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

Update prepared by
Climate Prediction Center / NCEP
November 13, 2006

Outline

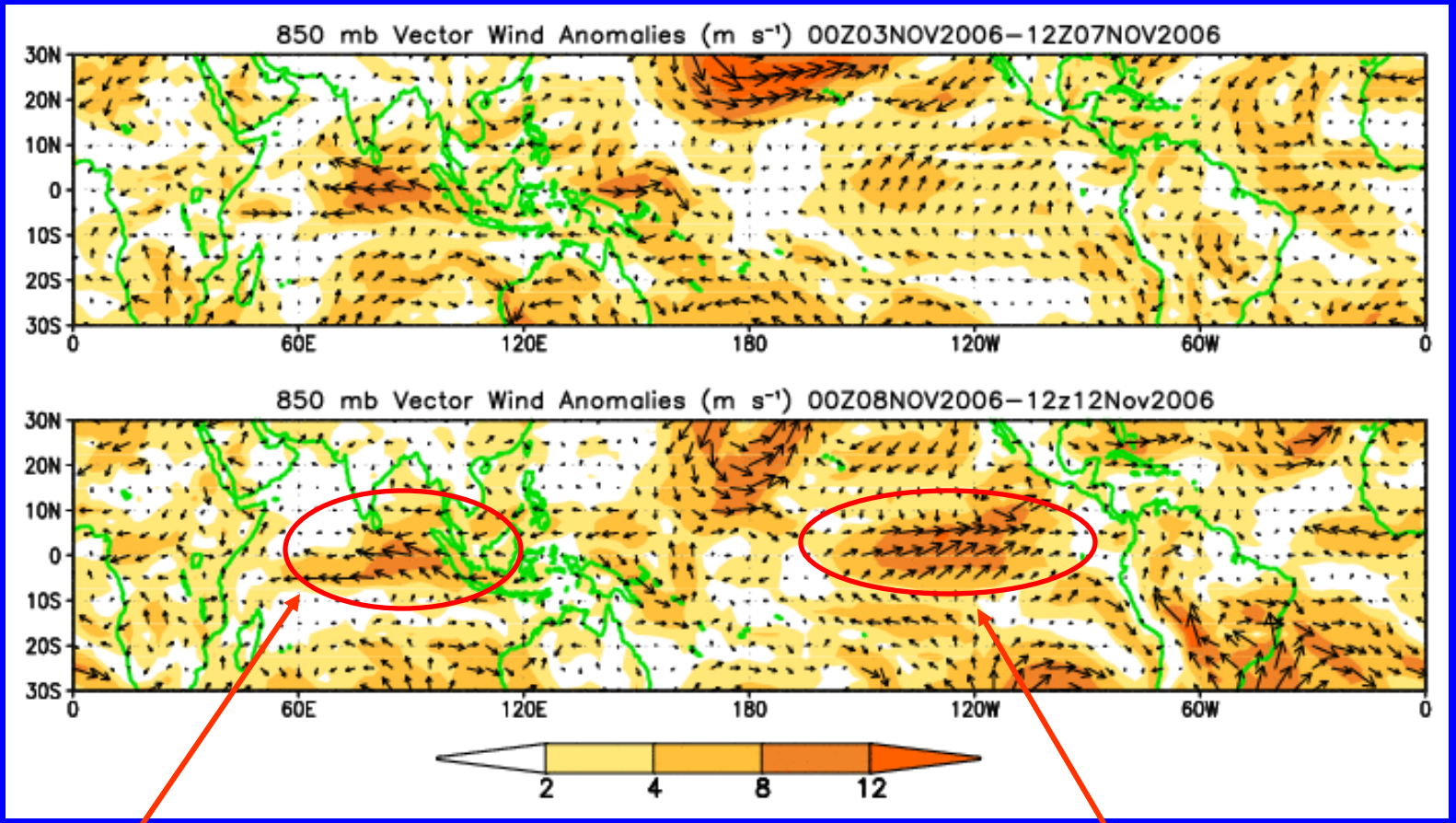
- Overview
- Recent Evolution and Current Conditions
- Madden Julian Oscillation Forecast
- Summary

Overview

- The latest observations indicate that the MJO remains weak.
- During week 1, wetter than normal conditions are expected for sections of the equatorial Indian Ocean and Greater Horn of Africa while there continues to exist an increased chance for drier than normal conditions across the Maritime Continent and surrounding waters. Favorable conditions exist for tropical cyclogenesis in the eastern Pacific Ocean.
- During week 2, wet conditions are expected for the central Indian Ocean and sections of the western Pacific Ocean. Dry conditions will persist across much of the Maritime Continent.
- It is expected that tropical moisture will continue to contribute to an increased likelihood of above average rainfall across sections of the US Pacific northwest and western Canada during both weeks 1 and 2.
- In addition, the western Pacific Ocean needs to be closely monitored for tropical cyclogenesis, although, the chances of development are considered low.

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

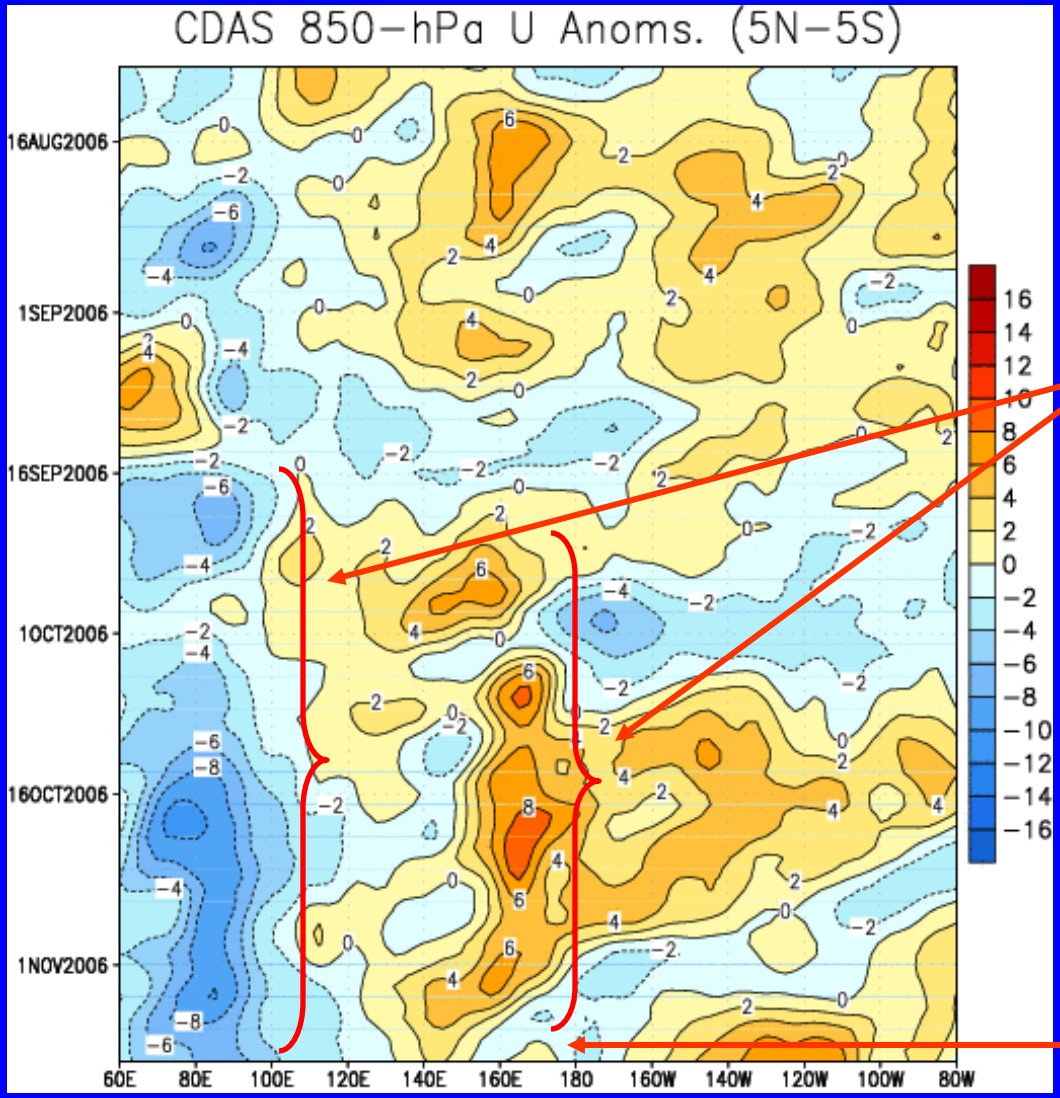
Note that shading denotes the magnitude of the anomalous wind vectors



Easterly anomalies continue in the Indian Ocean.

During the last five days, westerly anomalies have strengthened in the eastern Pacific.

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



Time

Longitude

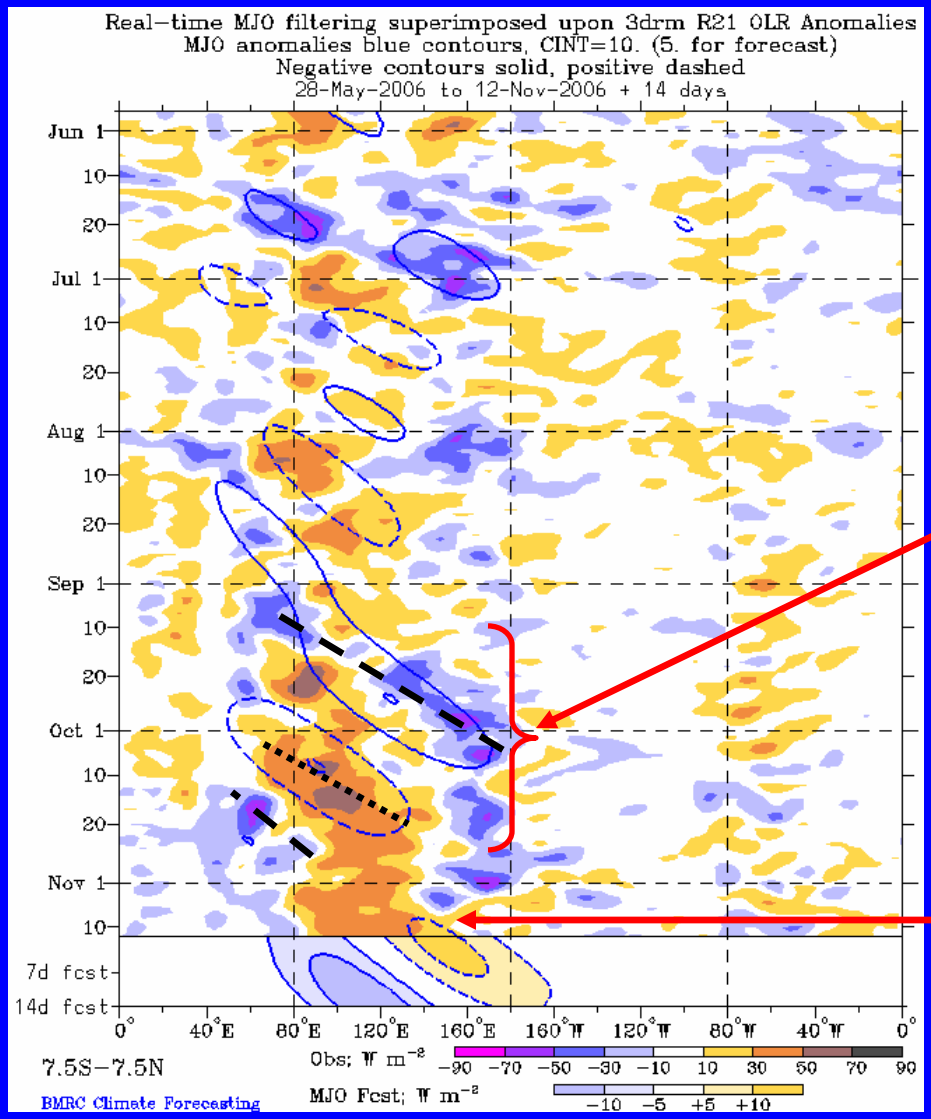
Weaker-than-average easterlies or westerlies (orange/red shading)

Stronger-than-average easterlies (blue shading)

Easterly anomalies in the Indian Ocean and westerly anomalies west of the Date Line have been very persistent since September.

Recently, westerly anomalies along the equator have shifted westward and weakened.

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



Time

Longitude

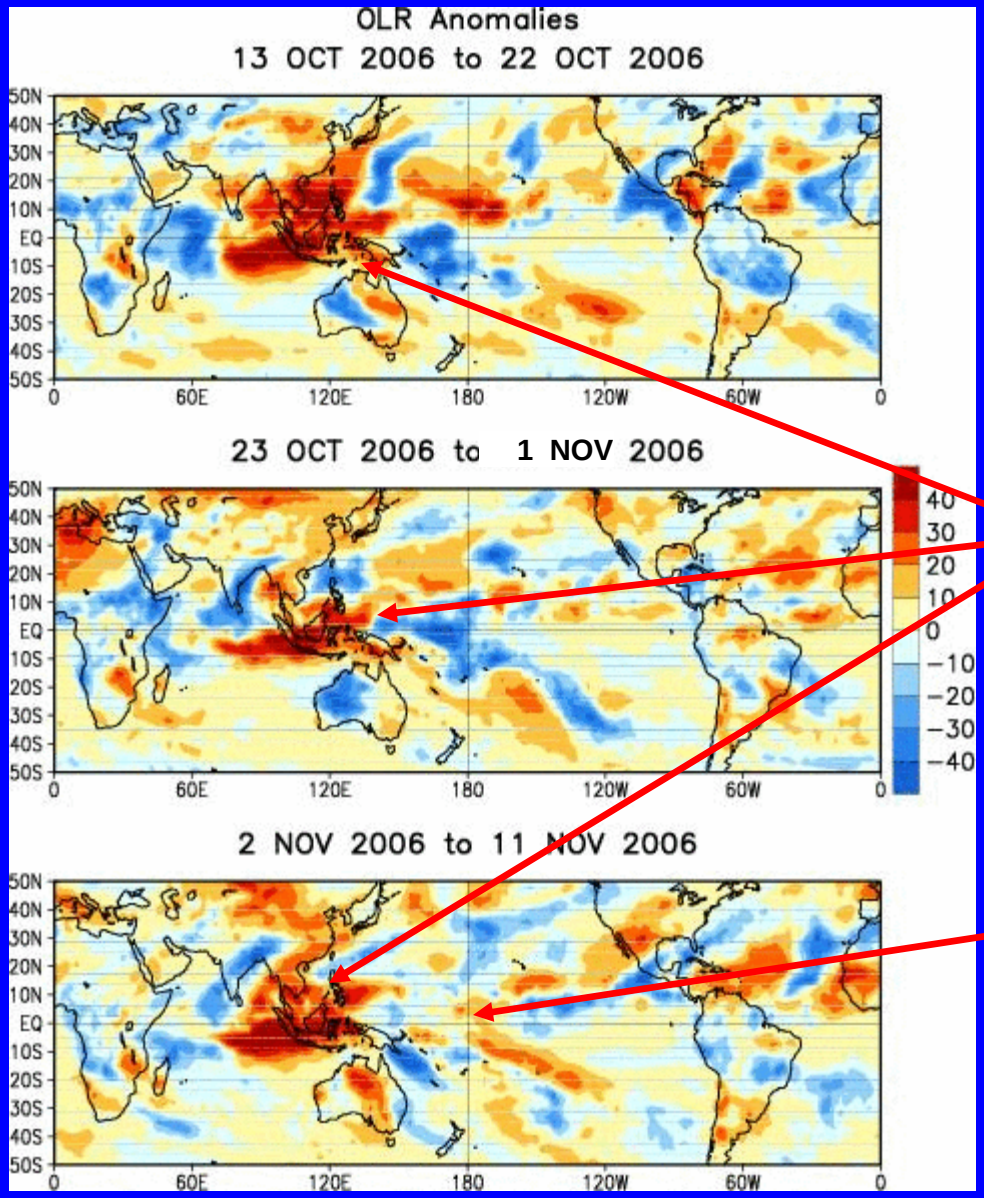
Drier-than-average conditions (/red shading)

Wetter-than-average conditions (blue shading)

OLR anomalies associated with the MJO developed in early-mid September over the eastern Indian Ocean and both negative and positive anomalies shifted east across the Maritime Continent.

Most recently, the greatest anomalies are for suppressed convection anchored across much of the Maritime Continent.

Anomalous OLR: Last 30 days



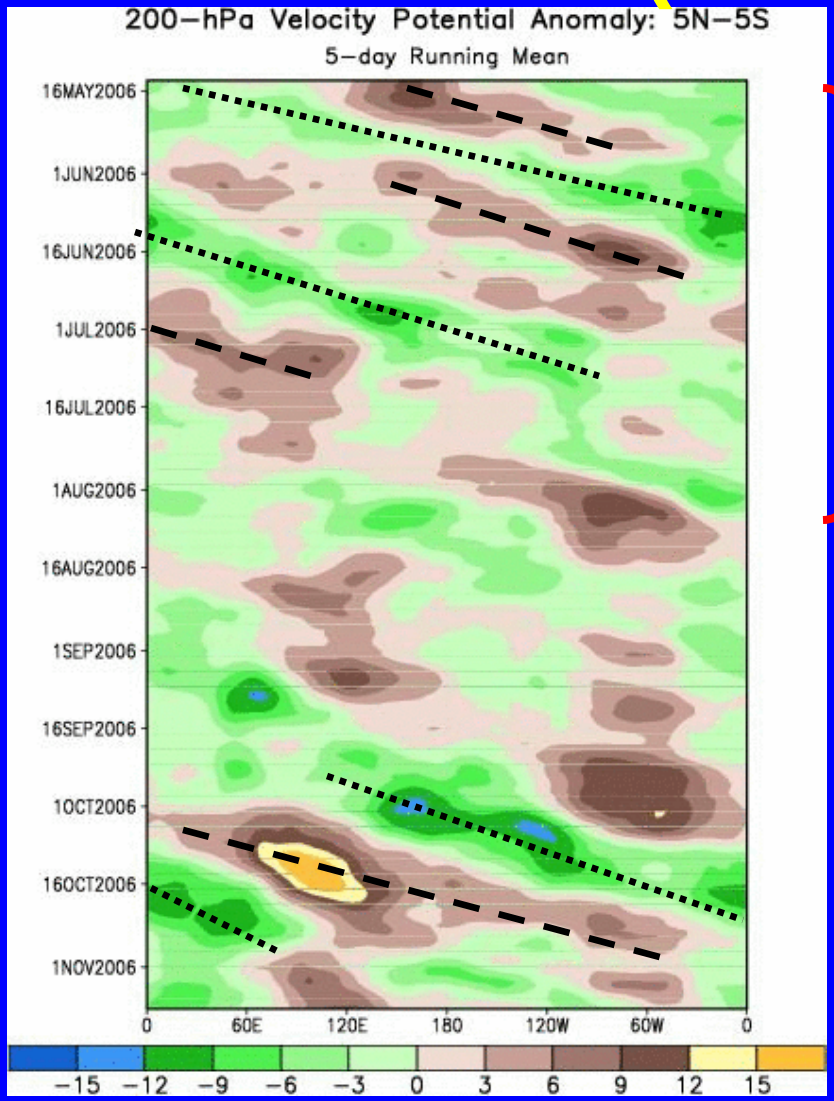
Drier-than-average conditions (red shading)

Wetter-than-average conditions (blue shading)

Dry conditions have been very persistent across the Maritime Continent throughout the period.

Wet conditions near and just west of the Date Line have waned during early November.

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



Time

Longitude

Positive anomalies (brown shading) indicate unfavorable conditions for precipitation.

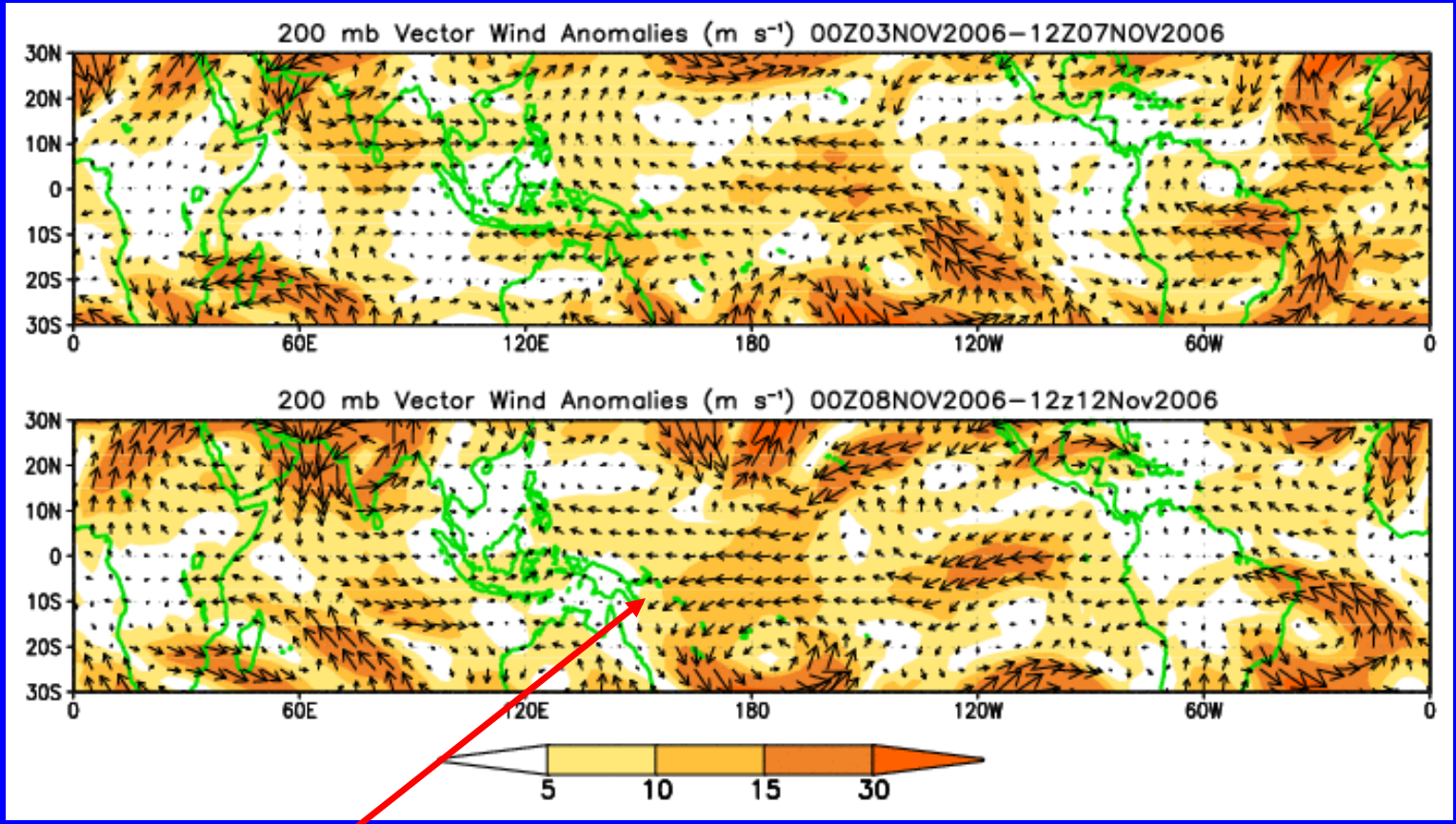
Negative anomalies (green shading) indicate favorable conditions for precipitation.

Only periods of weak MJO activity occurred some during May through August.

Moderate to strong MJO activity was observed from late-September to mid-October. Recently, the MJO has weakened.

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

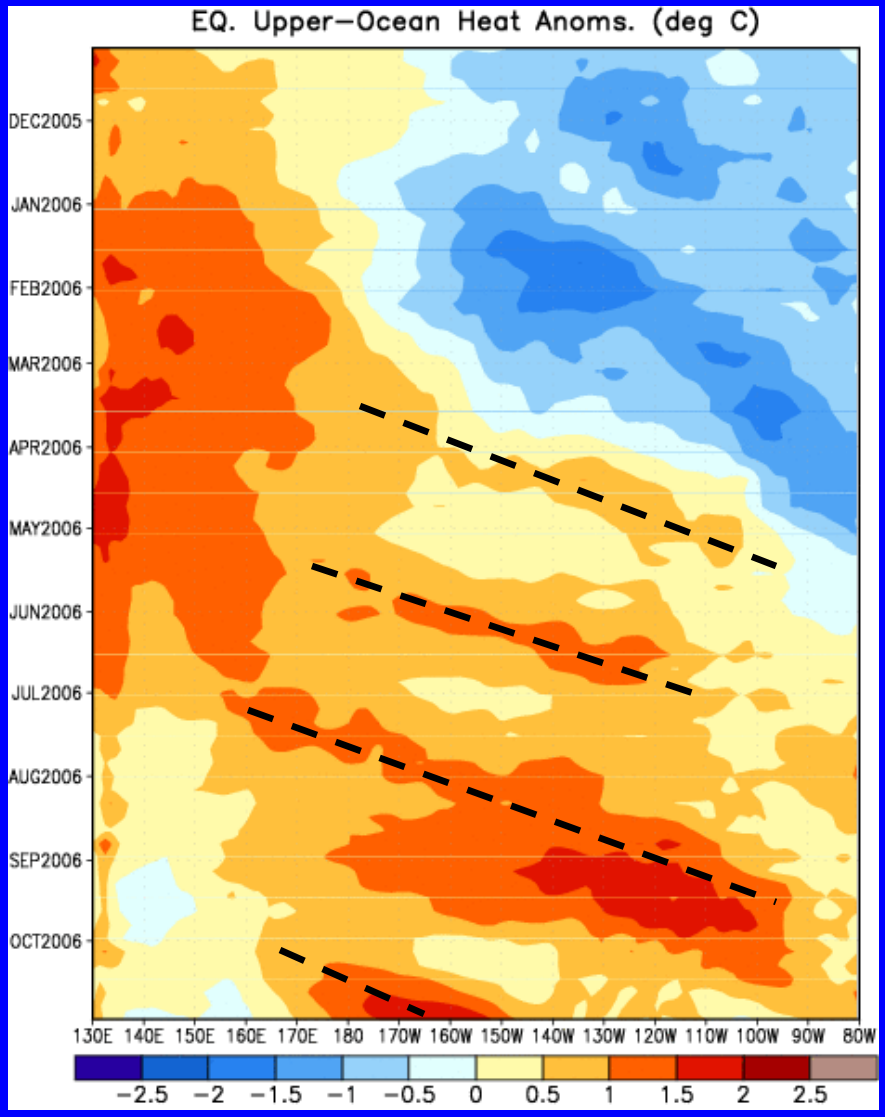
Note that shading denotes the magnitude of the anomalous wind vectors.



Easterly anomalies are evident across much of the western Pacific Ocean.

Heat Content Evolution in the Eq. Pacific

Time



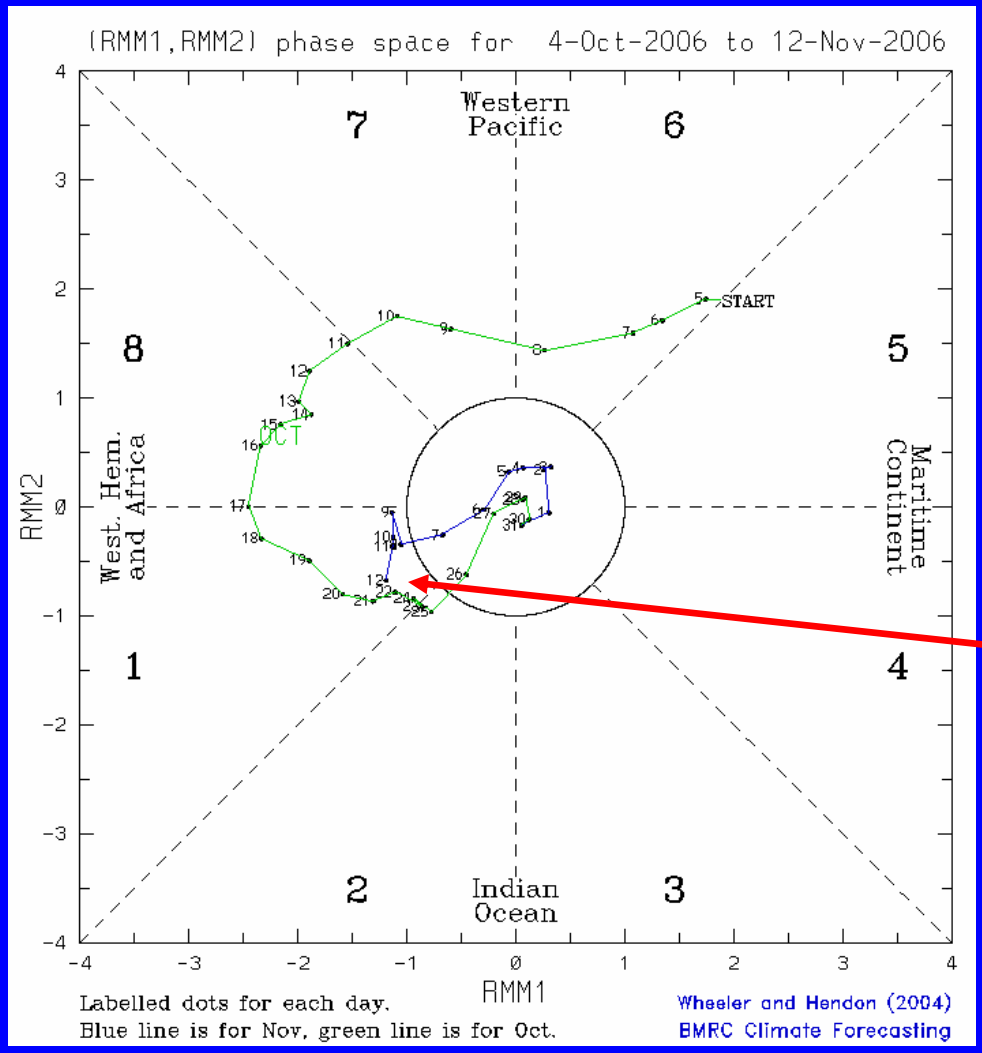
Longitude

Starting in April, above normal upper oceanic water temperatures expanded from the western Pacific into the eastern Pacific in part due to Kelvin wave activity. The most recent downwelling Kelvin wave was initiated in early October.

MJO Index (Magnitude and Phase)

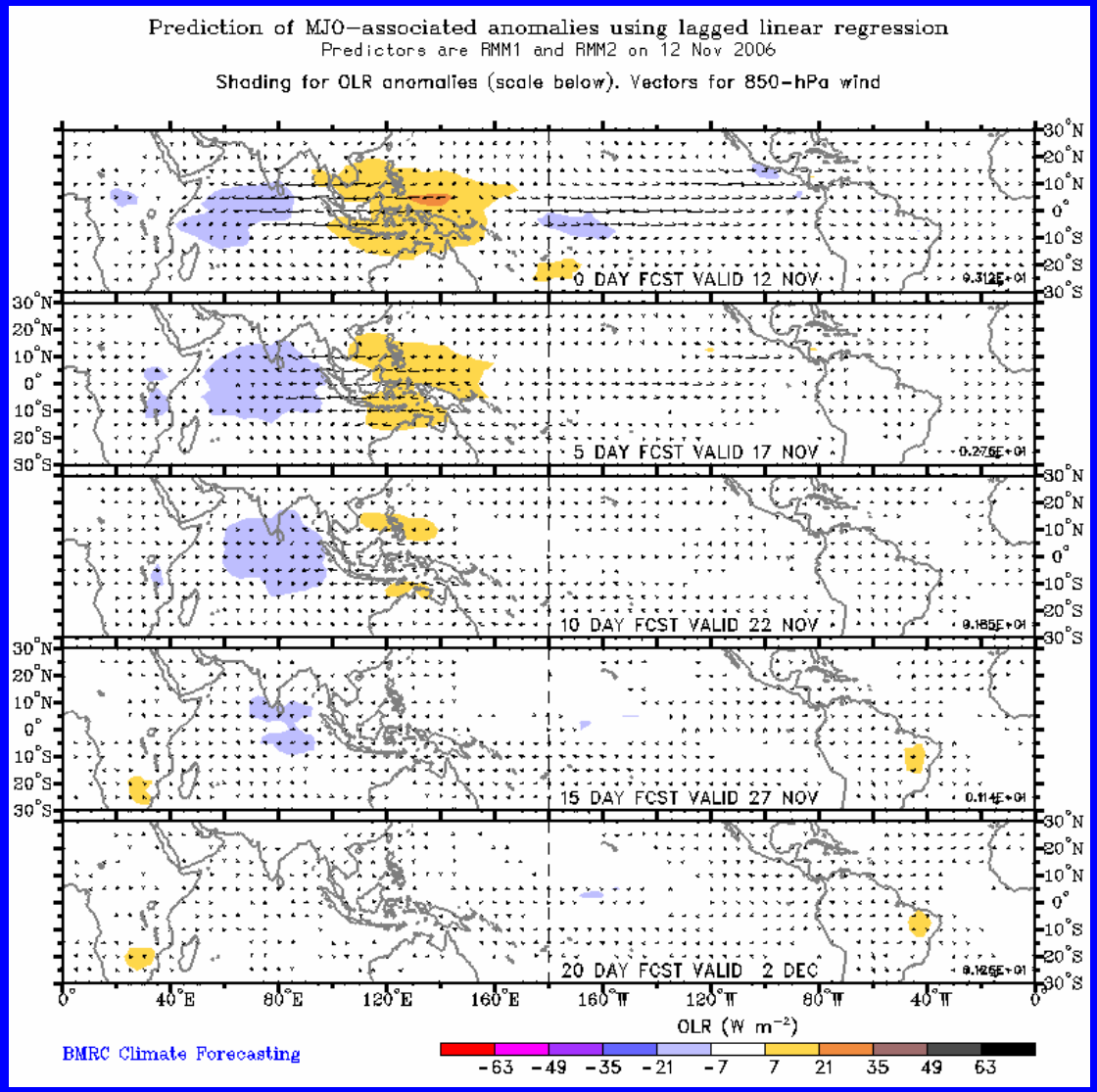
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850 hPa zonal wind, 200 hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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.



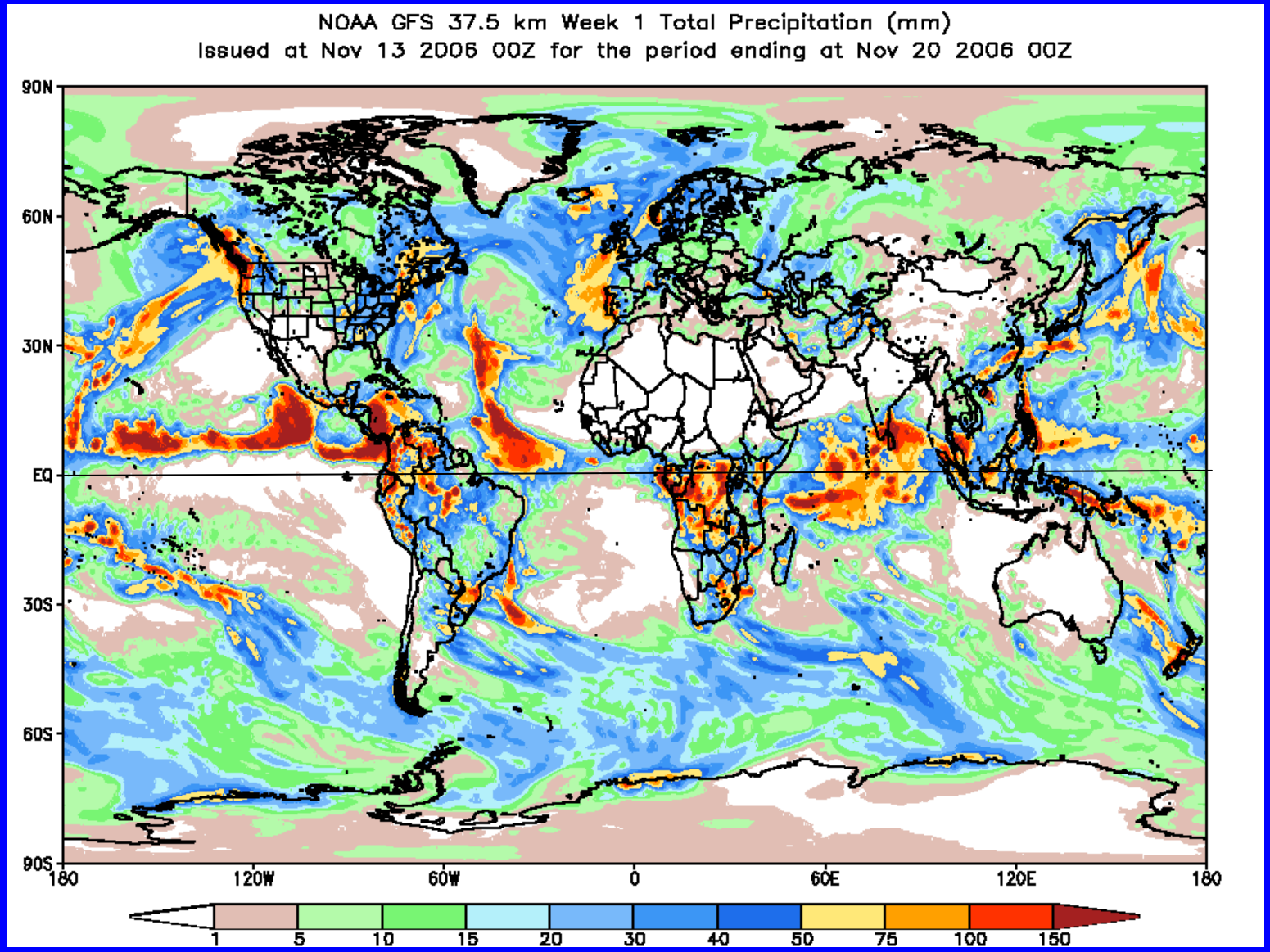
The MJO signal has strengthened some during recent days but remains weak.

Statistical OLR MJO Forecast

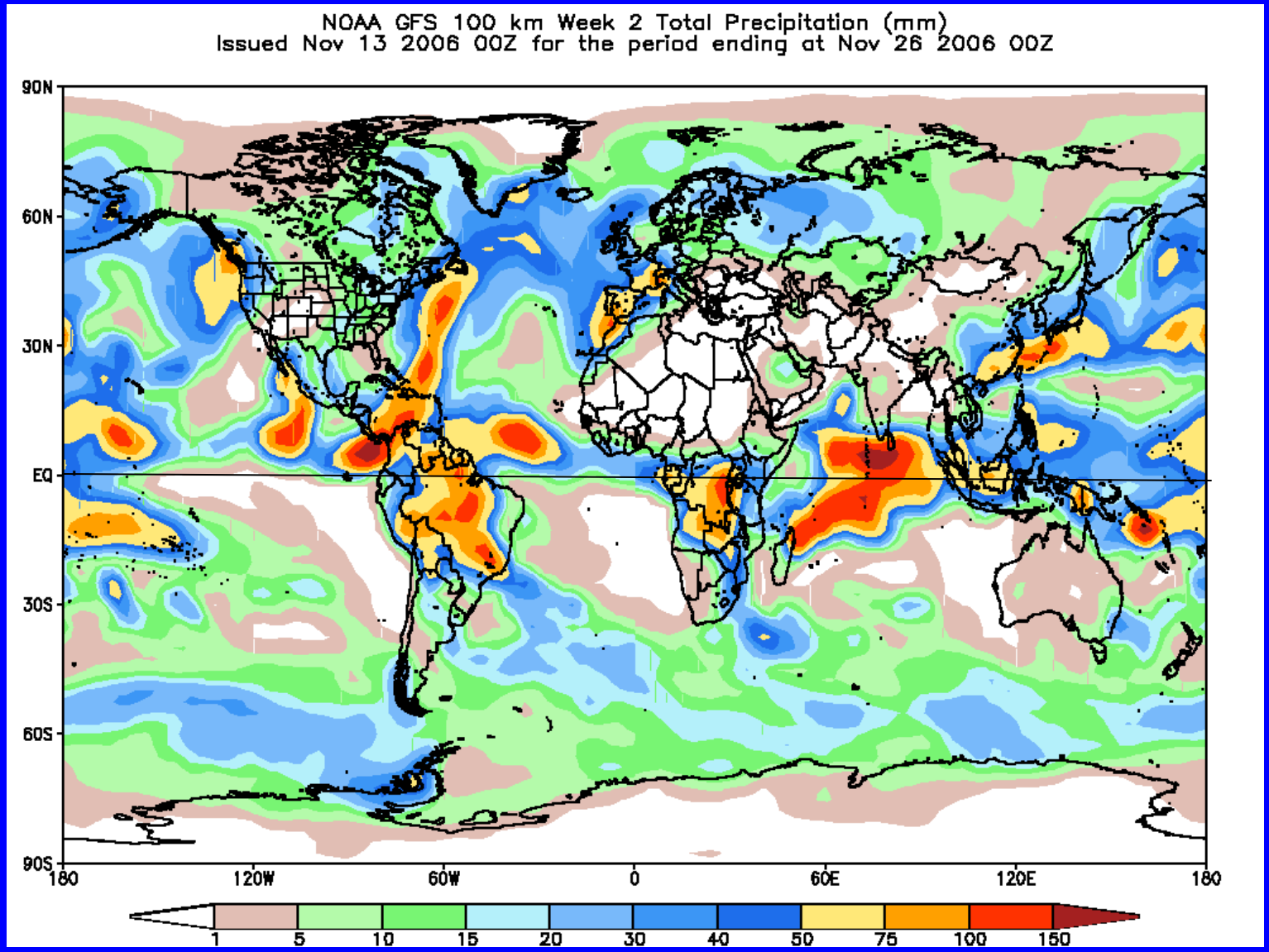


OLR anomalies associated with the MJO indicate wet (dry) conditions across the Indian Ocean (Maritime Continent).

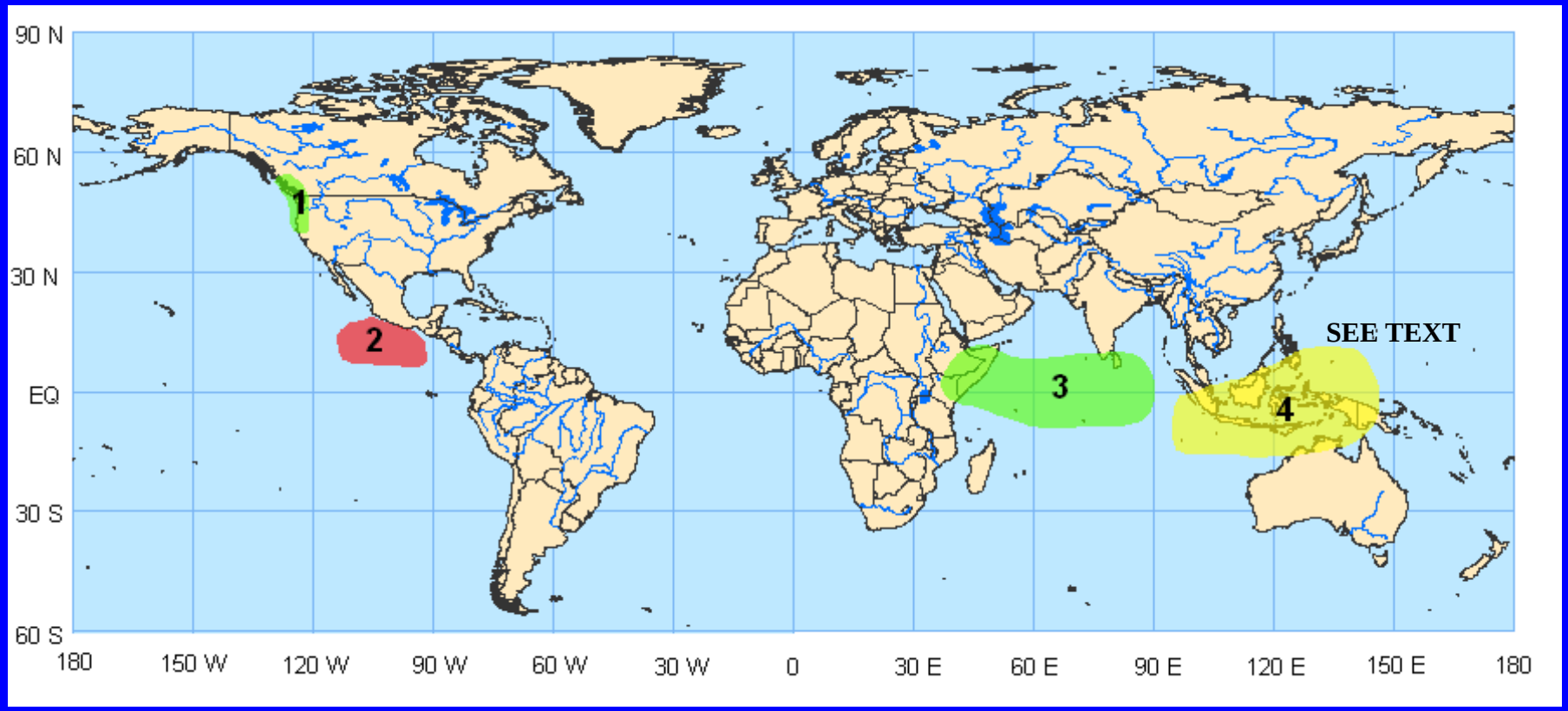
Global Forecast System (GFS) Week 1 Precipitation Forecast



Global Forecast System (GFS) Week 2 Precipitation Forecast

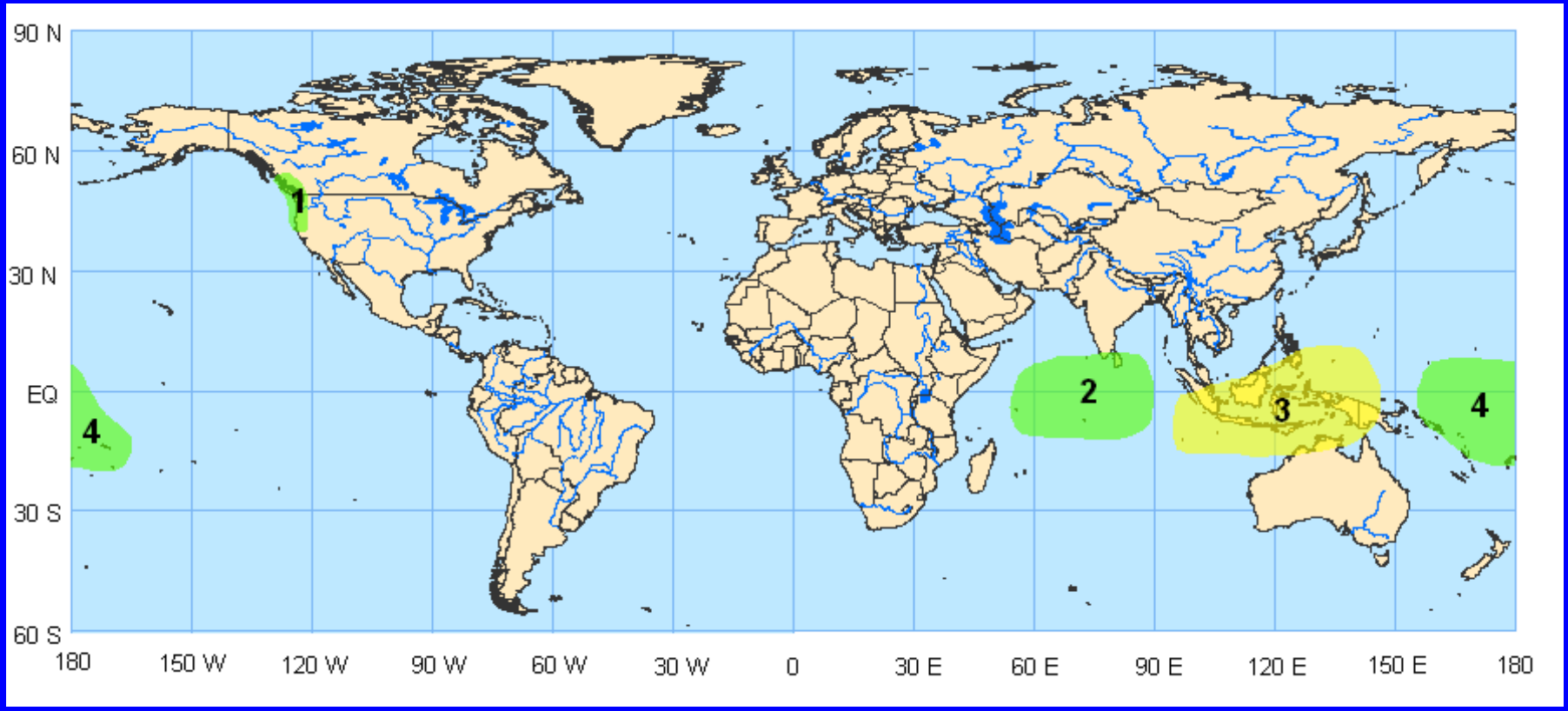


Potential Benefits/Hazards – Week 1
Valid November 14 – November 20, 2006



1. Periods of heavy rainfall, strong winds and heavy surf for areas of the US Pacific northwest and western Canada
2. Favorable conditions exist for tropical cyclogenesis in the east Pacific Ocean
3. An increased chance for above normal rainfall for the western Indian Ocean and the Greater Horn of Africa
4. An increased chance for below normal rainfall across sections of the Maritime Continent and adjacent waters

Potential Benefits/Hazards – Week 2
Valid November 21 - 27, 2006



1. Periods of heavy rainfall, strong winds and heavy surf for areas of the US Pacific northwest and western Canada
2. An increased chance for above normal rainfall for the central Indian Ocean
3. An increased chance for below normal rainfall across sections of the Maritime Continent and adjacent waters
4. An increased chance for above normal rainfall for sections of the western Pacific Ocean

Summary

- The latest observations indicate that the MJO remains weak.
- During week 1, wetter than normal conditions are expected for sections of the equatorial Indian Ocean and Greater Horn of Africa while there continues to exist an increased chance for drier than normal conditions across the Maritime Continent and surrounding waters. Favorable conditions exist for tropical cyclogenesis in the eastern Pacific Ocean.
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