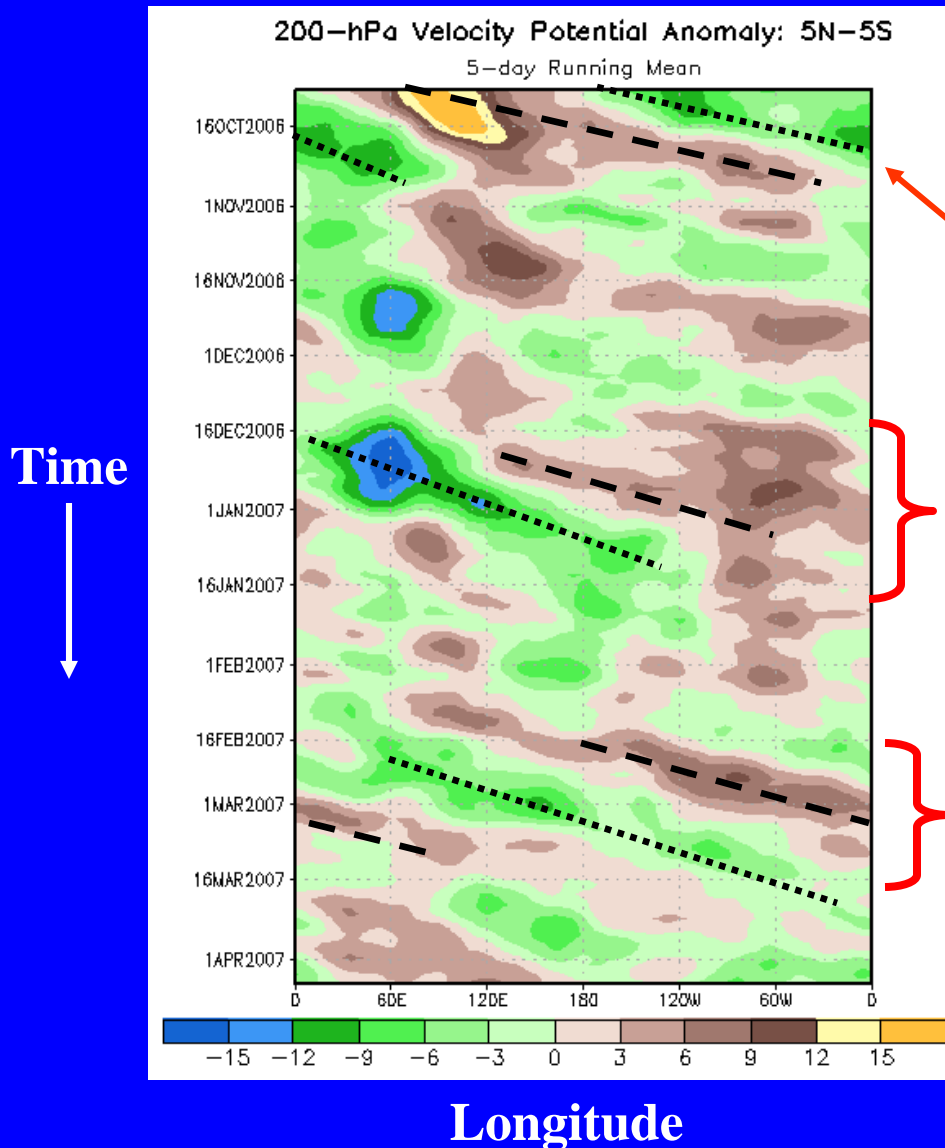
In mid March, the SPCZ weakened and enhanced convection over the Maritime continent extended northward to include the tropical western Pacific.

Recently, strong enhanced convection returned over the SPCZ. Convection remains enhanced over the tropical western Pacific.

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.



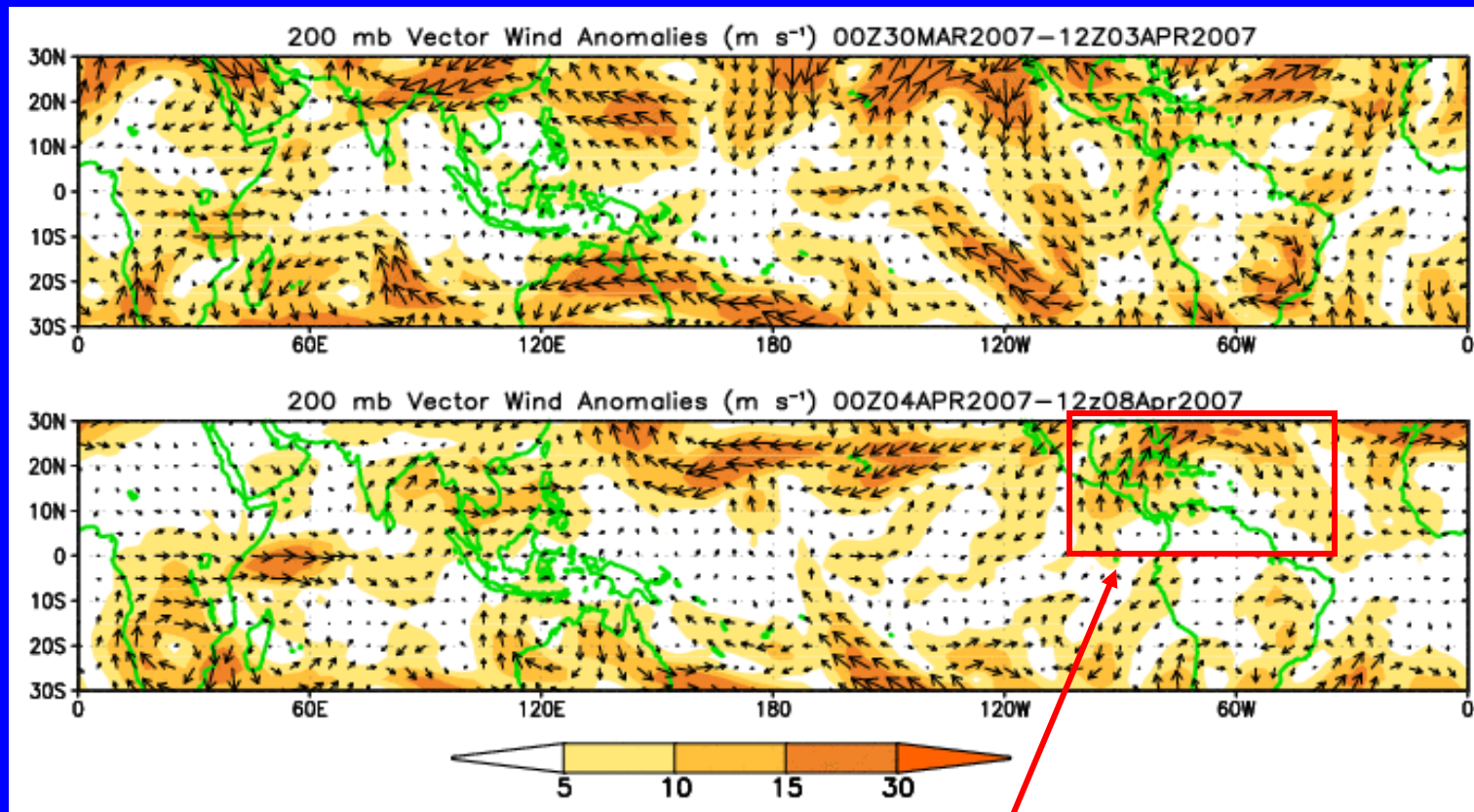
Moderate to strong MJO activity was observed from late-September to mid-October.

The MJO intensified in late December 2006, as negative OLR anomalies shifted eastward from the Maritime continent into the central tropical Pacific.

Weak to moderate MJO activity was observed during late February and early March as velocity potential anomalies shifted eastward.

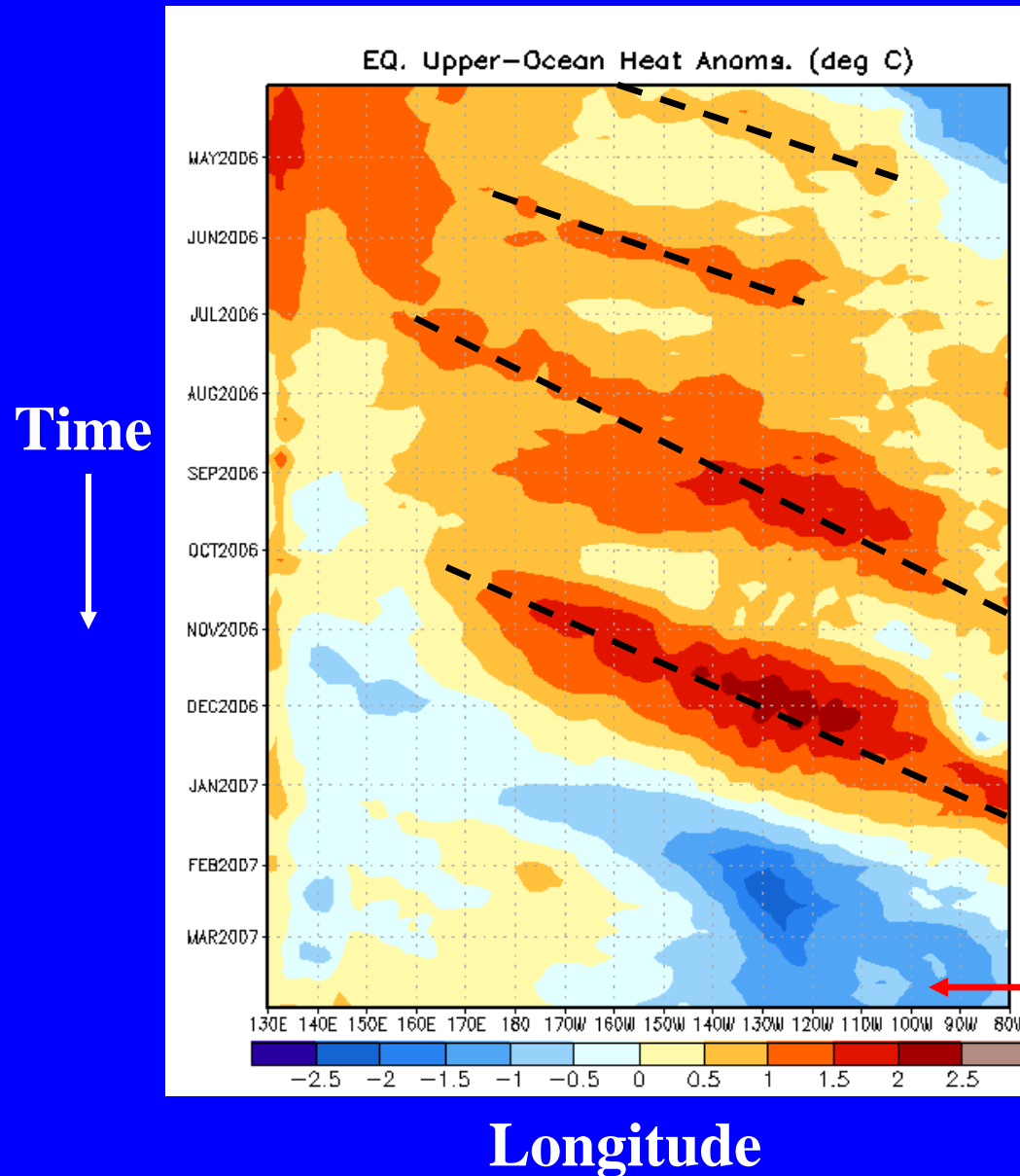
200-hPa Vector Winds and Anomalies (m s^{-1})

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



Anomalous anti-cyclonic circulation in part due to the enhanced convection in this region.

Heat Content Evolution in the Eq. Pacific



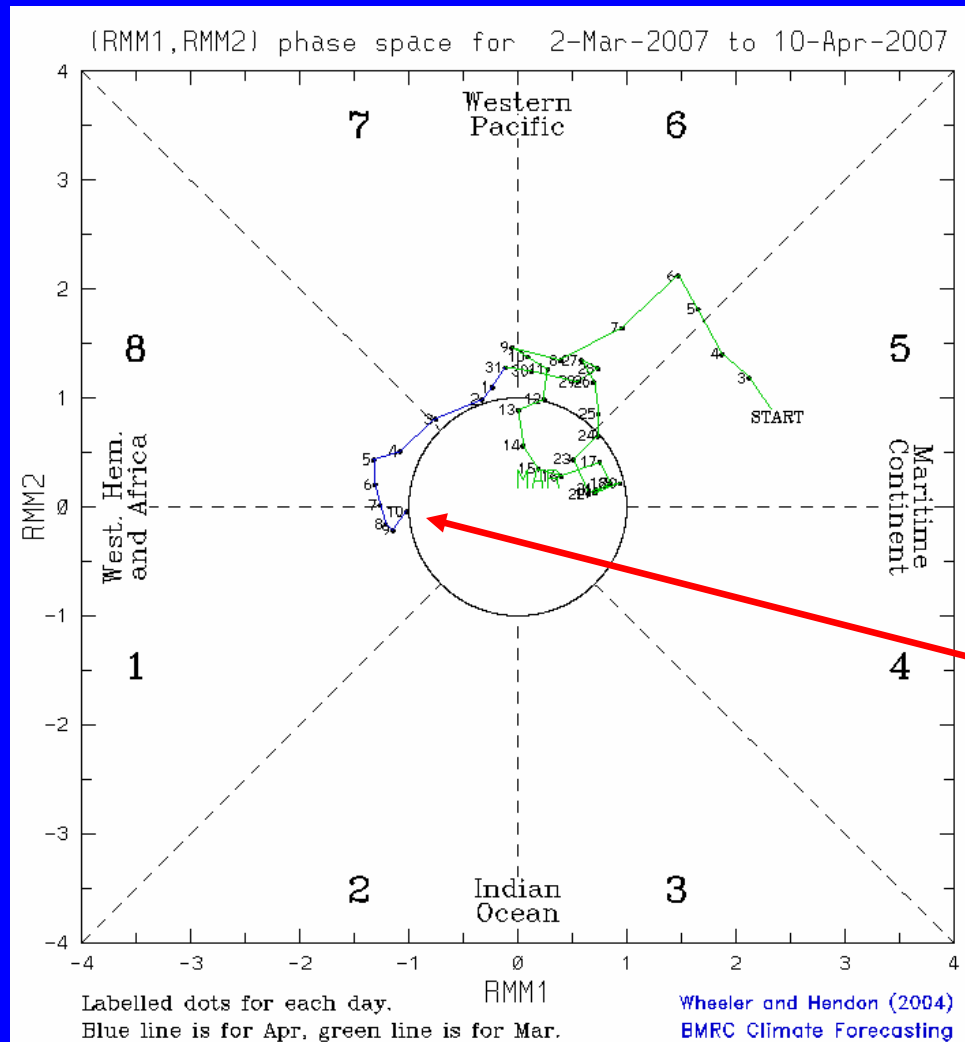
During this period eastward-propagating Kelvin waves (warm phases indicated by dashed lines) have caused considerable month-to-month variability in the upper-ocean heat content.

Since January, negative heat content anomalies are evident across the eastern equatorial Pacific. The negative temperature anomalies at depth have recently come to the surface, resulting in SST's of 1 to 3 °C below normal east of 130 °W.

MJO Index (Magnitude and Phase)

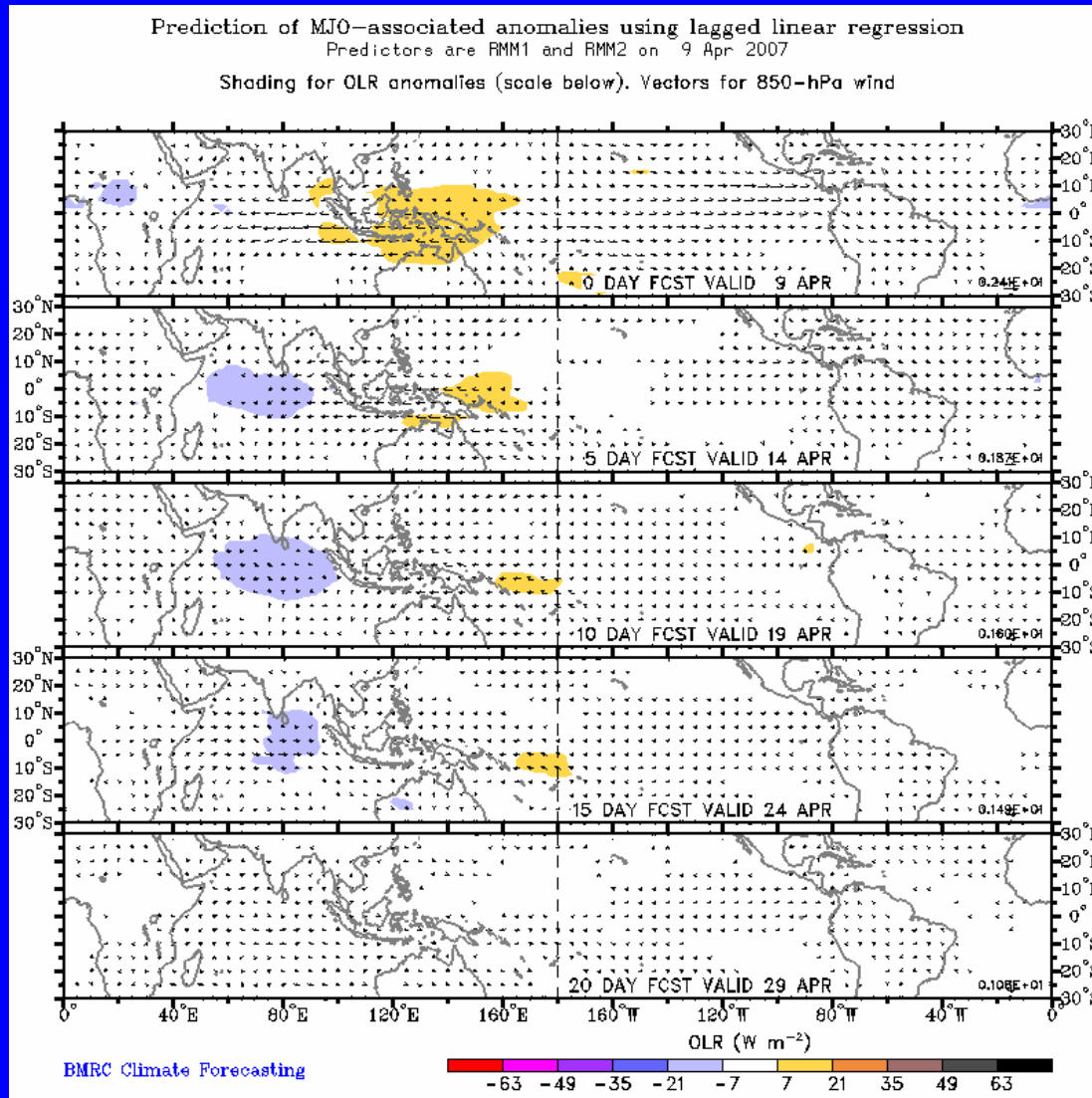
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850-hPa zonal wind, 200-hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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 index indicates weak MJO activity.

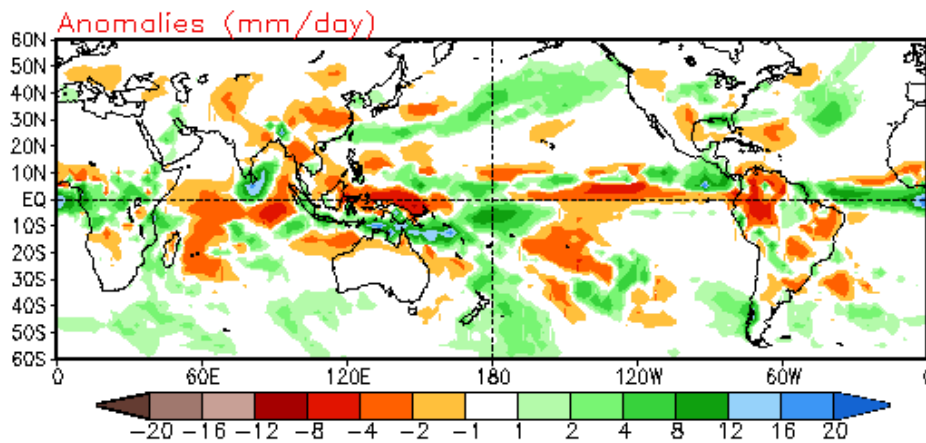
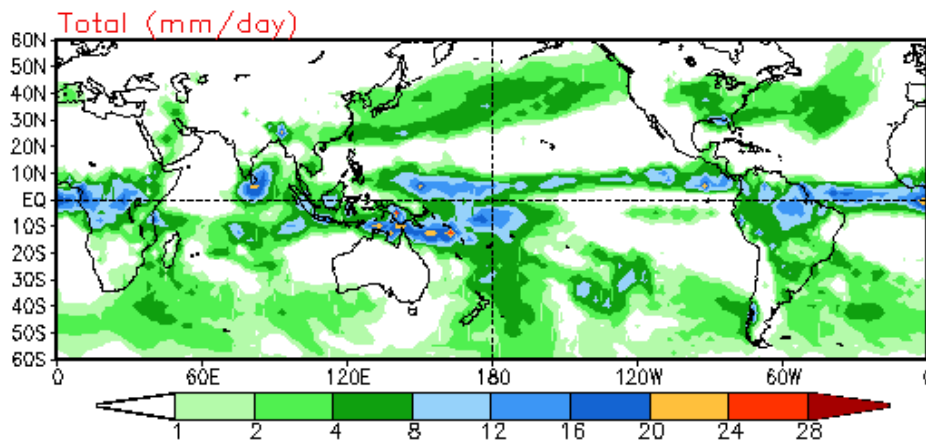
Statistical OLR MJO Forecast



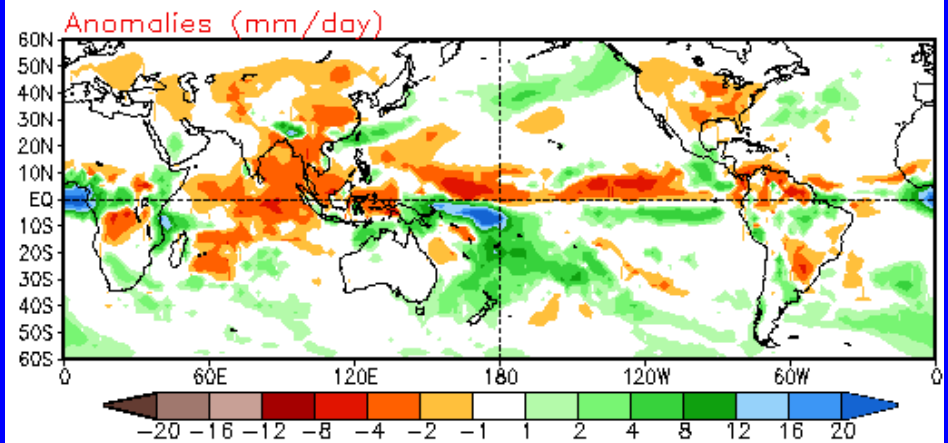
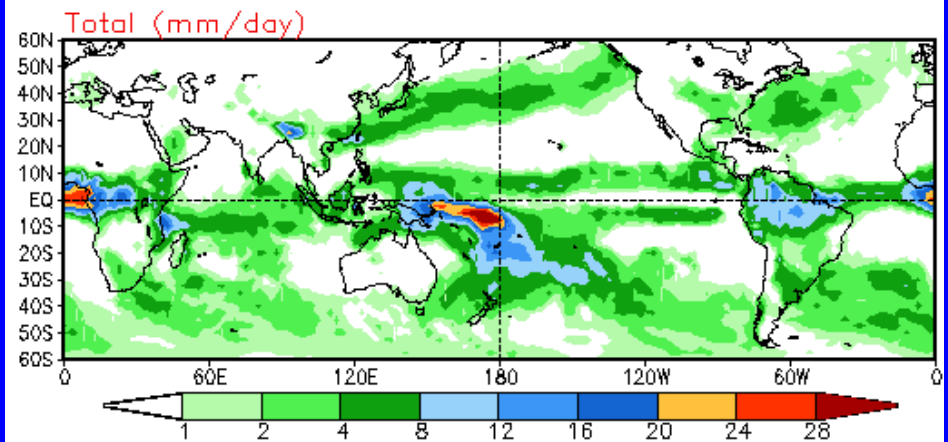
The statistical OLR MJO forecast indicates suppressed convection across the Maritime continent during the next 5 days.

Experimental Bias-Corrected GFS Precipitation

Week 1 Precipitation
Forecast from 09Apr2007



Week 2 Precipitation
Forecast from 09Apr2007



200 – 850 hPa Vertical Wind Shear

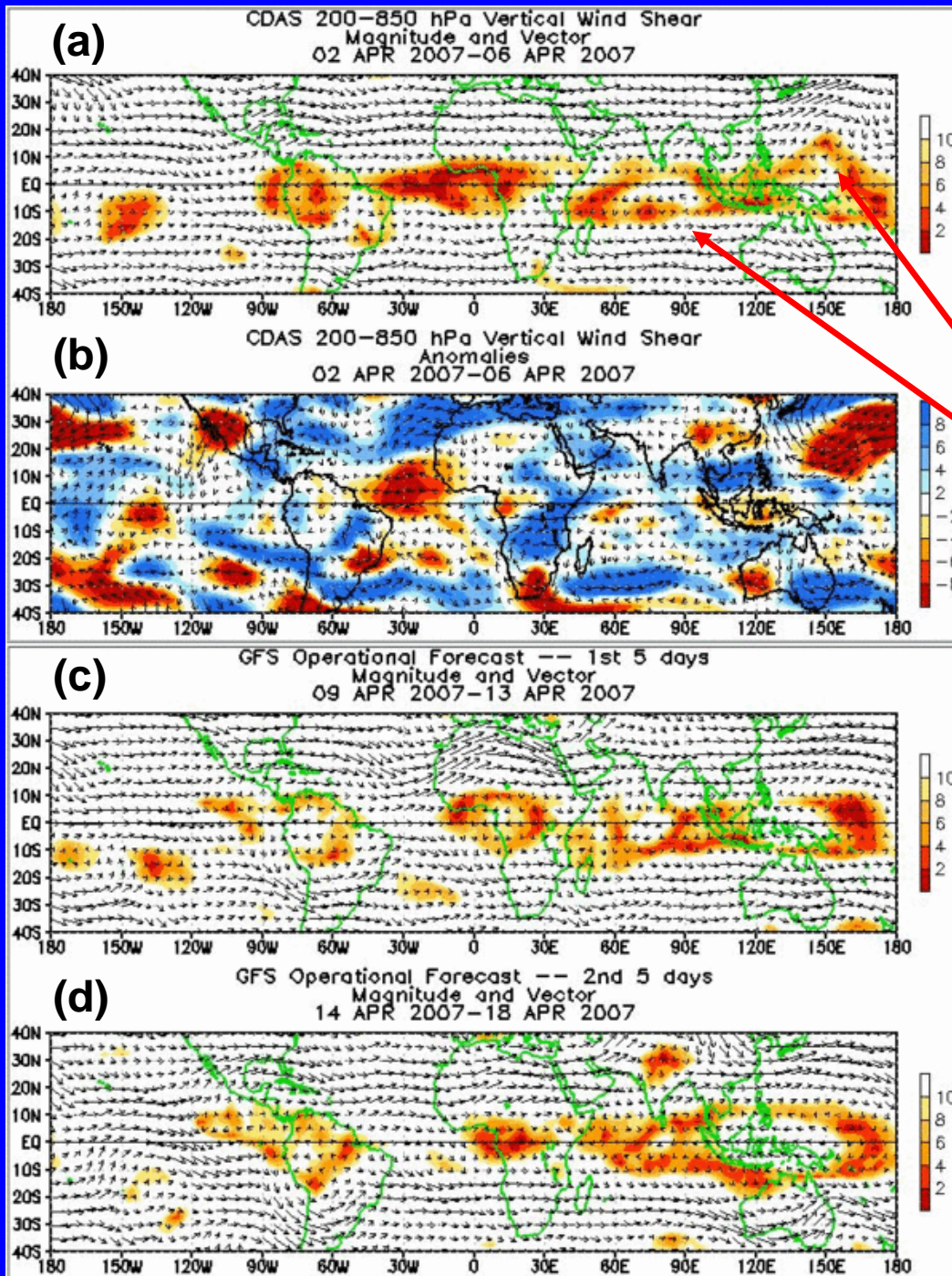
All plots: Shading denotes magnitude of vectors

Plots (a),(c),(d): low shear (red), high shear (yellow/white)

Plot (b): Shear greater than average (blue) Shear less than average (yellow/red)

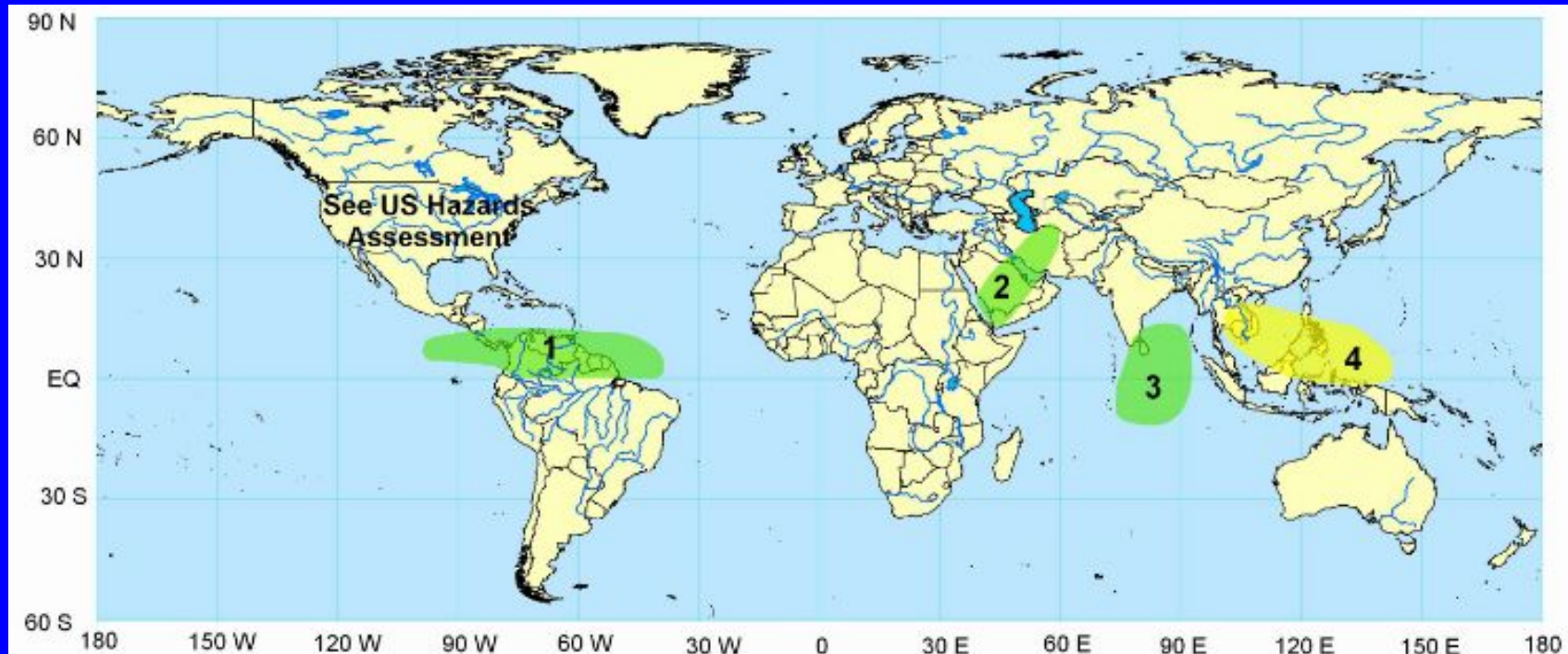
Low shear has been evident across sections of the western Pacific Ocean and the tropical Indian Ocean.

The GFS forecast indicates areas of low shear over the tropical Indian and western Pacific Oceans during the next ten days.



Potential Benefits/Hazards – Week 1

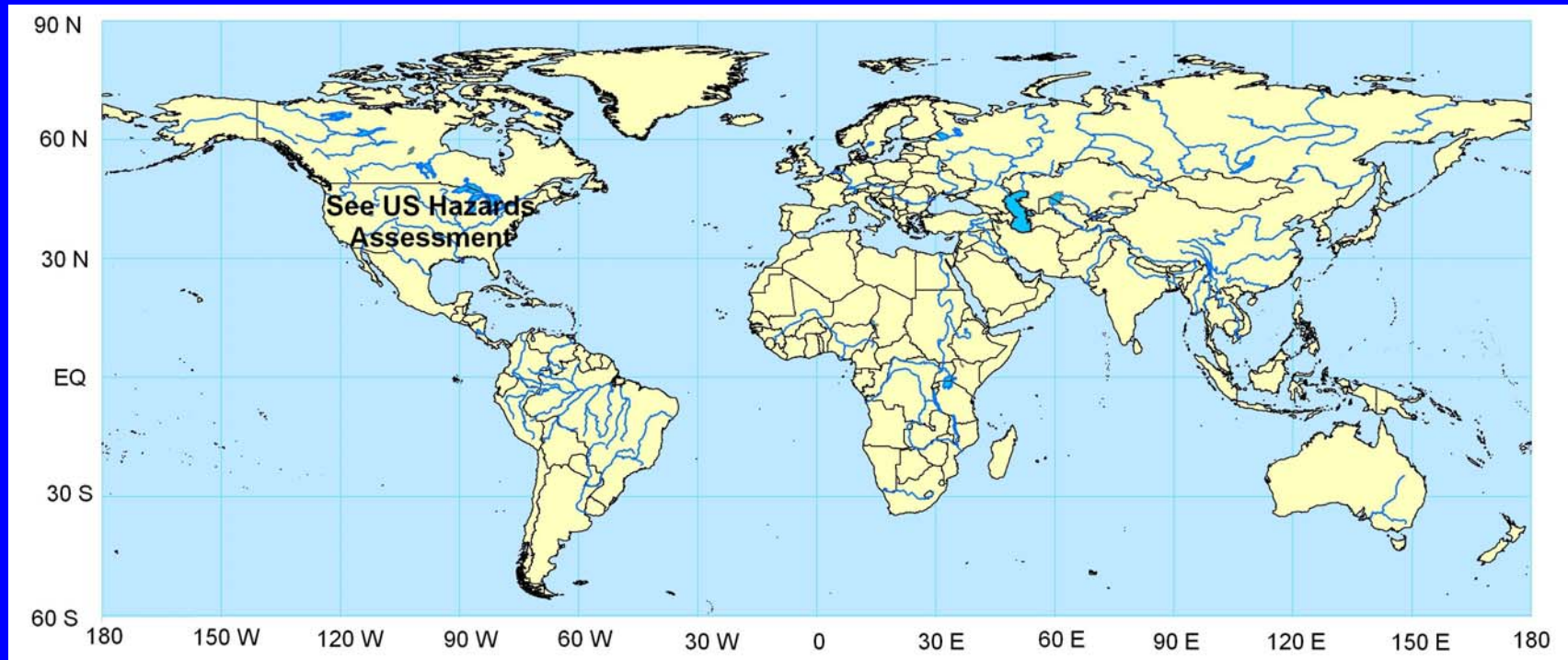
Valid: 10 - 16 April 2007



1. An increased chance for above-average rainfall over extreme northern South America.
2. Above normal rainfall is expected across Saudi Arabia and Iran.
3. The potential exists for above normal rainfall across Sri Lanka and the surrounding waters of the Indian Ocean.
4. An increased chance for below-average precipitation across Indo-China and the Philippines.

Potential Benefits/Hazards – Week 2

Valid: 17 - 23 April 2007



No definitive statements for potential benefits and hazards can be made during the time period

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