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

Update prepared by
Climate Prediction Center / NCEP
August 20, 2007

Outline

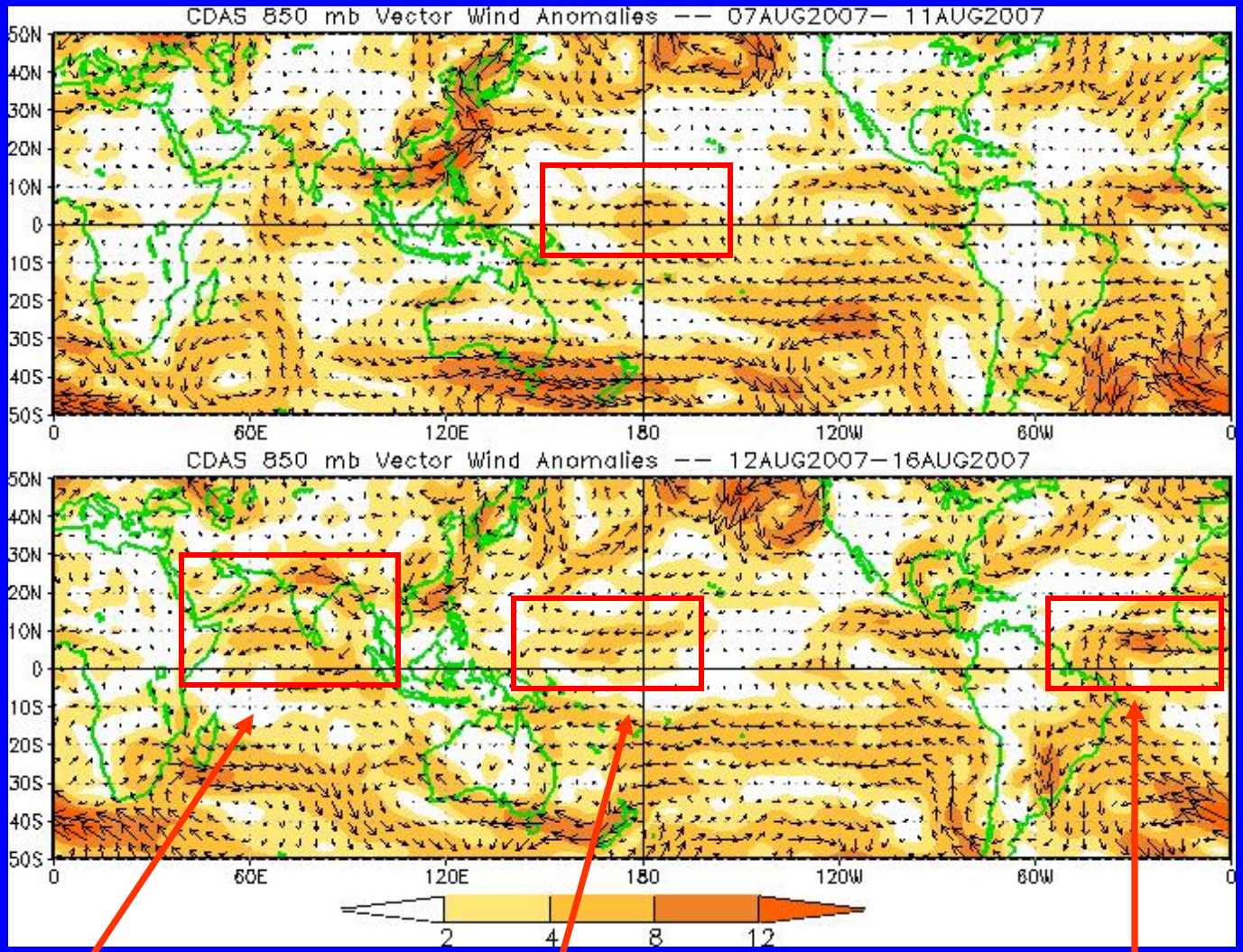
- Overview
- Recent Evolution and Current Conditions
- Madden-Julian Oscillation Forecast
- Summary

Overview

- The latest observations indicate that the MJO is incoherent.
- During the past week, convective anomalies have generally been small across the deep tropics.
- Areas of strong enhanced convection have been local and mainly associated with tropical cyclones (north of the Philippines, the Gulf of Mexico, and the western Atlantic).
- Based on the latest monitoring and forecast tools, weak MJO activity is expected 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

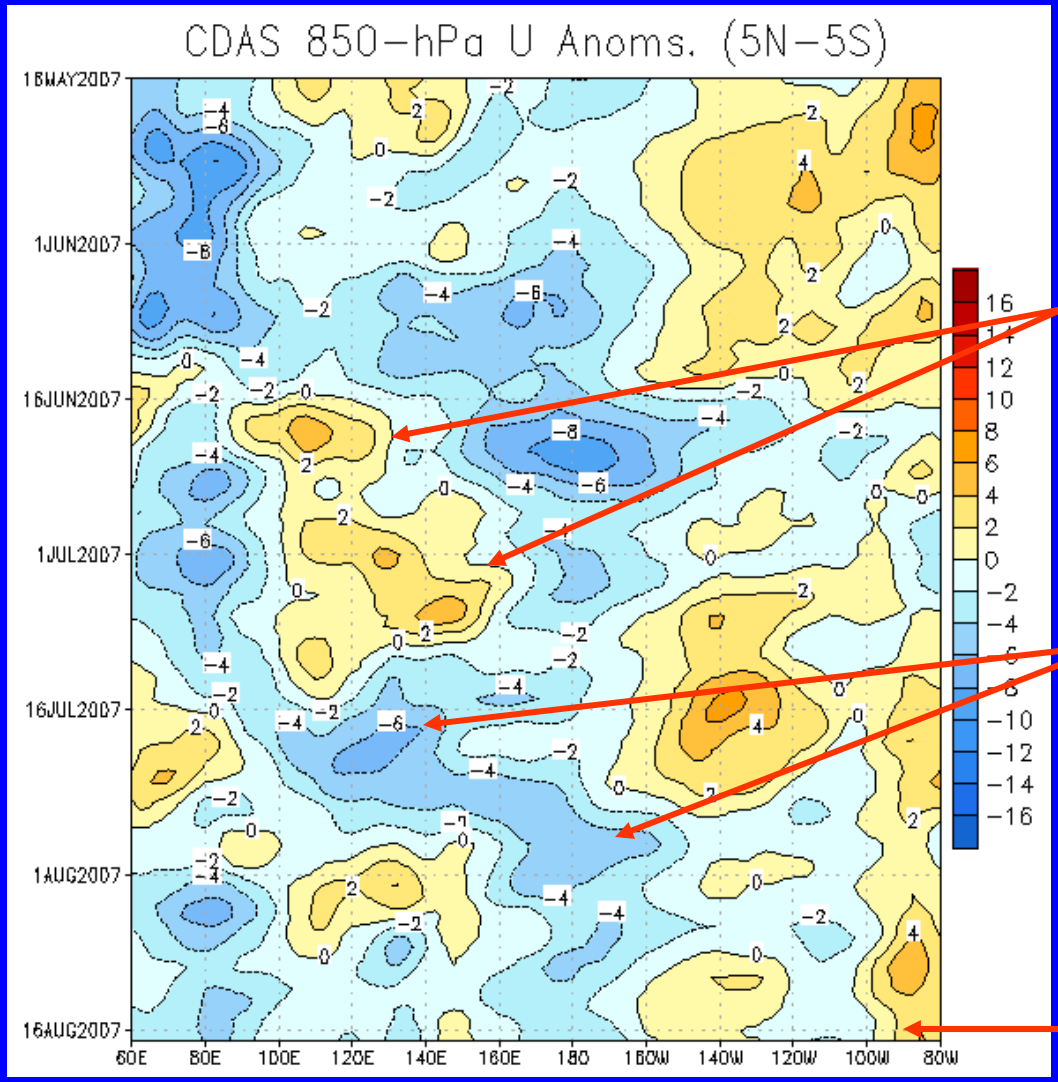


Low-level easterly anomalies have strengthened south of India, while westerly anomalies have strengthened over northern India.

Easterly anomalies have persisted near the Date Line and have expanded slightly to the west.

Westerly anomalies continue across the Atlantic deep tropics.

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



Time

Longitude

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

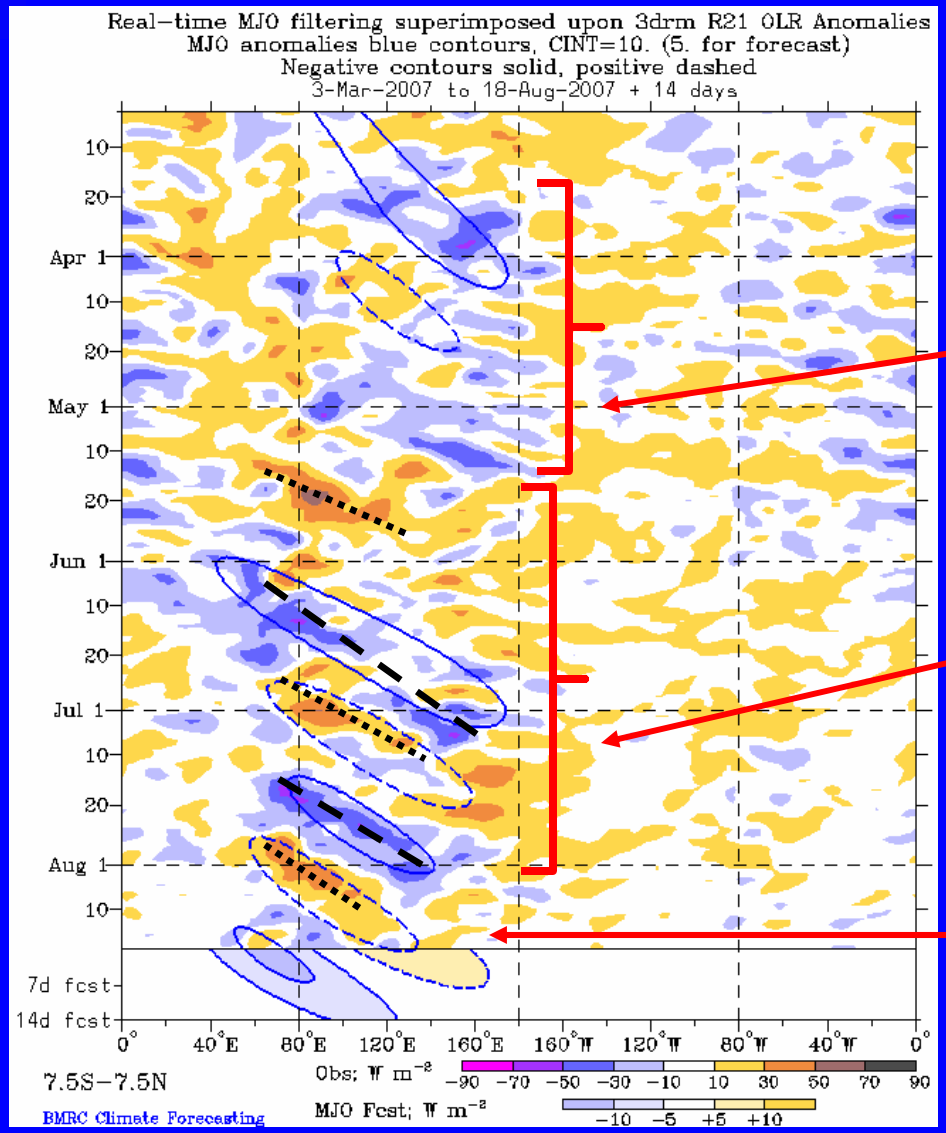
Easterly anomalies (blue shading) represent anomalous east-to-west flow.

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 increased during mid-July over the Maritime continent and western Pacific and shifted eastward during mid-late July.

Anomalous winds have been weak, with easterly anomalies prevalent west of and near the Date Line, while westerly anomalies have been observed in the east-central Pacific.

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



Time

Longitude

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

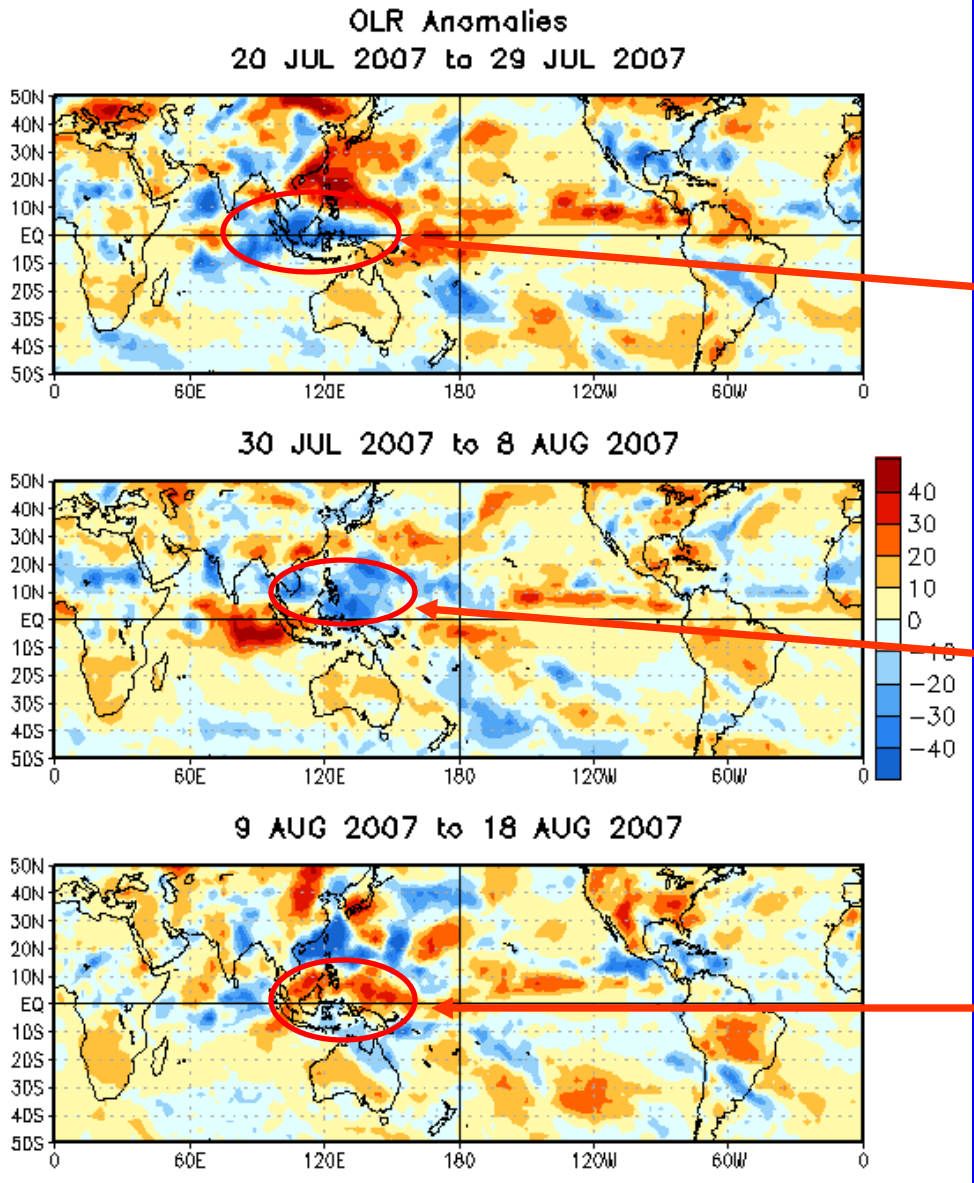
Wetter-than-normal conditions, negative OLR anomalies (blue shading)

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 regions of suppressed and enhanced convection have shifted eastward from the Indian Ocean into the far western Pacific.

Most recently, convection has become near average.

OLR Anomalies: Last 30 days



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

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

During later July, wet conditions were evident in the eastern Indian Ocean and Maritime Continent. Dry conditions prevailed in the central Pacific Ocean.

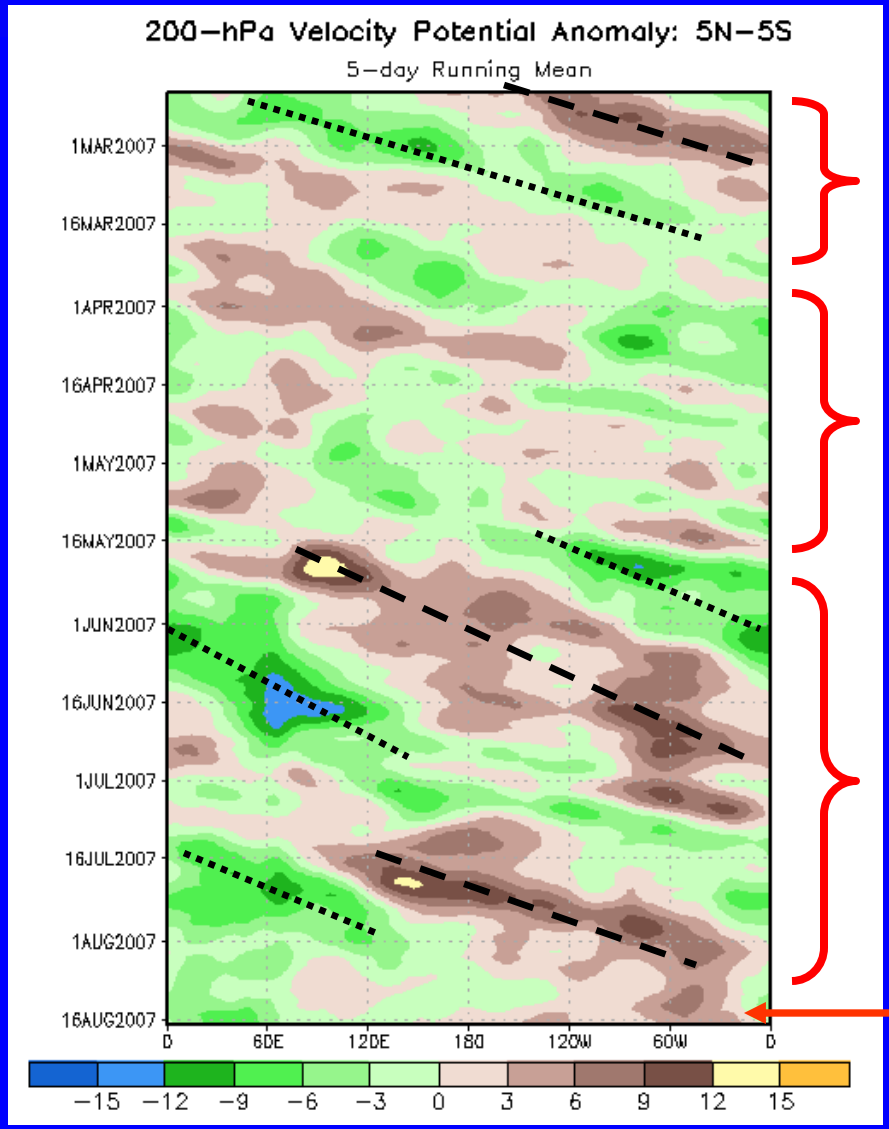
Wet conditions shifted northeastward of the Maritime Continent and dry conditions emerged in the Indian Ocean.

Enhanced convection shifted northwards of the Maritime Continent, while suppressed convection strengthened over parts of the Maritime Continent.

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

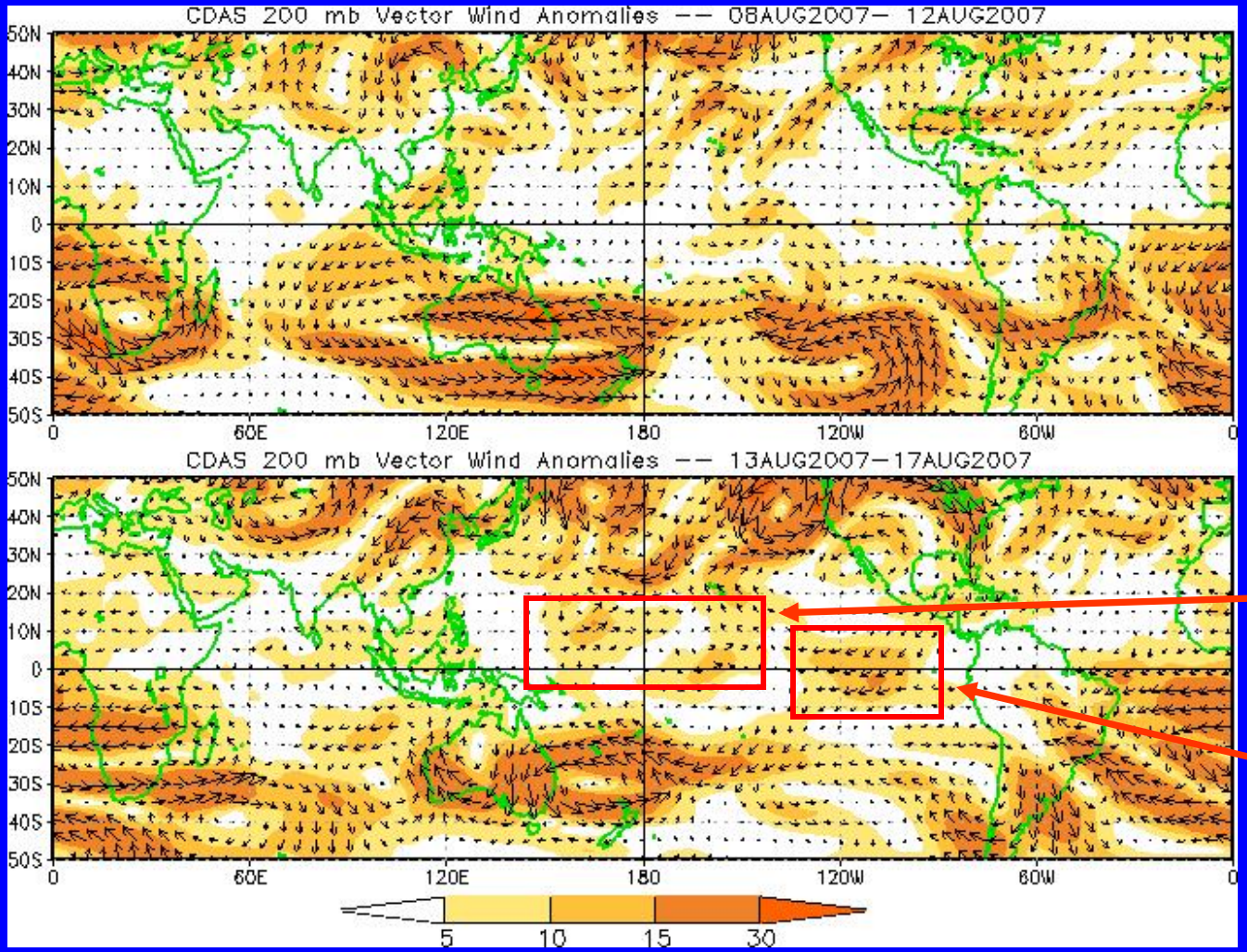
Weak to moderate MJO activity was observed during late February and early March as velocity potential anomalies shifted eastward.

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

From mid-May through July, weak to moderate MJO activity was observed.

Recently, the velocity potential anomalies have weakened and become more stationary.

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

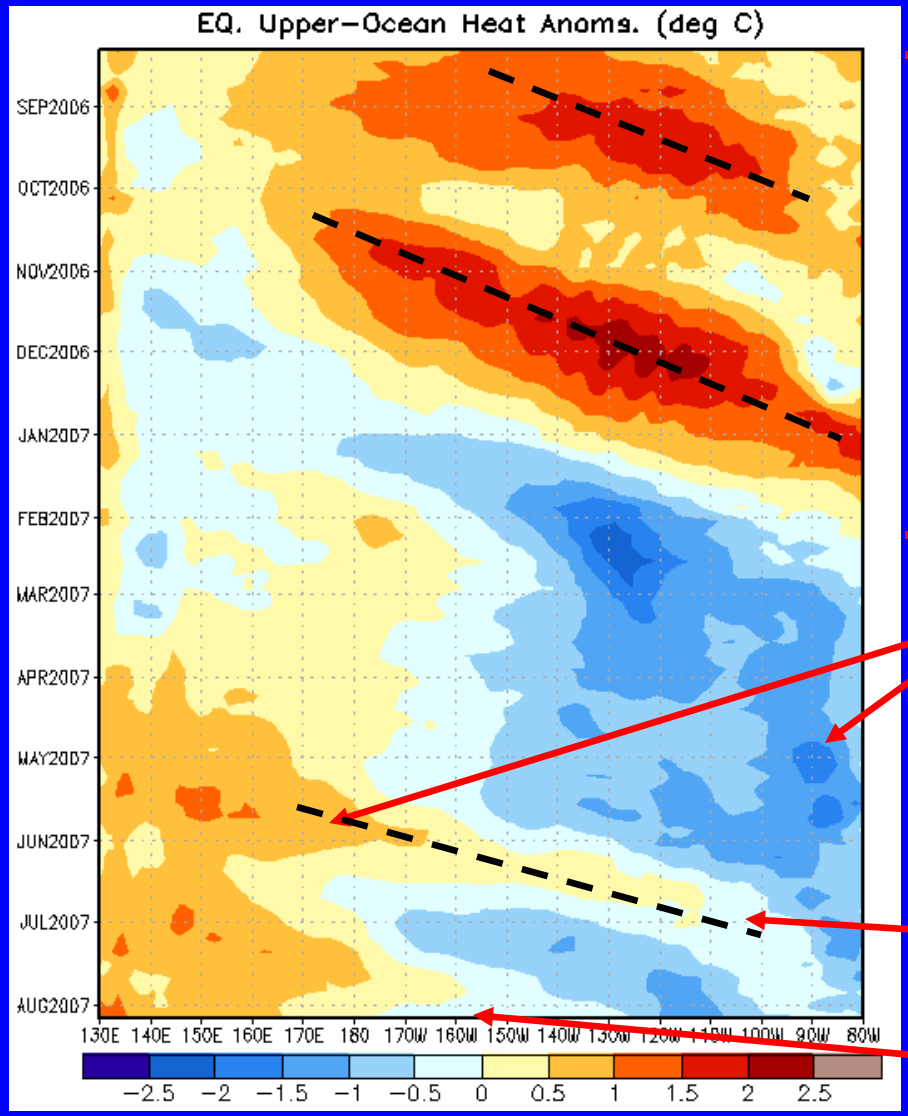


Note that shading denotes the magnitude of the anomalous wind vectors

Weak westerly wind anomalies are located over the central Pacific.

Upper-level easterly anomalies are found in the eastern Pacific.

Weekly Heat Content Evolution in the Equatorial Pacific



Time

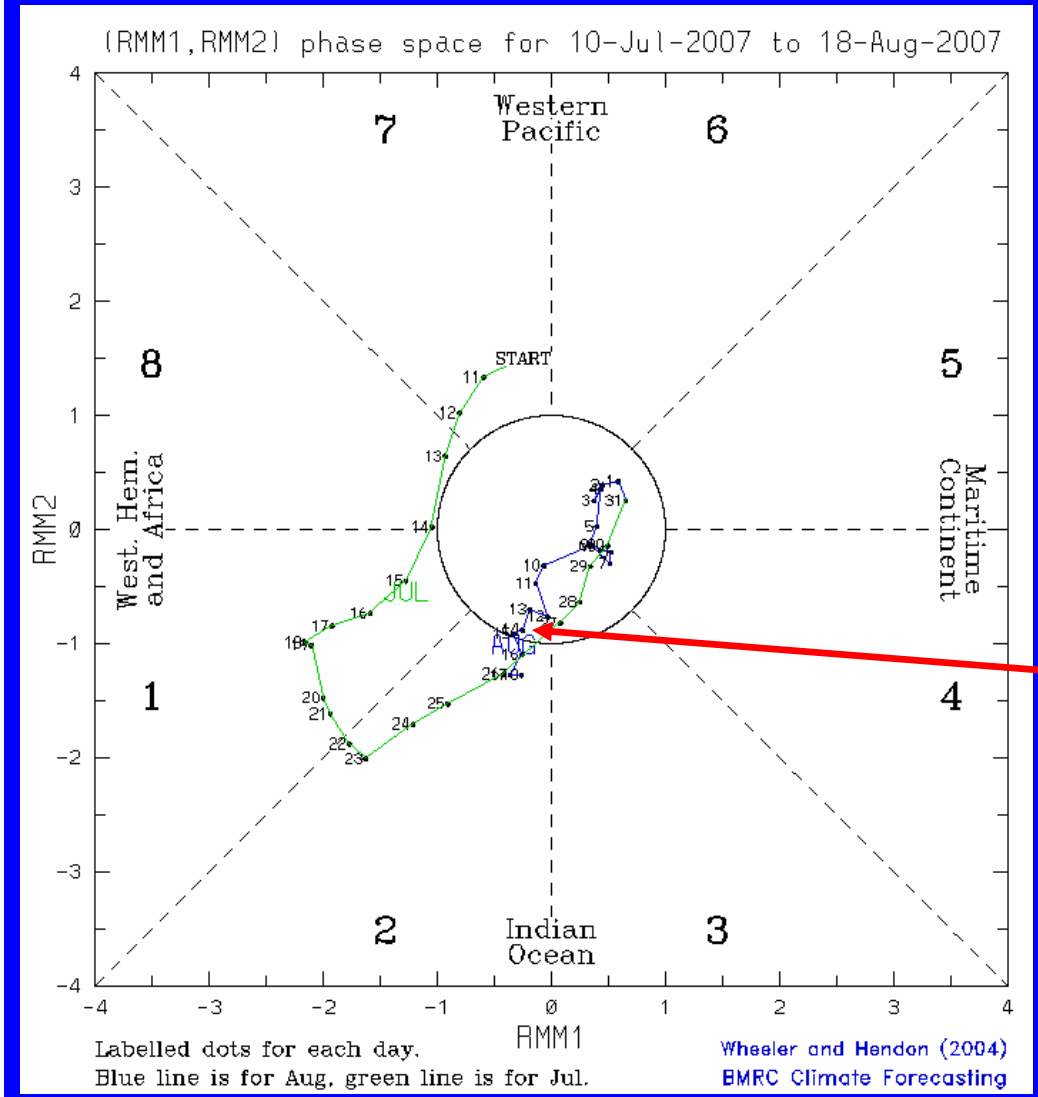
Longitude

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 have prevailed in the far western Pacific Ocean.

A weak Kelvin wave developed in mid-May, propagated eastwards and reached the eastern Pacific in early July. Another weak Kelvin wave developed in early July, but it's eastward progress has been limited.

MJO Index

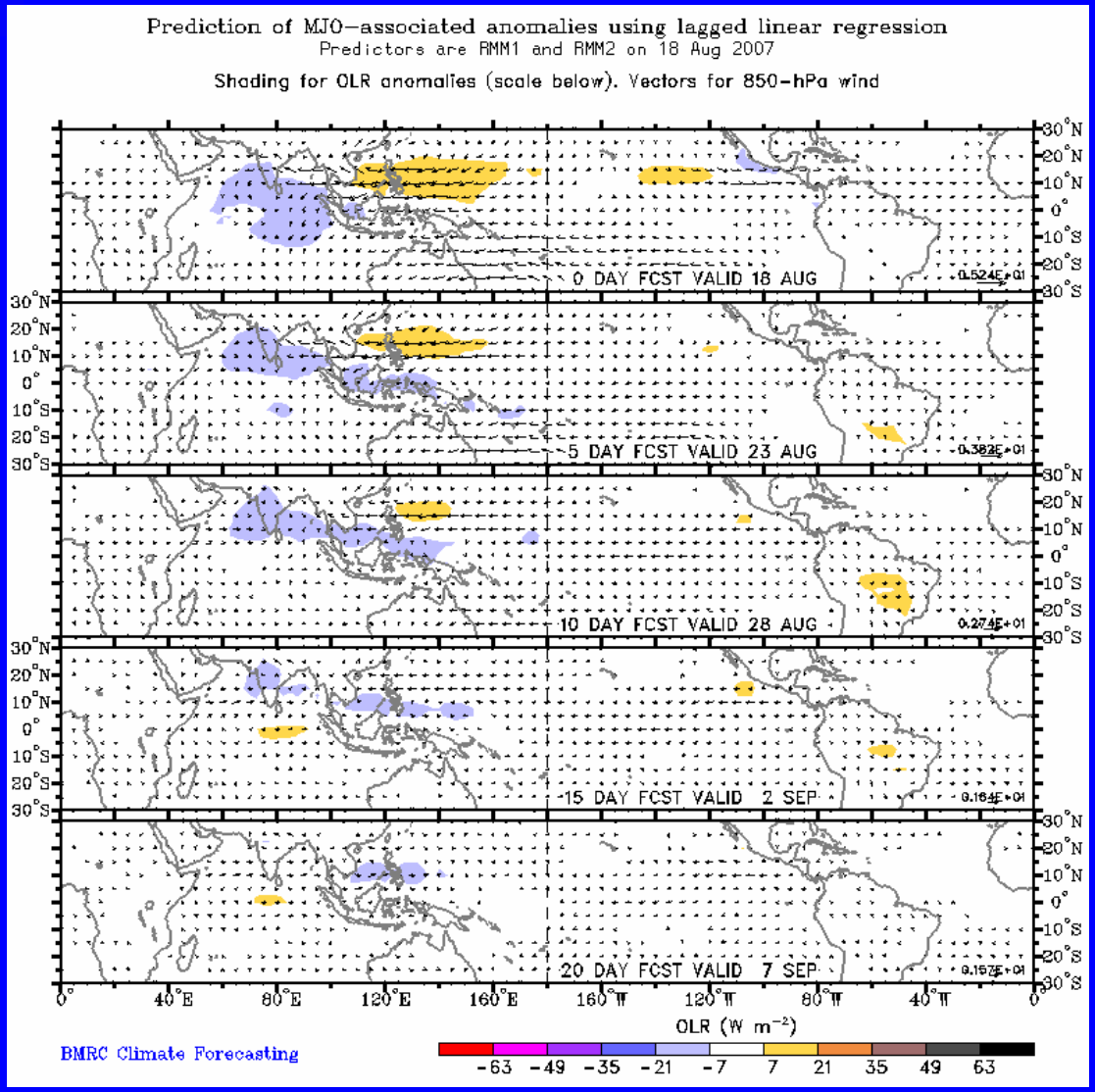


The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850-hPa and 200-hPa zonal wind and outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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 rapidly weakened in late July (green line). Currently, the MJO remains incoherent.

Statistical OLR MJO Forecast



Wet conditions are forecast for sections of India and the Maritime Continent during the next 5-10 days while dry conditions are expected east of the Philippines.

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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