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

Update prepared by
Climate Prediction Center / NCEP
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Outline

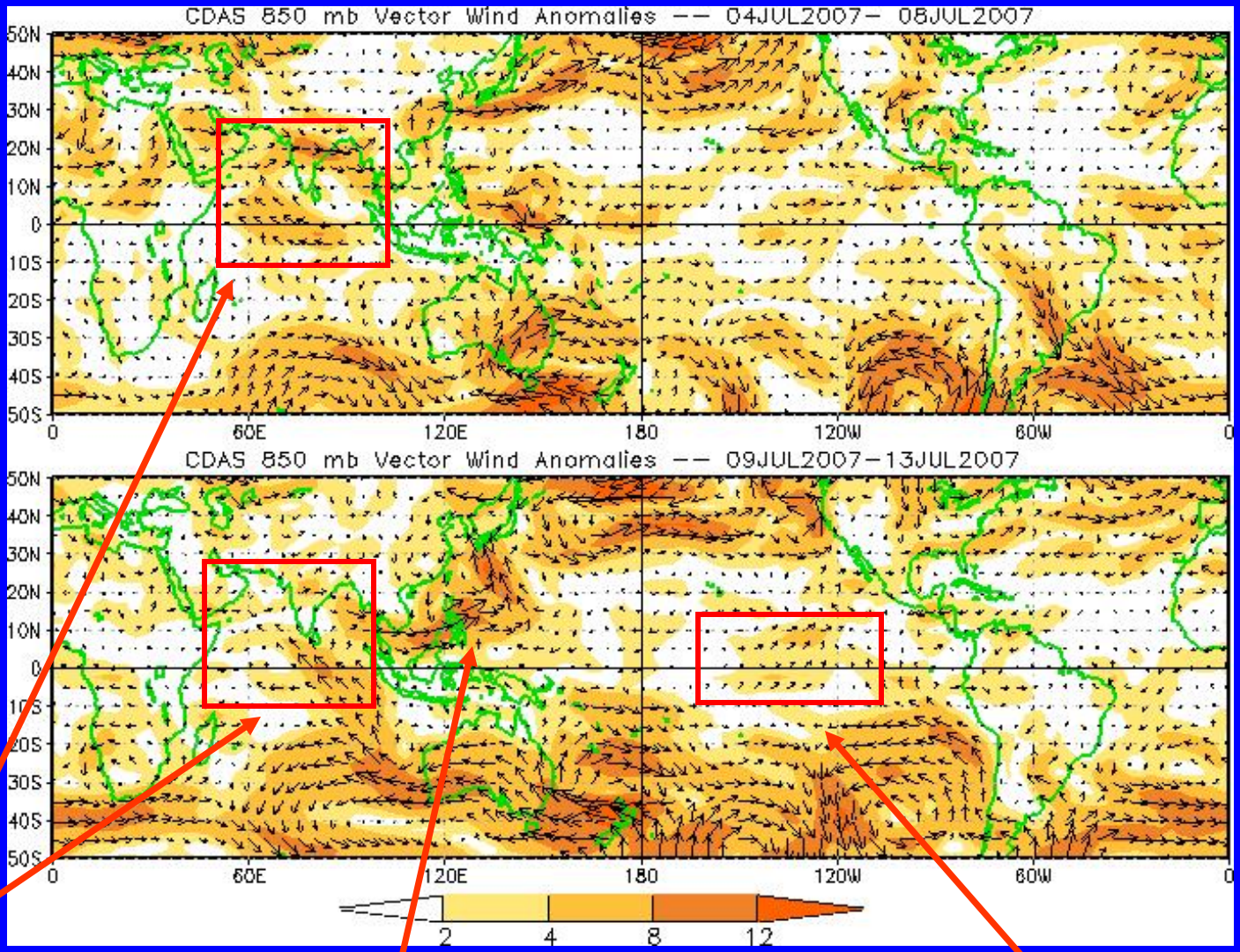
- Overview
- Recent Evolution and Current Conditions
- Madden-Julian Oscillation Forecast
- Summary

Overview

- **The MJO has weakened during the past week.**
- **Tropical convection has been focused across the South China Sea and far western Pacific Ocean – much of this associated with Typhoon Man-Yi.**
- **The Arabian Sea and south Asia received a respite from the above-average rainfall these areas have seen during much of June and early July as dry conditions prevailed.**
- **Based on the latest monitoring and forecast tools, weak MJO activity is expected to continue during the next 1-2 weeks.**

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

Note that shading denotes the magnitude of the anomalous wind vectors

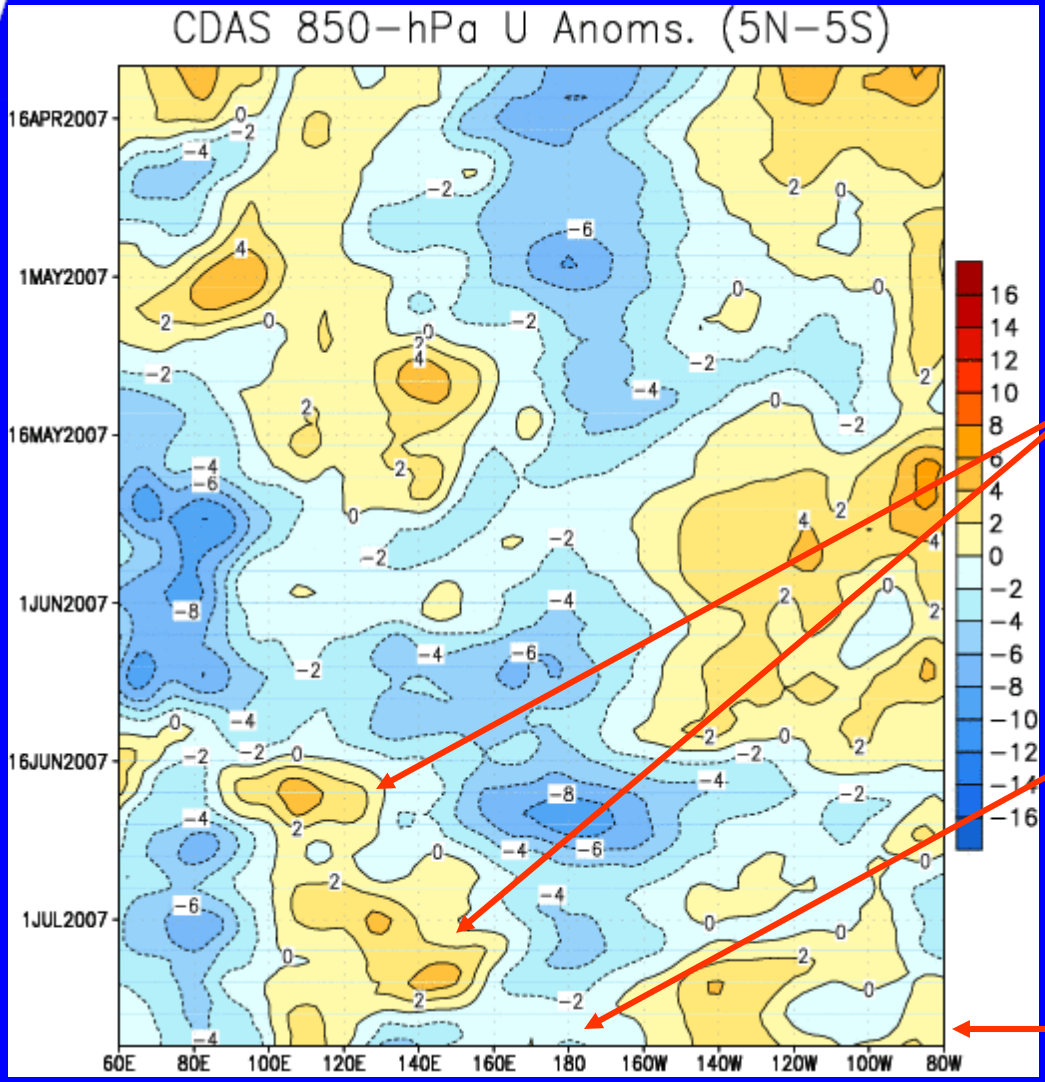


The Somali Jet has weakened during the last five days.

Westerly anomalies across the far western Pacific have shifted off of the equator with Typhoon Man-Yi.

Small westerly anomalies developed across the east-central Pacific Ocean.

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



Time

Longitude

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

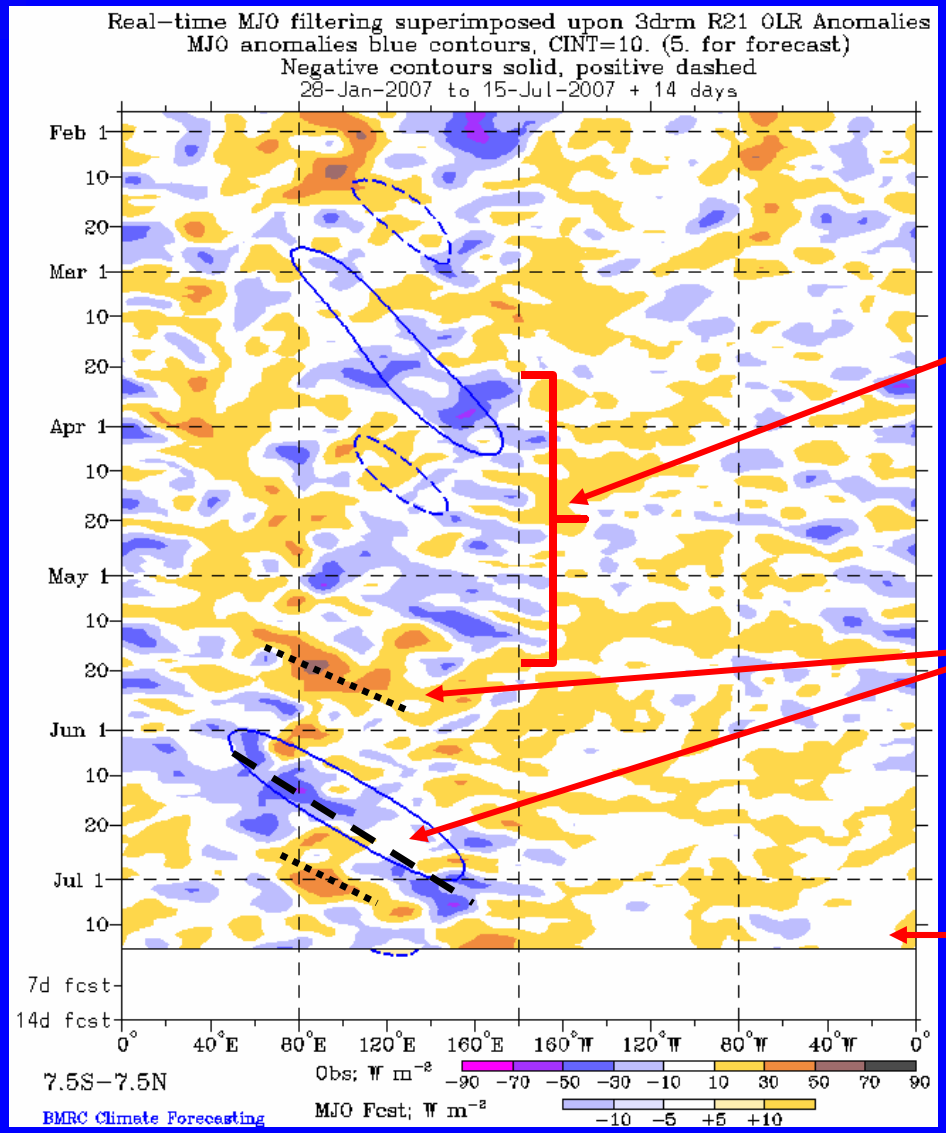
Easterly anomalies (blue shading) represent anomalous east-to-west flow.

Westerly anomalies were evident across sections of the Maritime continent and the western Pacific Ocean from the latter half of June into mid-July.

Easterly anomalies near the Date Line have lessened and are at their smallest values since mid-late May.

Positive anomalies are again evident across sections of the east Pacific Ocean during the last couple of weeks.

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



Time

Longitude

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

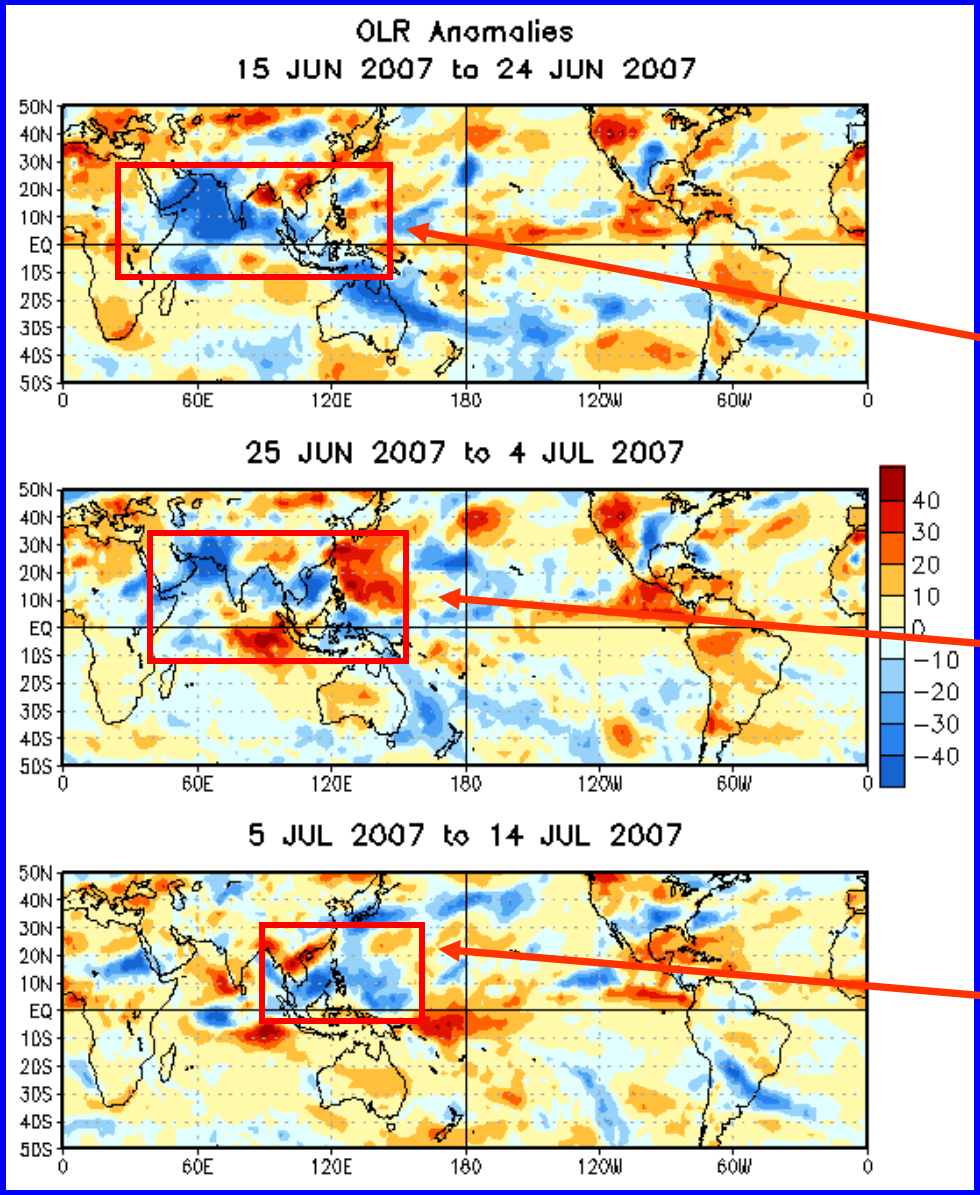
Wetter-than-normal conditions, negative OLR anomalies (blue shading)

Intermittent periods of enhanced convection were evident in the western Pacific Ocean from late March into May.

Beginning in mid May, weak-moderate MJO activity has been observed as first suppressed convection and later enhanced convection shifted eastward from the Indian Ocean into the far western Pacific.

Current convection is generally near average along the equator except for dry conditions just west of the Date Line.

OLR Anomalies: Last 30 days



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

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

During mid-late June, enhanced rainfall continued over the Arabian Sea and expanded eastward to western Indonesia. Dry conditions continued across Southeast Asia.

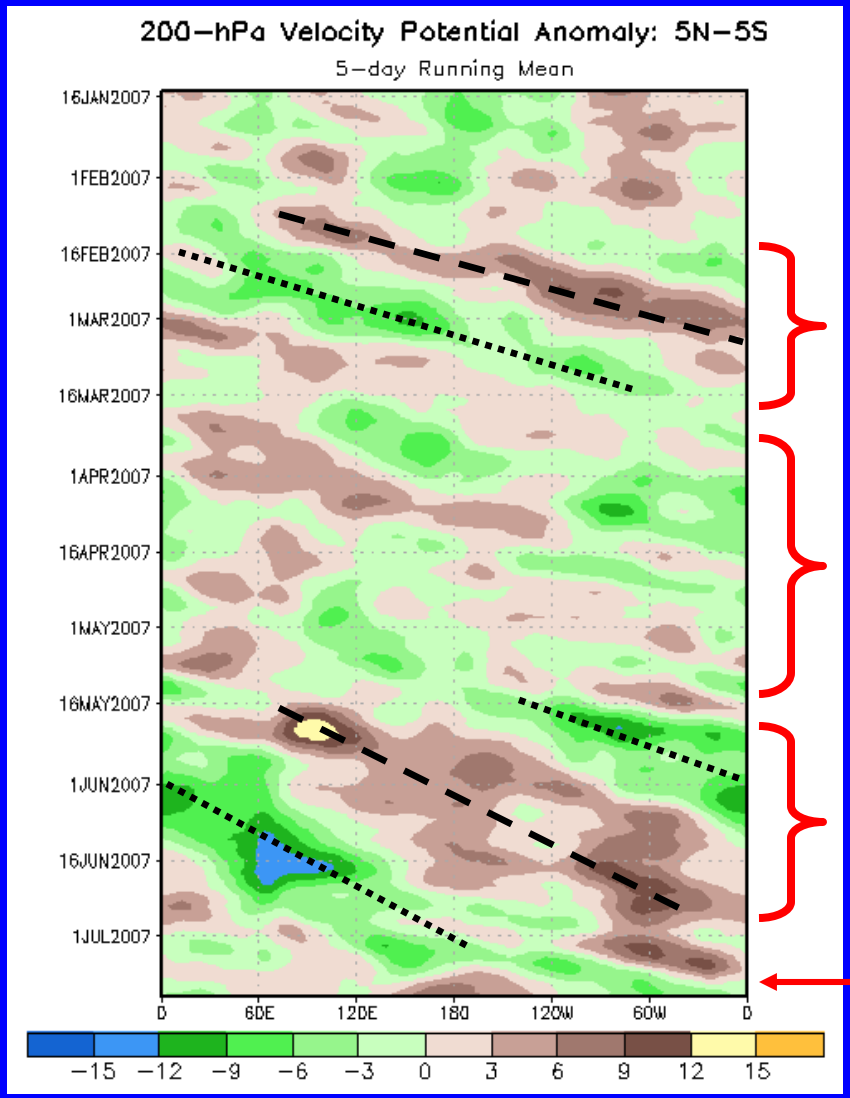
Wet conditions shifted northeastward during late June while dry conditions developed across the equatorial Indian Ocean. These patterns are typical of MJO activity during the boreal summer.

Wet conditions developed across the western Pacific Ocean during early-mid July.

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

Longitude

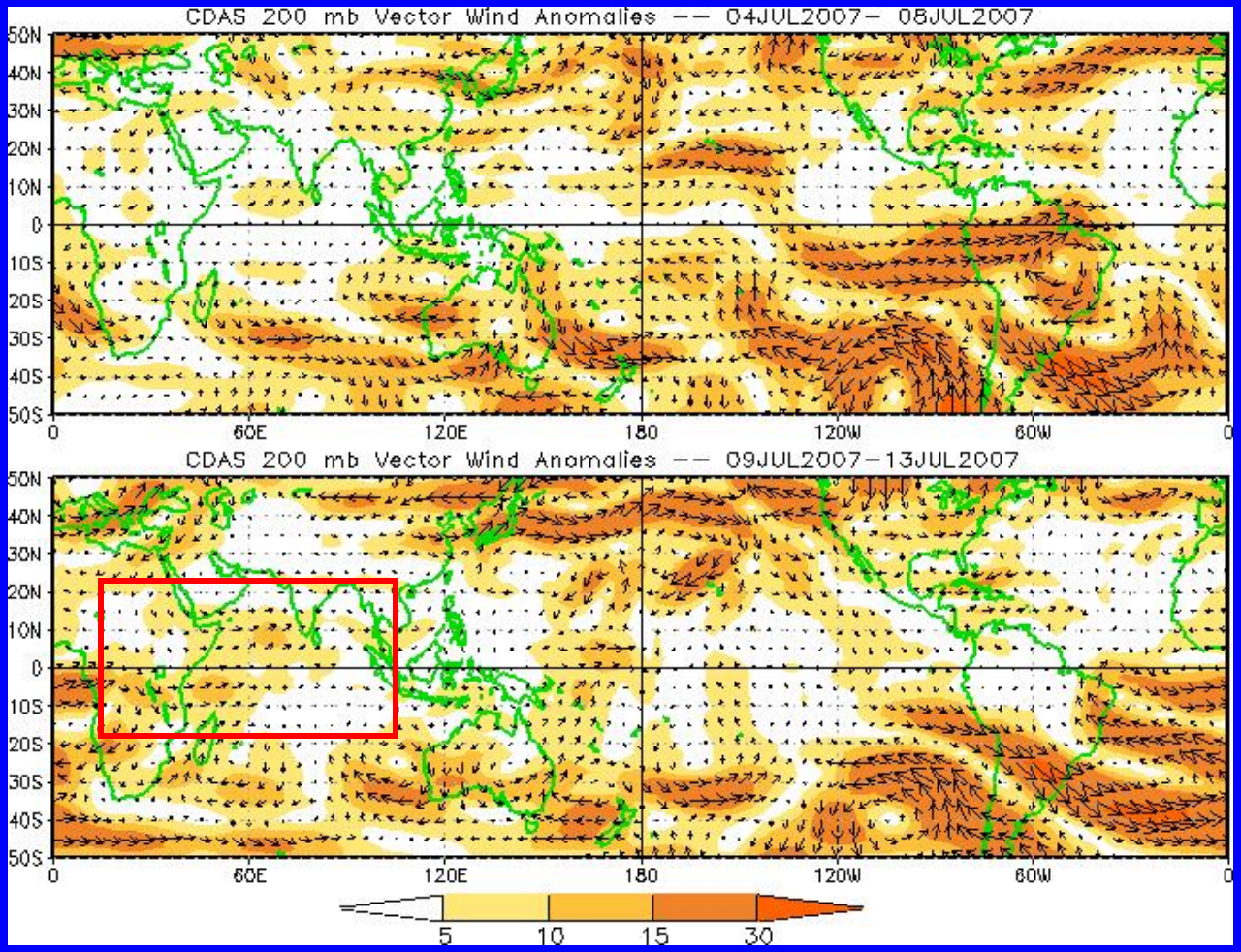
Weak to moderate MJO activity was observed during late February and early March as velocity potential anomalies shifted eastward.

The MJO was weak or incoherent from mid-March to mid-May.

Weak to moderate MJO activity was evident from mid-May to early July.

The MJO has weakened during the past week.

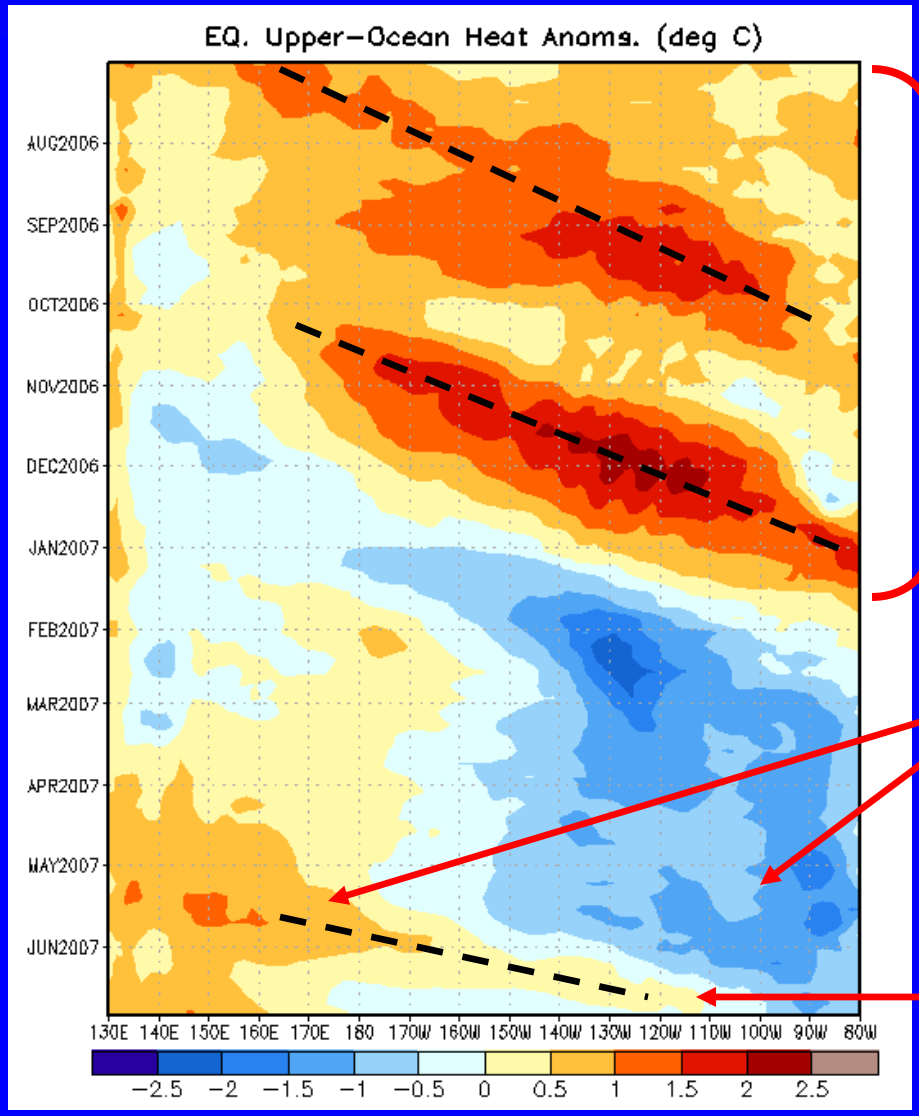
200-hPa Vector Wind Anomalies (m s^{-1})



Note that shading denotes the magnitude of the anomalous wind vectors

Small westerly anomalies are evident across some of the tropical western Indian Ocean.

Weekly Heat Content Evolution in the Equatorial Pacific



Time

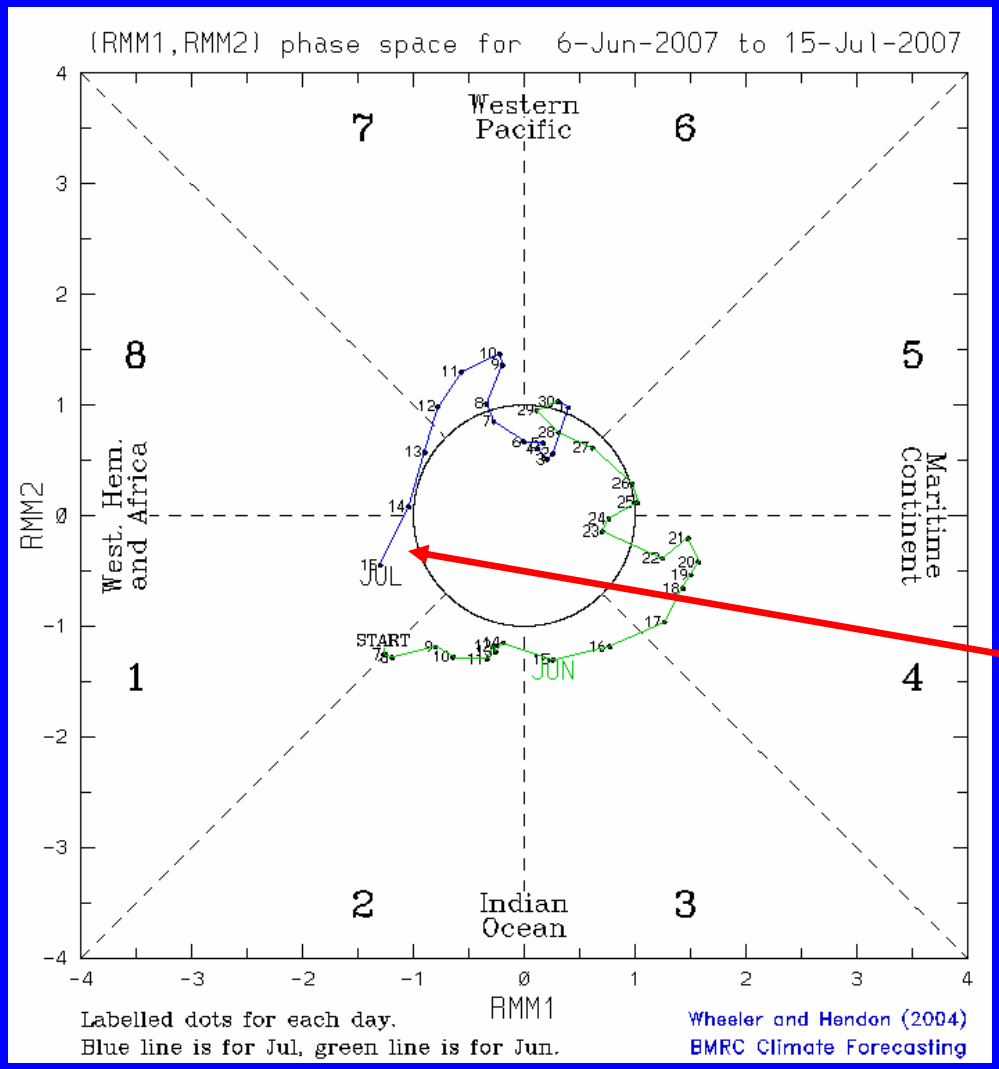
Longitude

During this period two 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 and since late March larger positive anomalies are evident in the far western Pacific Ocean.

Most recently a weak Kelvin wave has resulted in small positive anomalies as far east as 110° W.

MJO Index

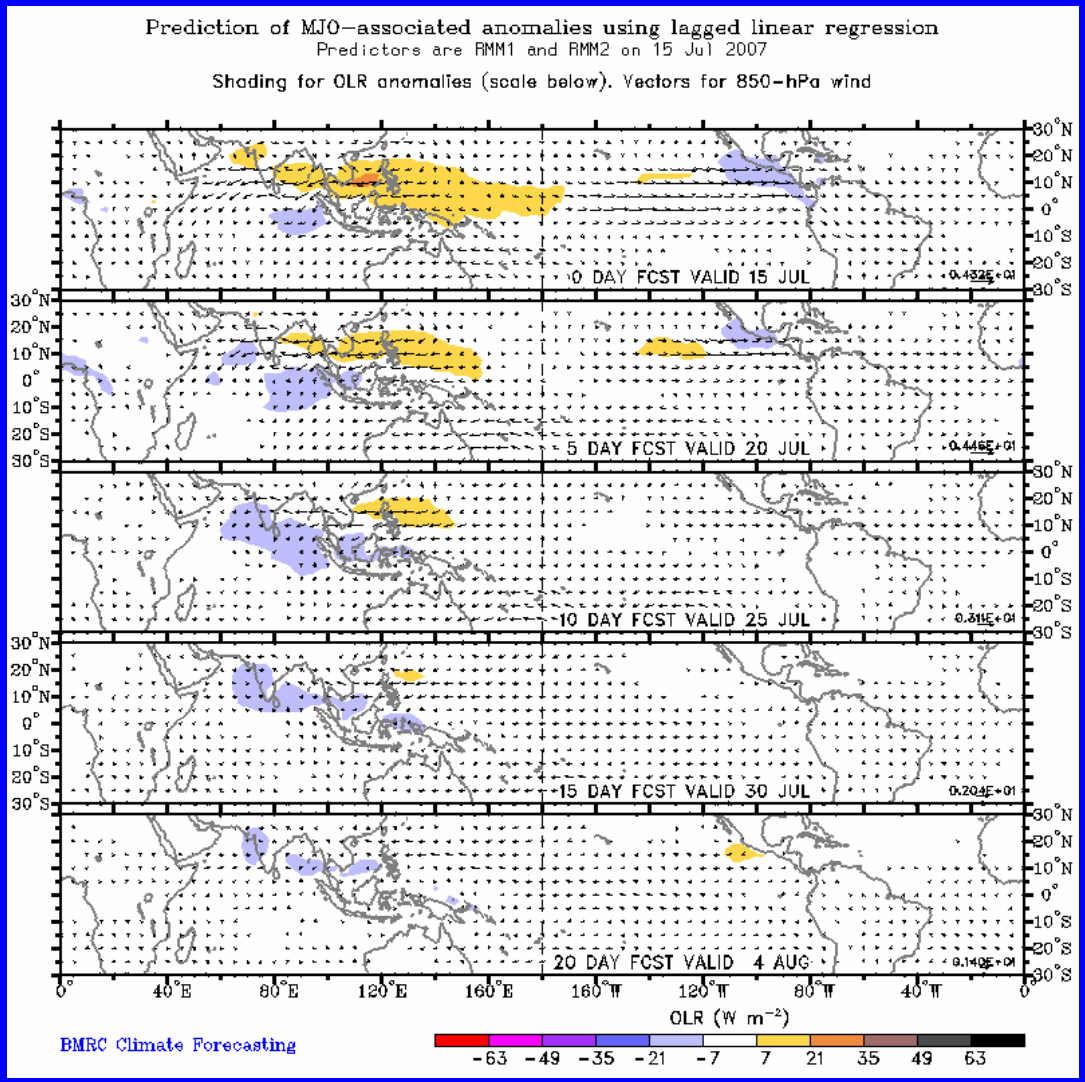


The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850-hPa and 200-hPa zonal wind and outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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 generally weak MJO activity but a rapid eastward propagation.

MJO OLR Forecast



The statistical method forecasts dry conditions across Southeast Asia and the western Pacific during the next 5-10 days with wet conditions entering the Indian ocean by week 2.

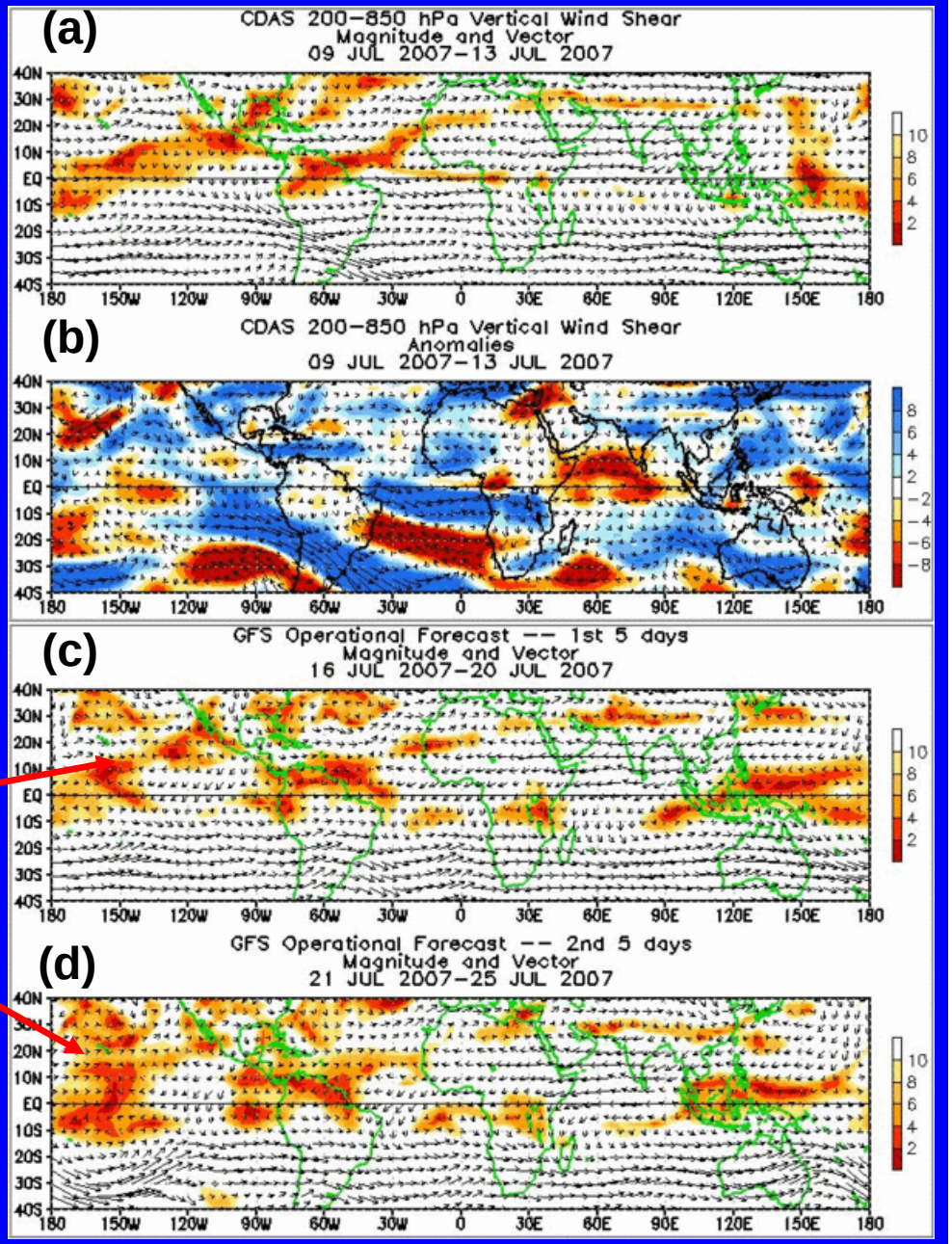
200–850 hPa Vertical Wind Shear

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)

The GFS forecast indicates weak shear across sections of the east-central Pacific Ocean during the upcoming 10 days.



NOTICE OF CHANGE

The slides depicting potential benefits and hazards normally located here will no longer be placed within the MJO weekly update. Expected impacts during the upcoming 1-2 week time period can now be found as part of a new product:

Experimental Global Tropics Benefits/Hazards Assessment

The product can be found at:

http://www.cpc.ncep.noaa.gov/products/precip/CWlink/ghazards/ghaz.shtml

Please send questions/comments/suggestions to

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