

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

**Update prepared by
Climate Prediction Center / NCEP
January 15, 2007**

Outline

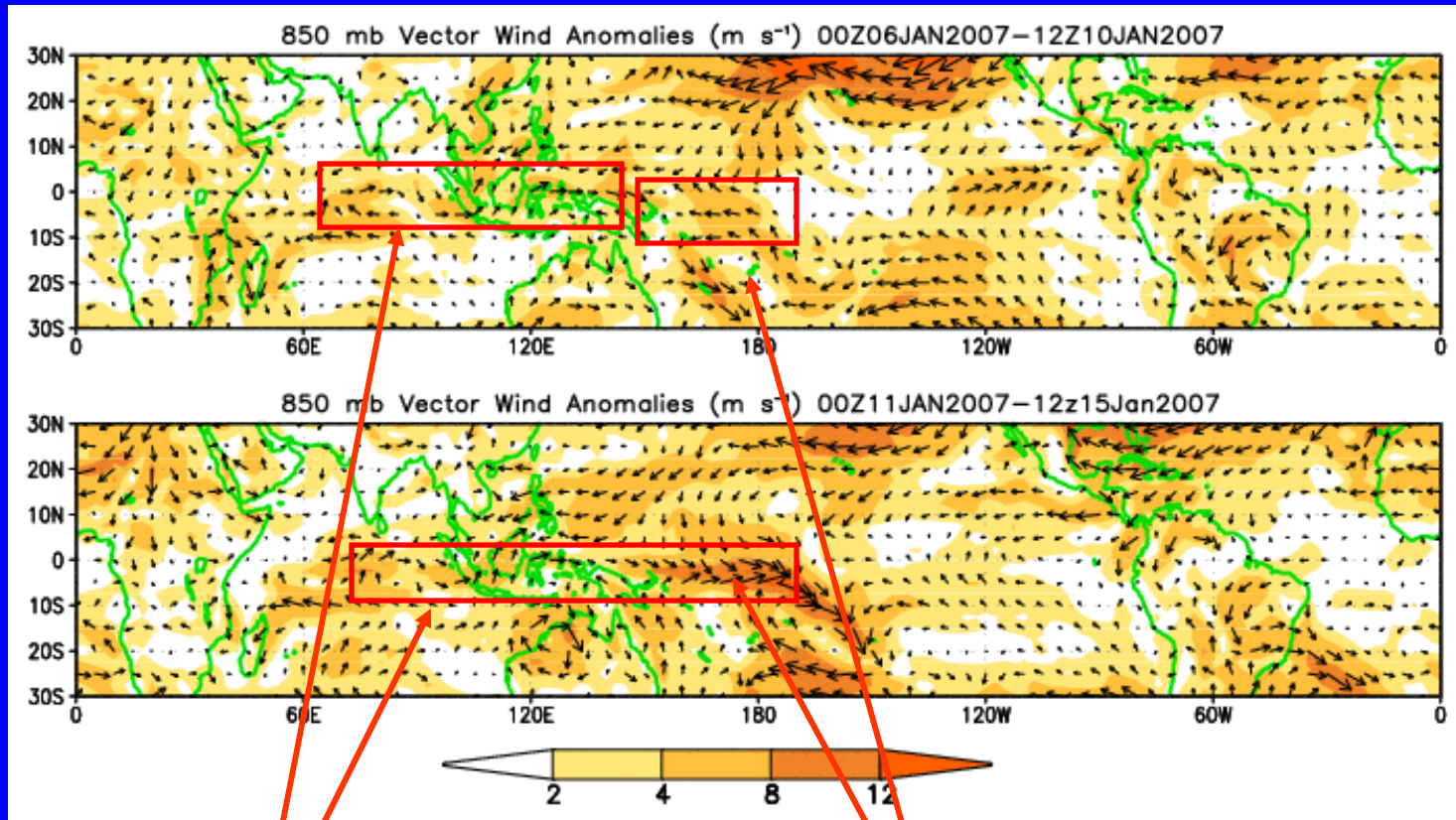
- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**

Overview

- The latest observations indicate that the MJO has become incoherent.
- During week 1, there is an increased chance for above-normal rainfall over the central tropical Pacific Ocean and below-normal rainfall over the eastern Indian Ocean / western Maritime Continent.
- The wet and dry conditions are expected to persist over the central tropical Pacific Ocean and the eastern Indian Ocean / western Maritime Continent respectively.
- Favorable conditions for tropical cyclogenesis are expected for the central South Pacific Ocean during weeks 1 and 2.

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

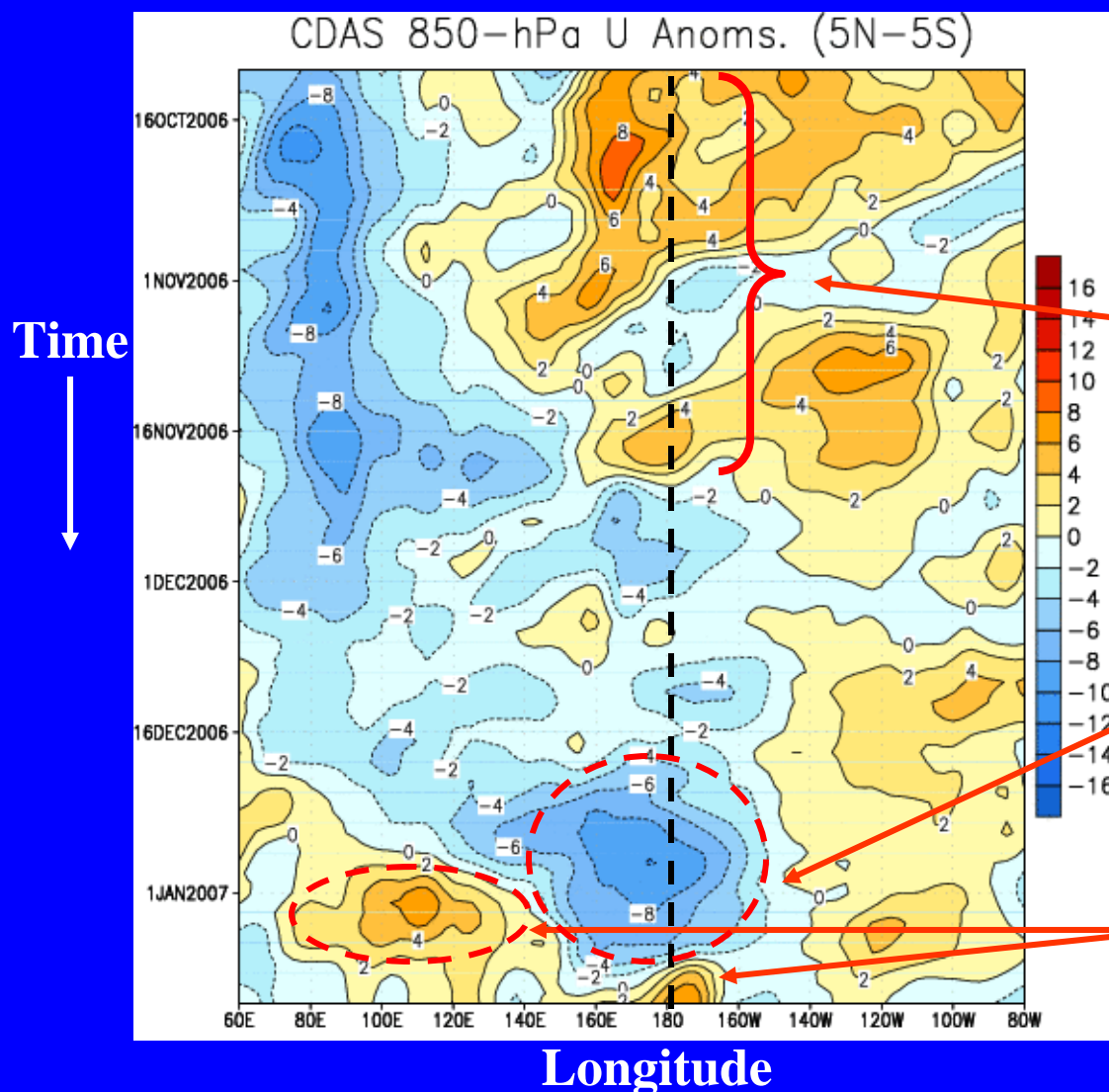
Note that shading denotes the magnitude of the anomalous wind vectors



Weak equatorial westerly anomalies continued over the region from the eastern Indian Ocean eastward across Indonesia.

Easterly anomalies have been replaced by strong westerly anomalies in the central equatorial Pacific (150° - 150°W).

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



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

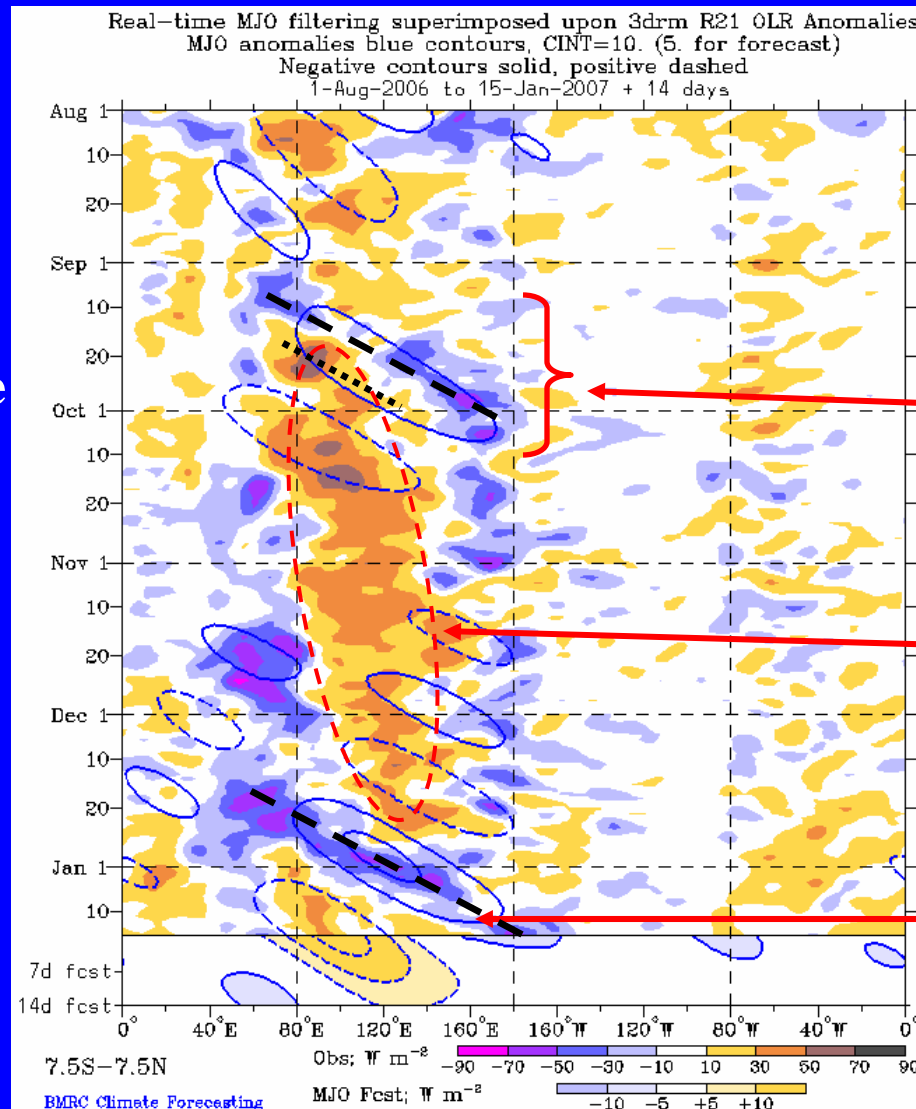
Easterly anomalies (blue shading) represent anomalous east-to-west flow.

Periods of westerly anomalies were frequent near and west of the Date Line (vertical dashed line) during October, and early November 2006.

Strong easterly anomalies, observed near the Date Line in late December 2006, weakened in early January 2007.

Westerly anomalies developed over the equatorial Indian Ocean and Indonesia in late December 2006, and over the central equatorial Pacific during the last week.

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



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

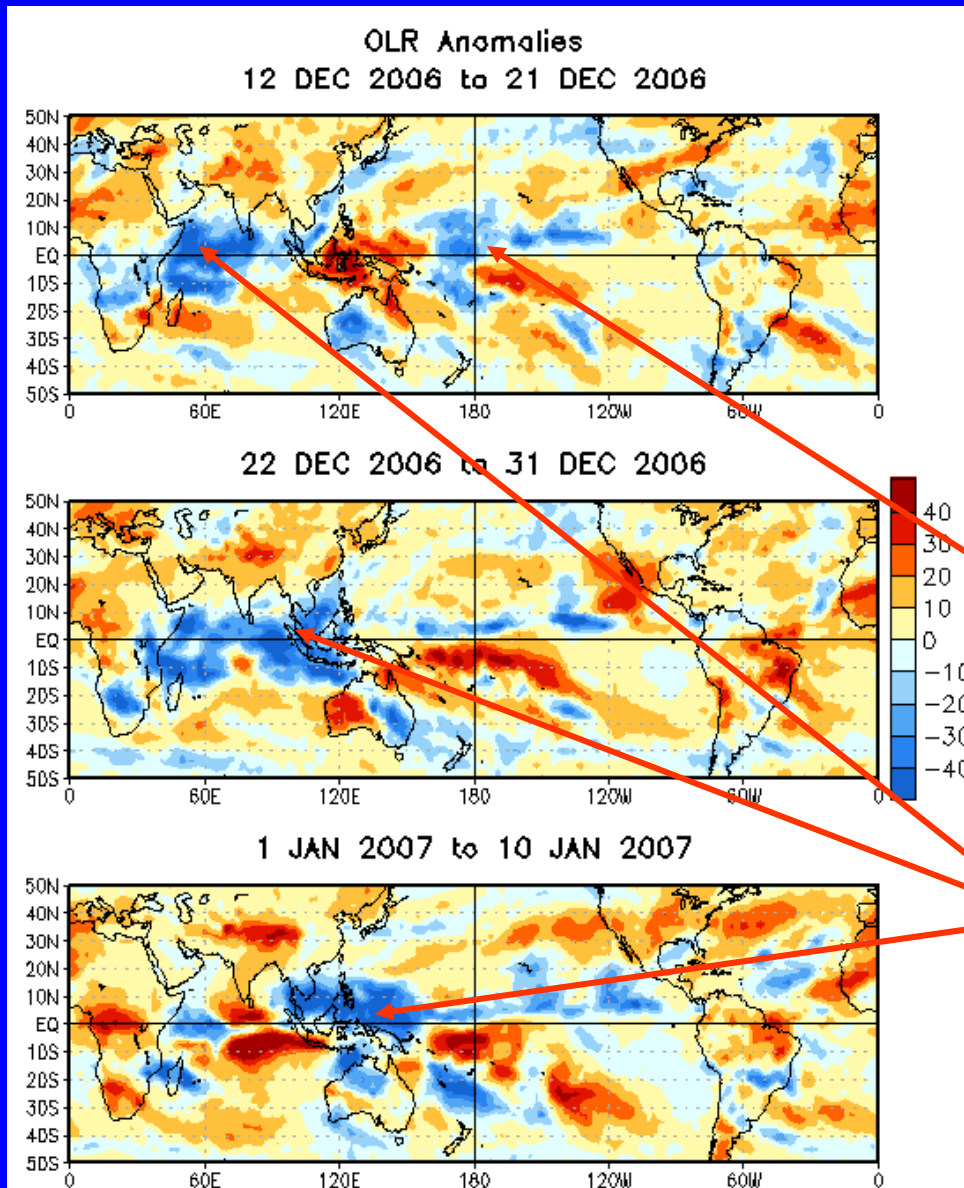
Wetter-than-average conditions, negative OLR anomalies (blue shading)

Negative OLR anomalies associated with the MJO propagated eastward from the Indian Ocean to the western Pacific Ocean beginning in early September.

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

Enhanced convection, associated with the recent MJO event, shifted eastward from the Indian Ocean to the Maritime Continent and western Pacific between late December 2006 and early January 2007.

Anomalous OLR: Last 30 days



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

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

Dry conditions prevailed across sections of the Maritime Continent and Australia during the first two-thirds of December.

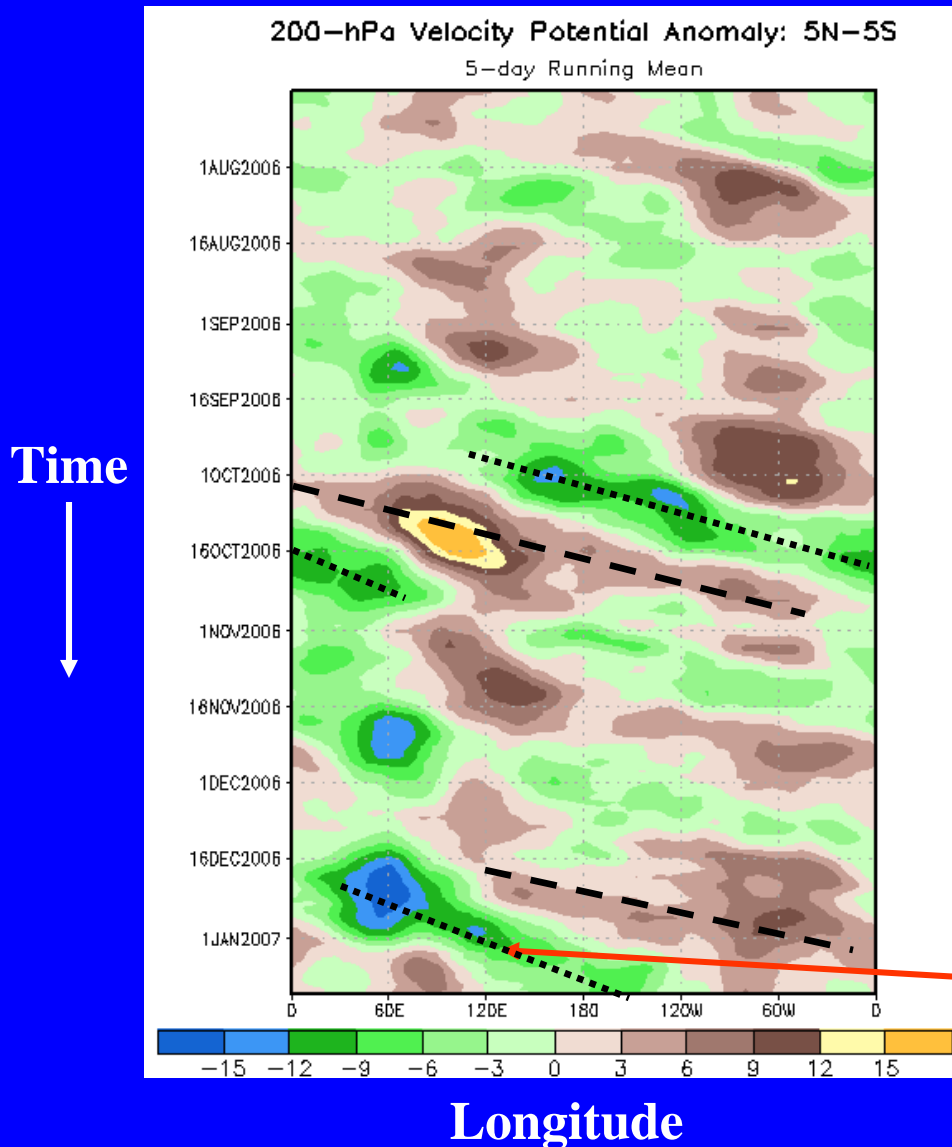
During the first half of December, enhanced convection was more prevalent in the central Pacific, particularly in areas north of the equator.

An extensive area of enhanced convection developed in the Indian Ocean in mid-December and expanded eastward to include the Maritime Continent and western tropical Pacific by early January.

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.



The MJO was incoherent during much of July, August, and September.

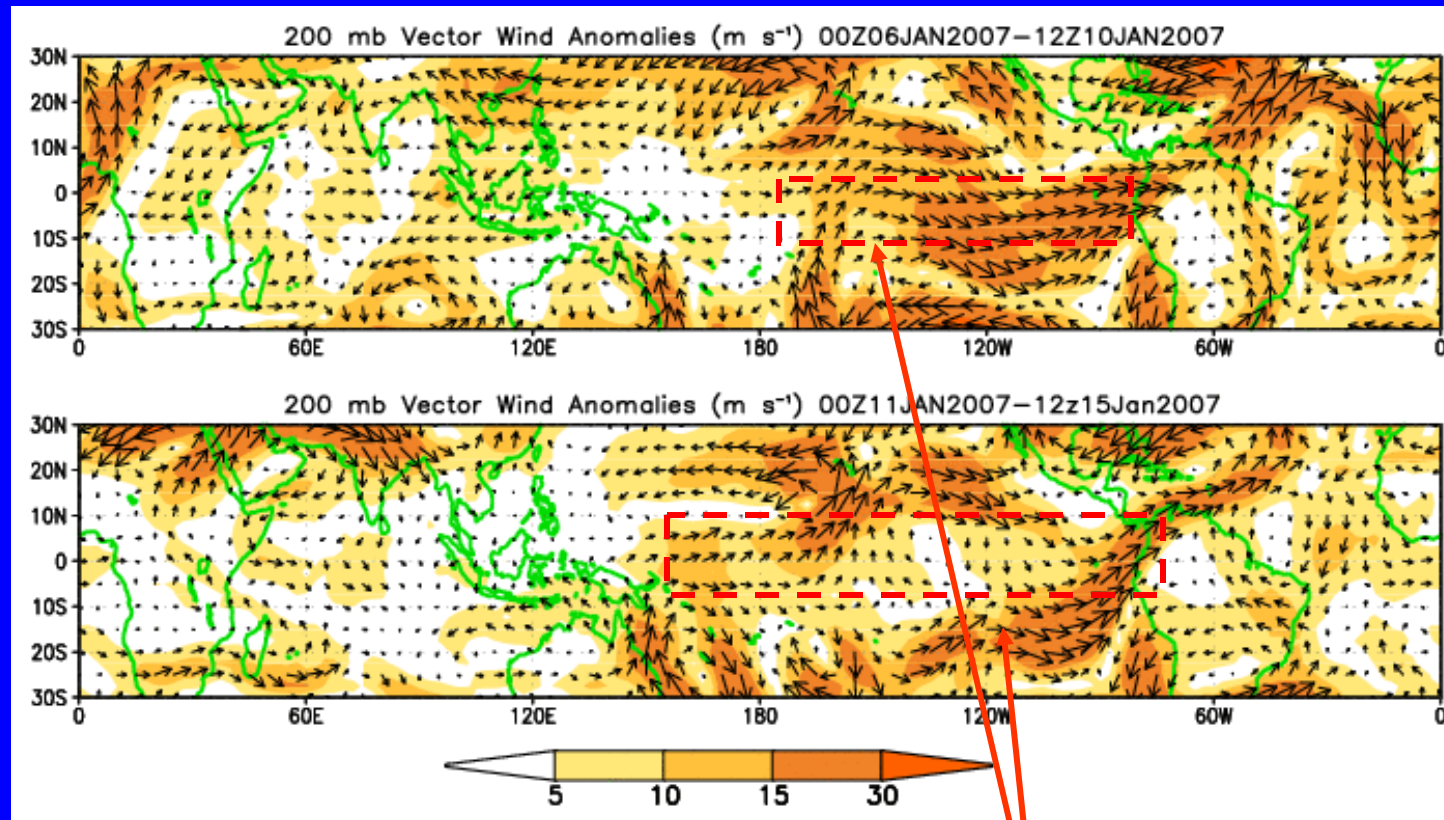
Moderate to strong MJO activity was observed from late-September to mid-October.

The MJO weakened considerably during the late October to early December time period.

The MJO intensified in late December 2006, but weakened in early January 2007, as negative OLR anomalies shifted eastward from the Maritime continent into the western tropical Pacific.

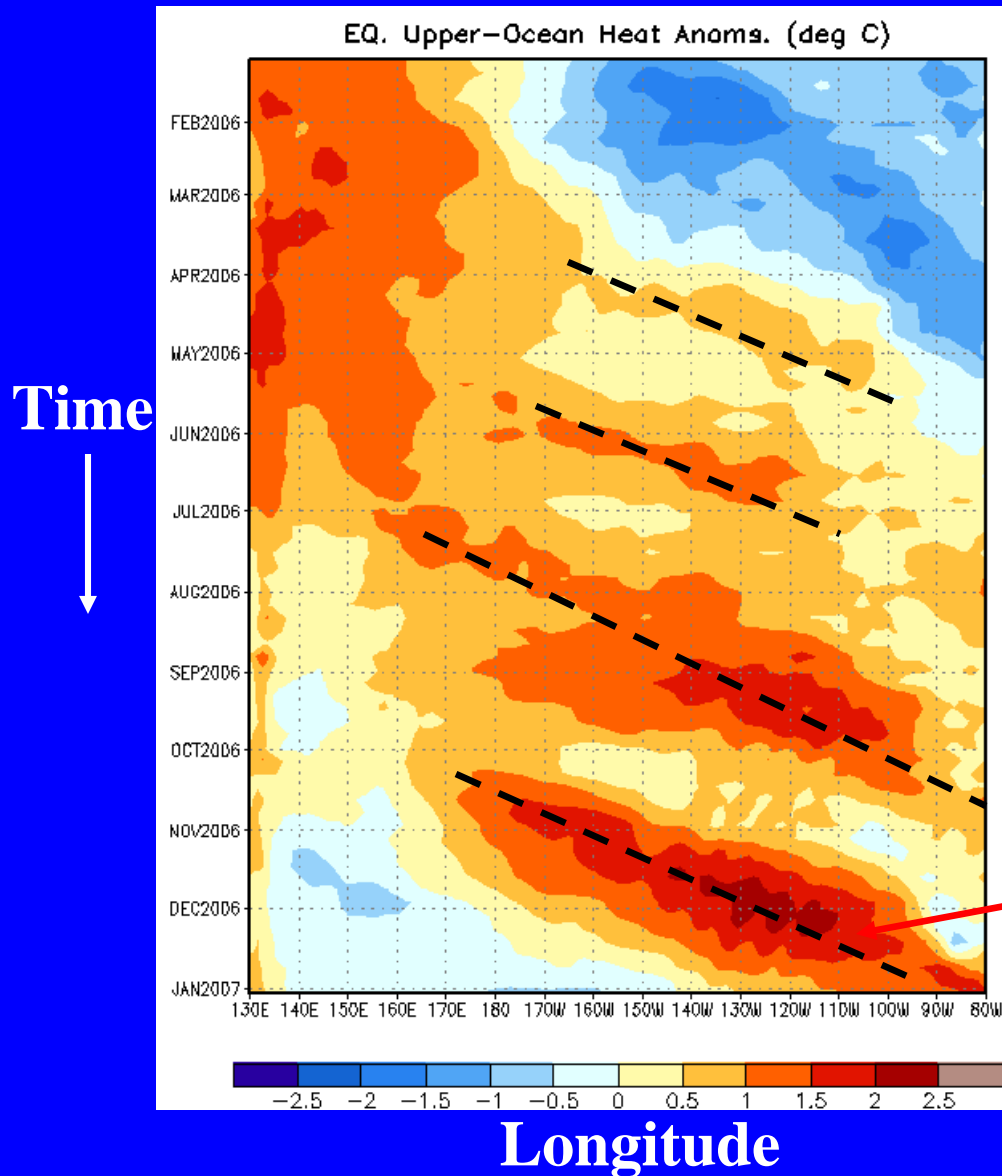
200-hPa Vector Winds and Anomalies (m s^{-1})

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



Westerly anomalies (anomalous west-to-east flow) weakened over the eastern equatorial Pacific.

Heat Content Evolution in the Eq. Pacific



Starting in April, above normal upper oceanic water temperatures expanded from the western Pacific into the eastern Pacific.

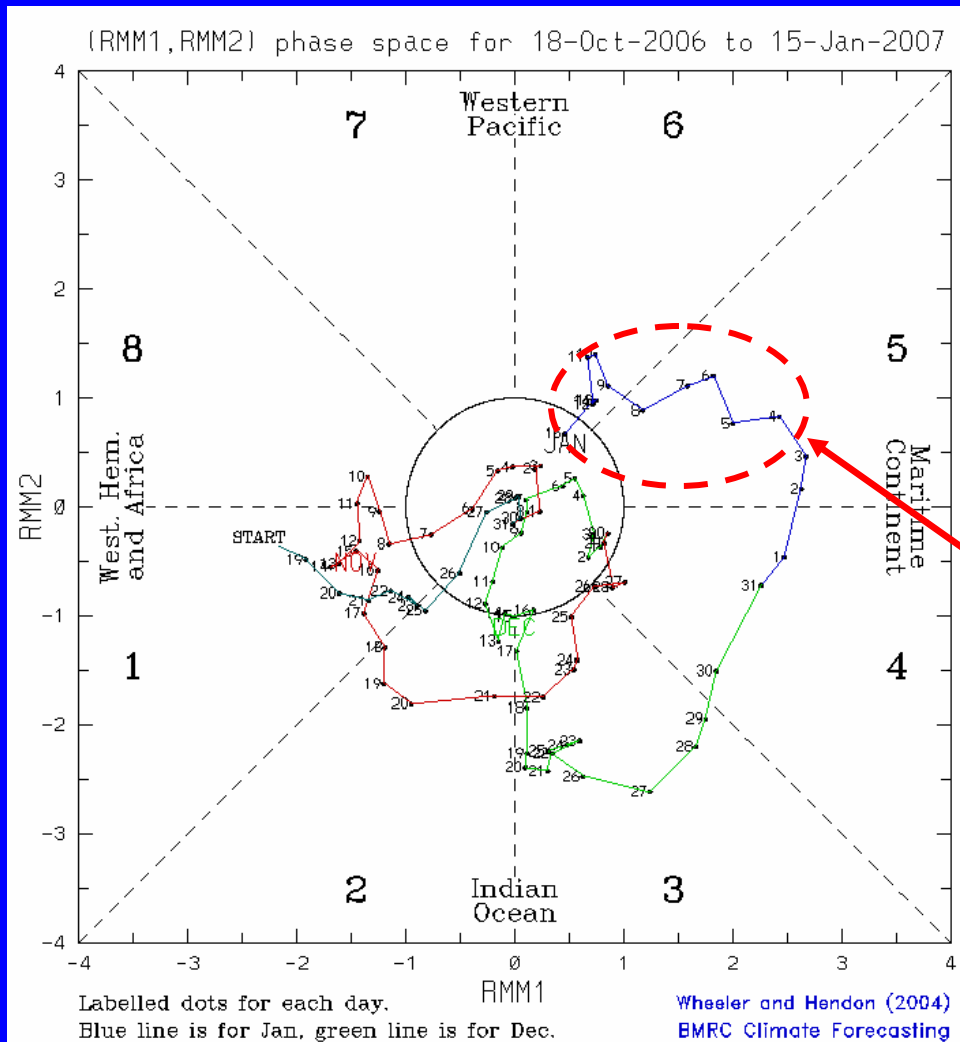
During this period eastward-propagating Kelvin waves (warm phases indicated by dashed lines) have caused considerable month-to-month variability in the upper-ocean heat content.

The latest Kelvin wave was initiated in early October and appears to be the strongest in over a year. Anomalously warm waters have reached the coast of South America.

MJO Index (Magnitude and Phase)

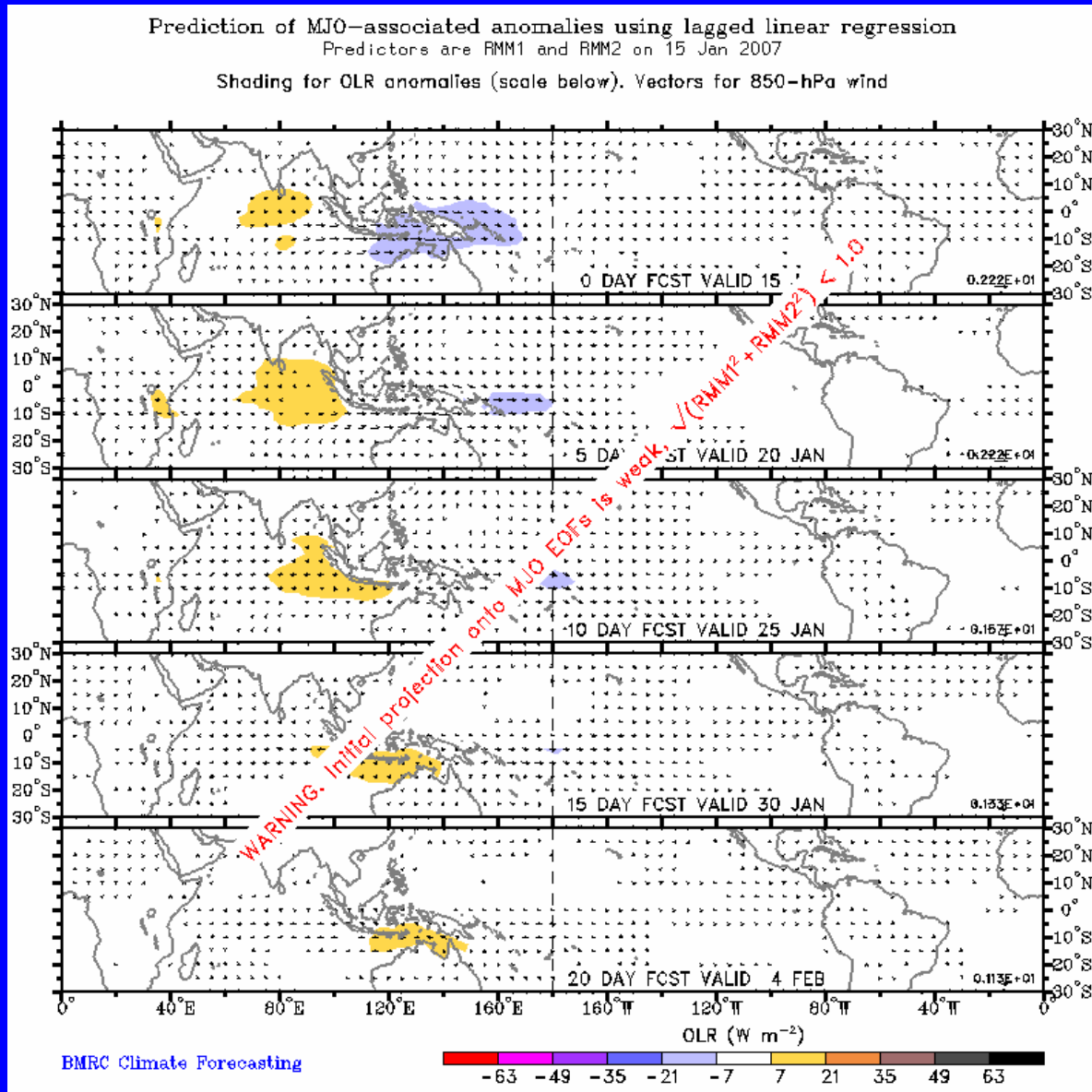
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850-hPa zonal wind, 200- hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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 has weakened considerably during the last 10 days.

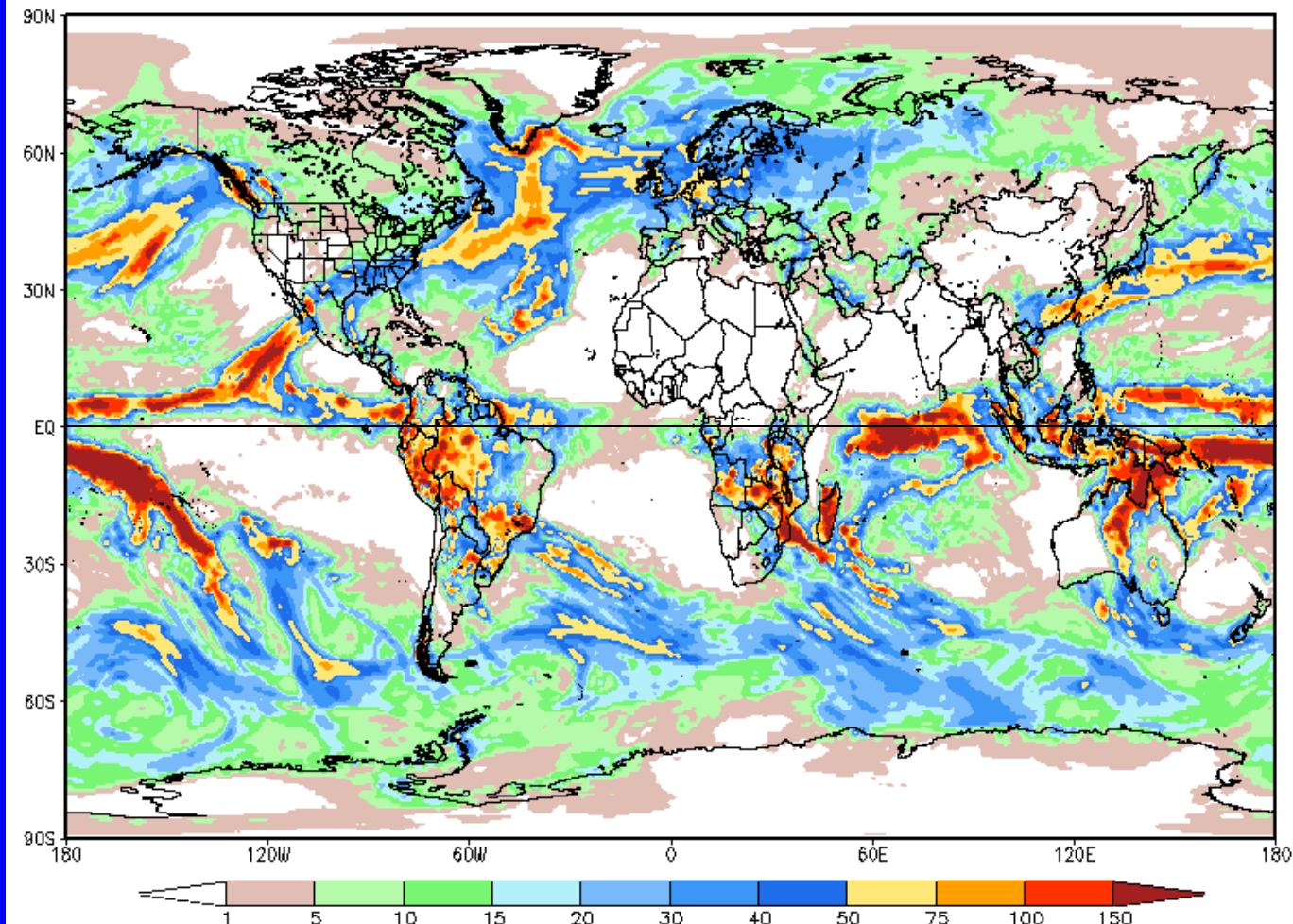
Statistical OLR MJO Forecast



The amplitude of the MJO is too weak to make a forecast.

Global Forecast System (GFS) Week 1 Precipitation Forecast

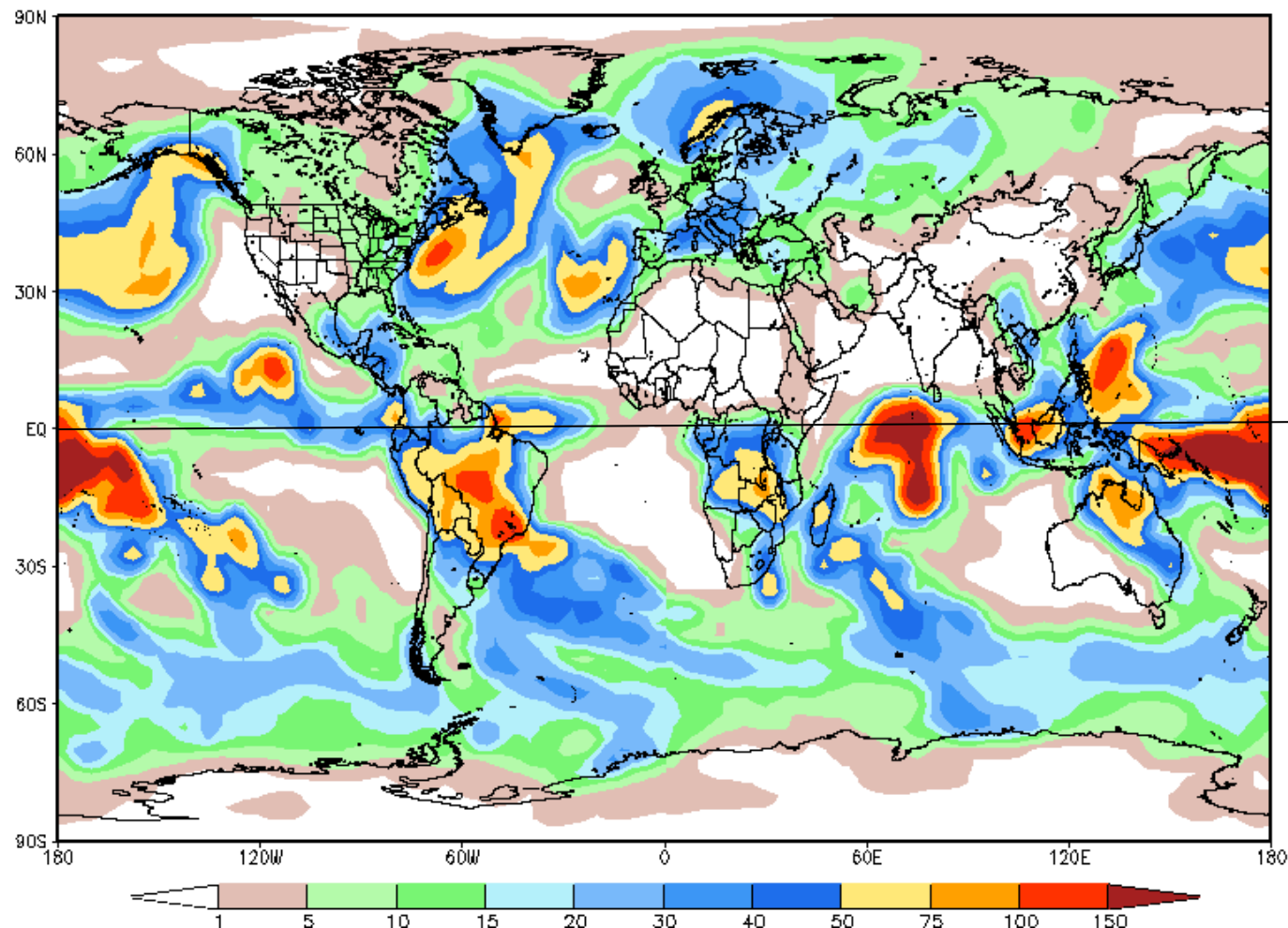
NOAA GFS 37.5 km Week 1 Total Precipitation (mm)
Issued at Jan 16 2007 00Z for the period ending at Jan 23 2007 00Z



Global Forecast System (GFS) Week 2

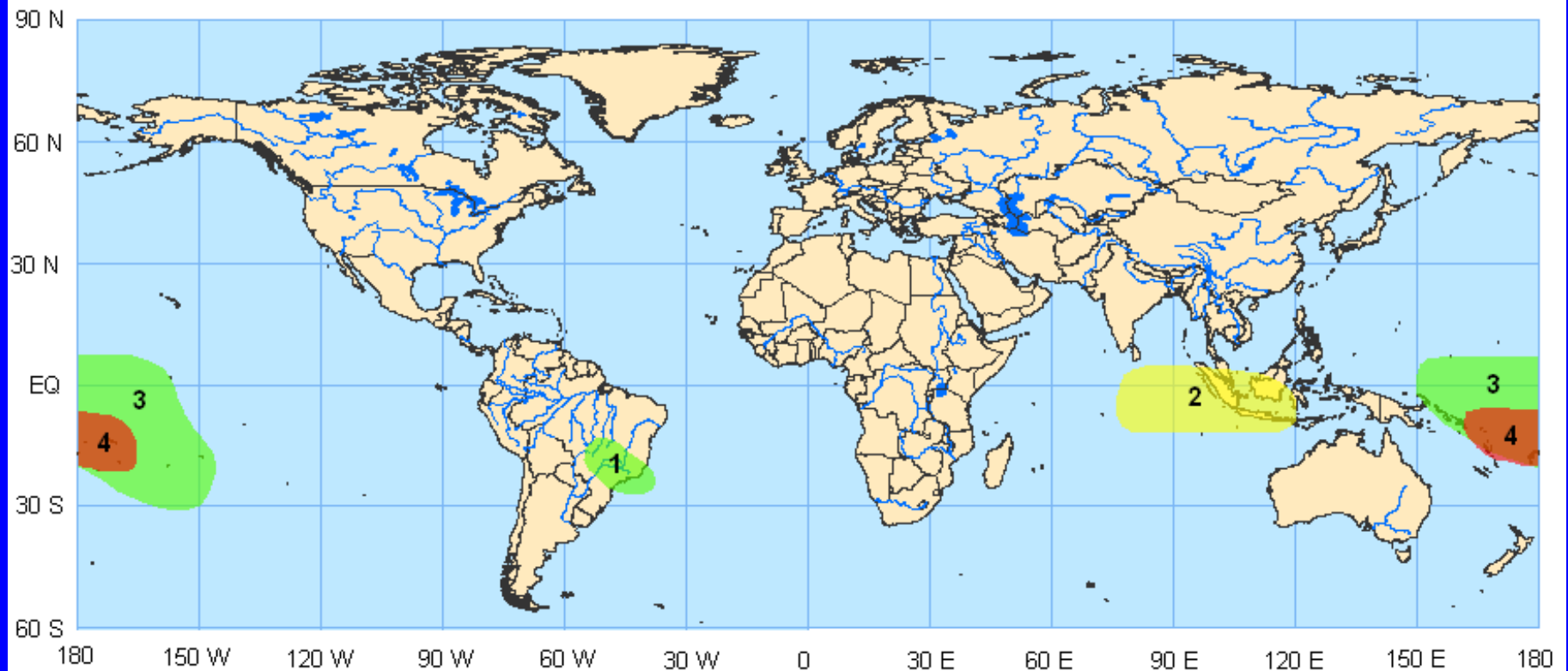
Precipitation Forecast

NOAA GFS 100 km Week 2 Total Precipitation (mm)
Issued Jan 16 2007 00Z for the period ending at Jan 29 2007 00Z



Potential Benefits/Hazards – Week 1

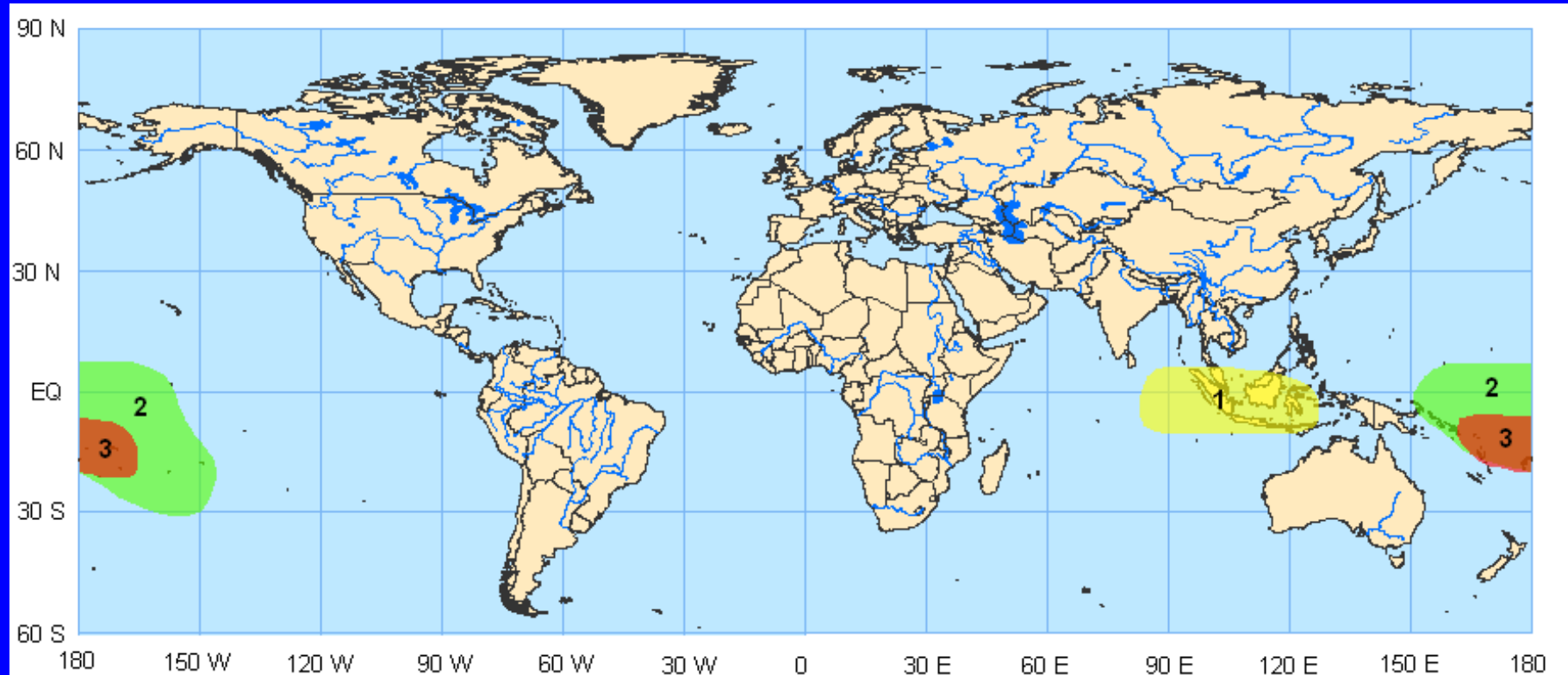
Valid January 16 – January 22, 2007



1. An increased chance for above normal rainfall over Southeast Brazil.
2. An increased chance for below normal rainfall over the eastern tropical Indian Ocean and the western portions of Malaysia and Indonesia.
3. An increased chance for above normal rainfall for the central tropical Pacific Ocean.
4. Favorable conditions exist for tropical cyclogenesis in the central South Pacific.

Potential Benefits/Hazards – Week 2

Valid January 23 – January 29, 2007



1. An increased chance for below normal rainfall for the eastern Indian Ocean and western Maritime Continent.
2. An increased chance for above normal rainfall for the central tropical Pacific Ocean.
3. Favorable conditions exist for tropical cyclogenesis in the central South Pacific.

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