

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

Update prepared by
Climate Prediction Center / NCEP
December 4, 2006

Outline

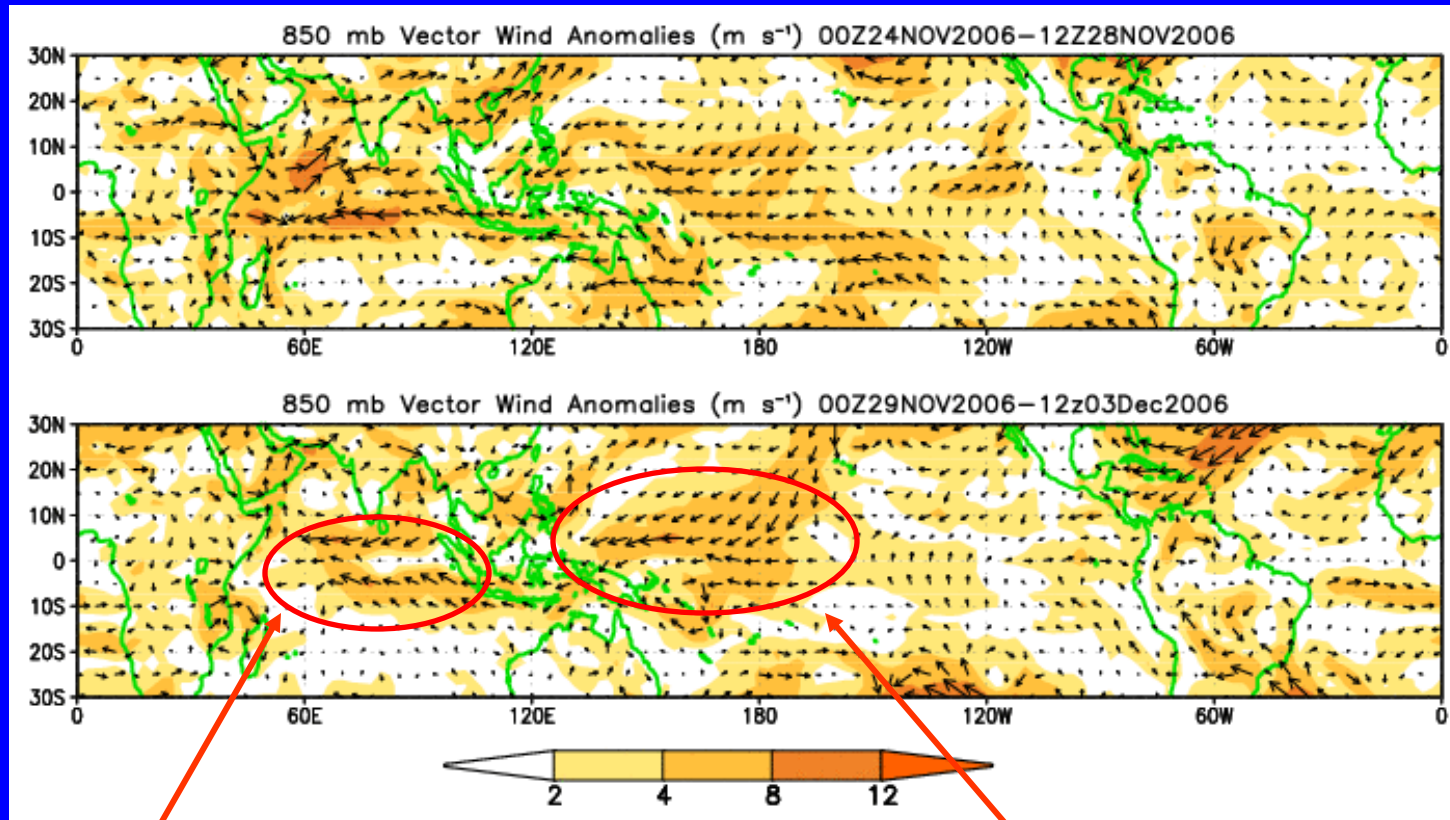
- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**

Overview

- The latest observations indicate that the MJO remains weak.
- During week 1, there is an increased chance of above normal rainfall for the equatorial eastern Indian Ocean and sections of the tropical western Pacific Ocean while drier than normal conditions are expected to continue for the southern Maritime Continent and northern Australia. A weakening Tropical storm Durian is expected impact southern Southeast Asia early in the period.
- Wet (dry) conditions are expected to persist for sections of the western Pacific Ocean (Maritime Continent) during week 2. Also, the threat exists for periods of storminess (above average precipitation, strong winds, and heavy surf) for sections of the US Pacific Northwest.
- Favorable conditions for tropical cyclogenesis are expected throughout the period in the western Pacific Ocean.
- Although confidence is somewhat lower, there does exist the threat of tropical cyclogenesis in the south Pacific Ocean near and to the east of the Solomon Islands.

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

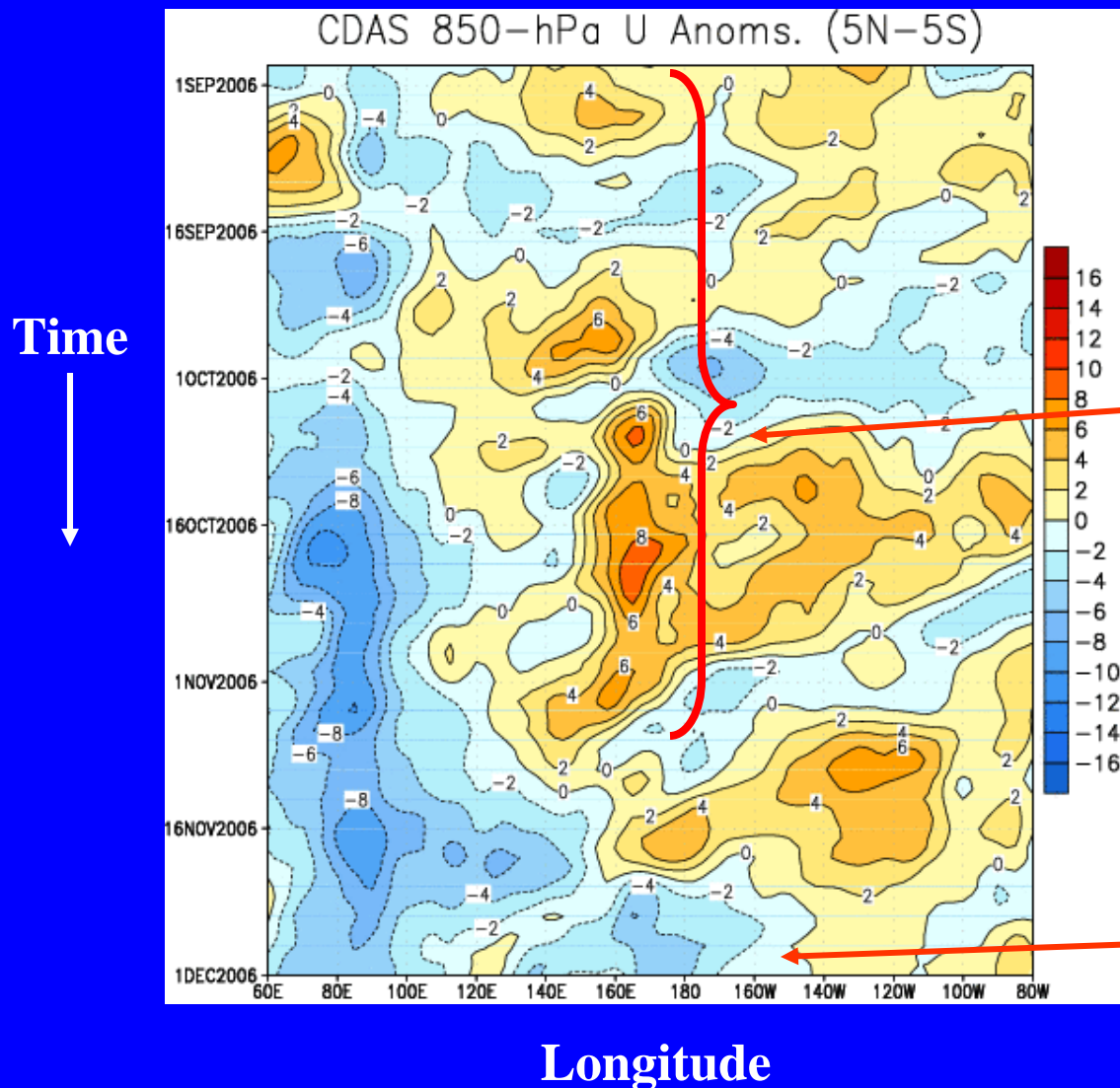
Note that shading denotes the magnitude of the anomalous wind vectors



Easterly anomalies in the Indian Ocean have weakened during the last five days.

Easterly anomalies remain across the western Pacific.

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



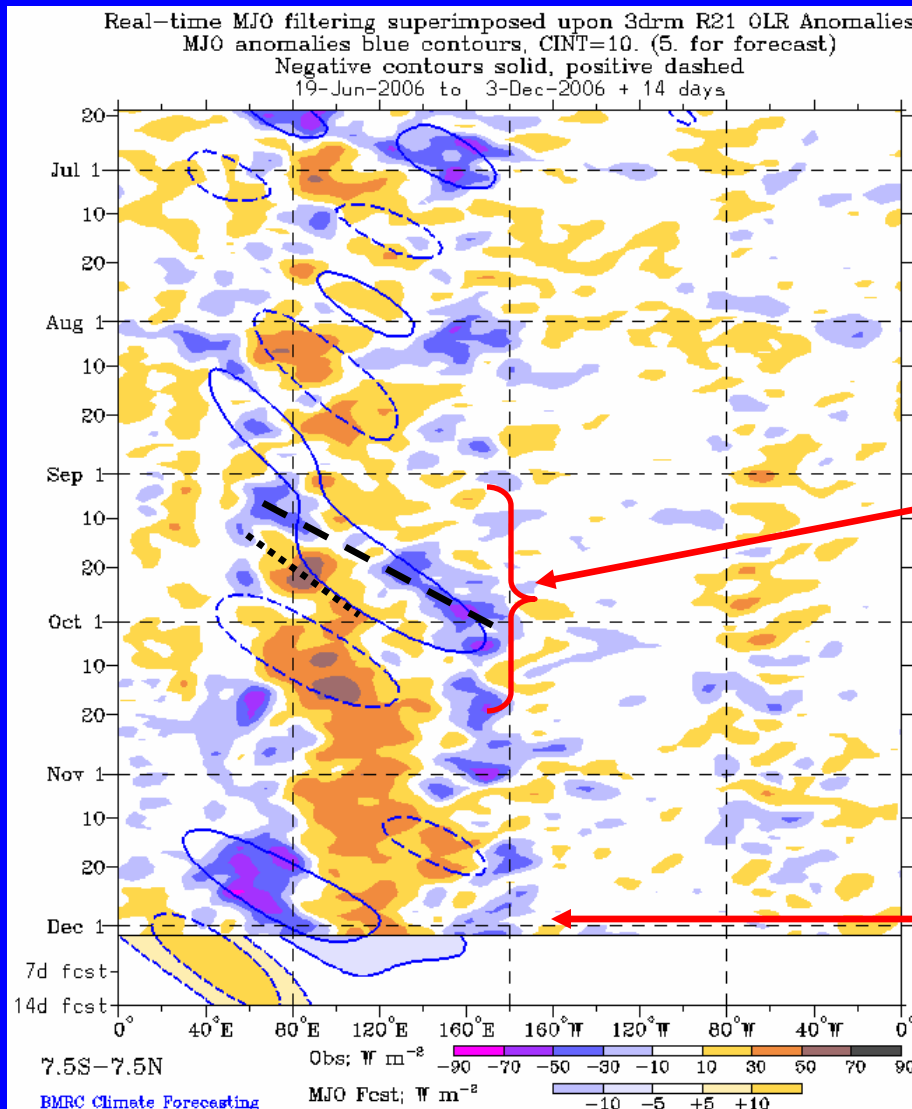
Weaker-than-average easterlies or westerlies (orange/red shading)

Stronger-than-average easterlies (blue shading)

Periods of westerly anomalies were frequent near and west of the Date Line during September, October, and early November.

Most recently, easterly anomalies have expanded eastward to near 160W.

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



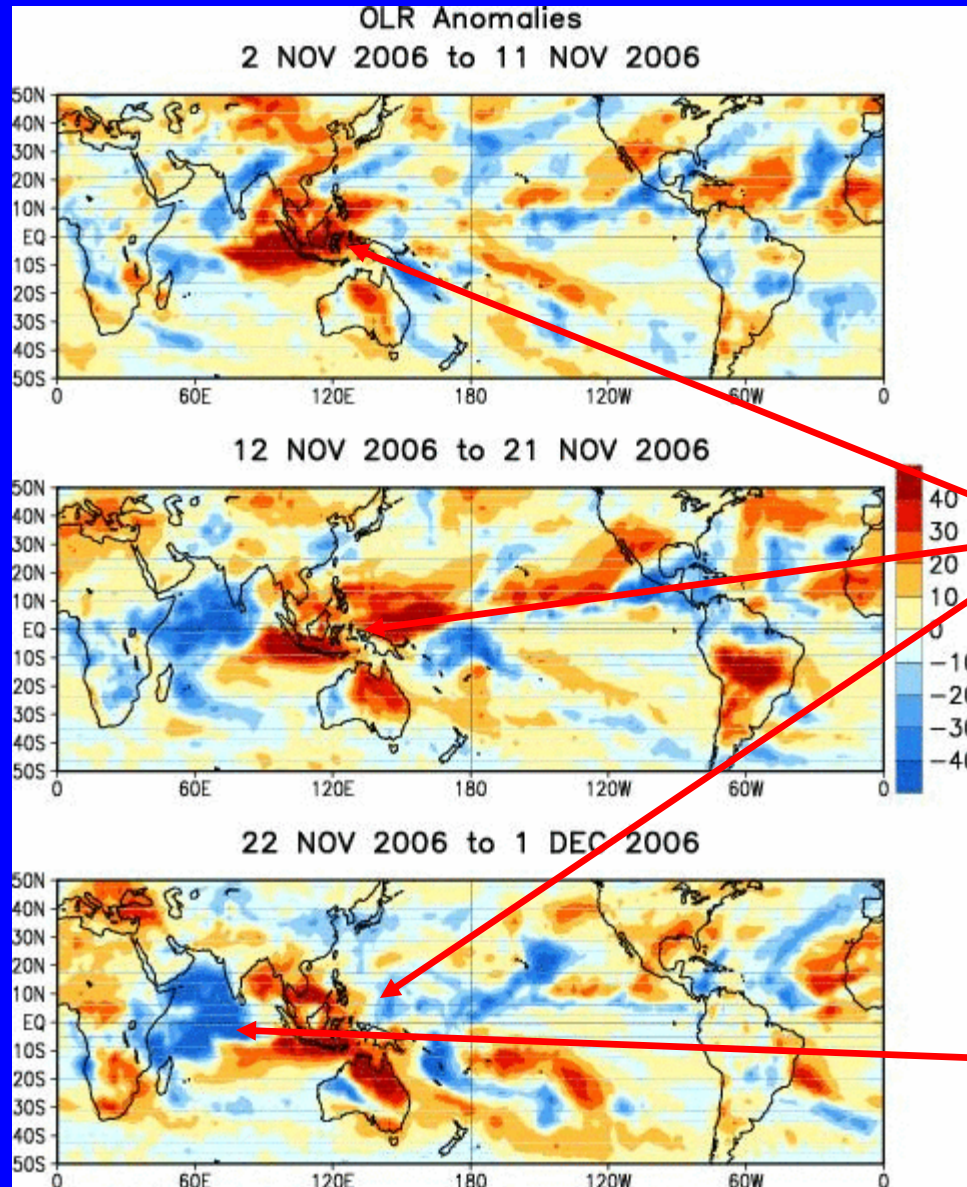
Drier-than-average conditions (/red shading)

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.

Enhanced (suppressed) convection remain across the Indian Ocean (Maritime Continent) during the past week. Also, enhanced convection has redeveloped west of the Date Line.

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 and sections of Australia throughout the period.

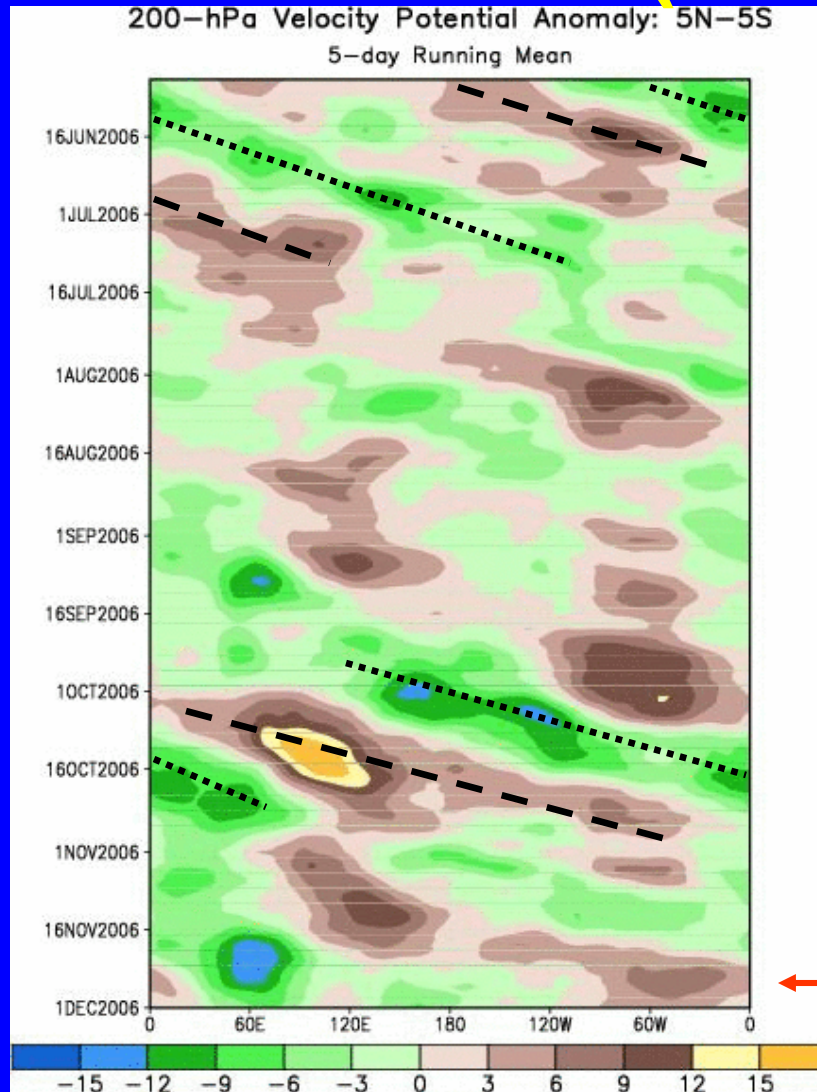
During the last twenty days, strong enhanced convection has been observed across the western Indian Ocean and Arabian Sea.

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



Weak MJO activity was evident during June and July.

The MJO was incoherent during much of August and September.

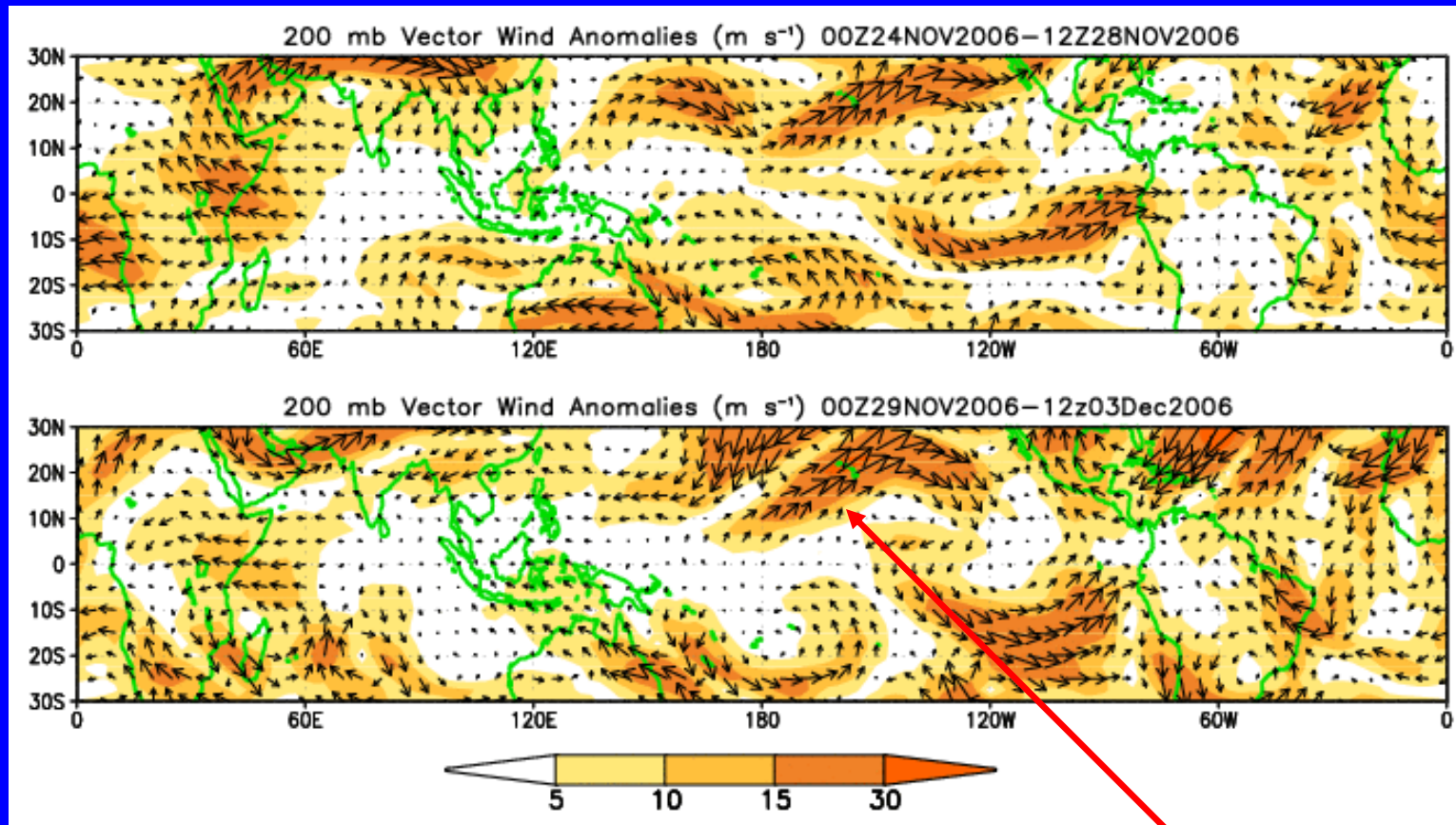
Moderate to strong MJO activity was observed from late-September to mid-October.

The MJO weakened considerably during late October and remains weak.

Longitude

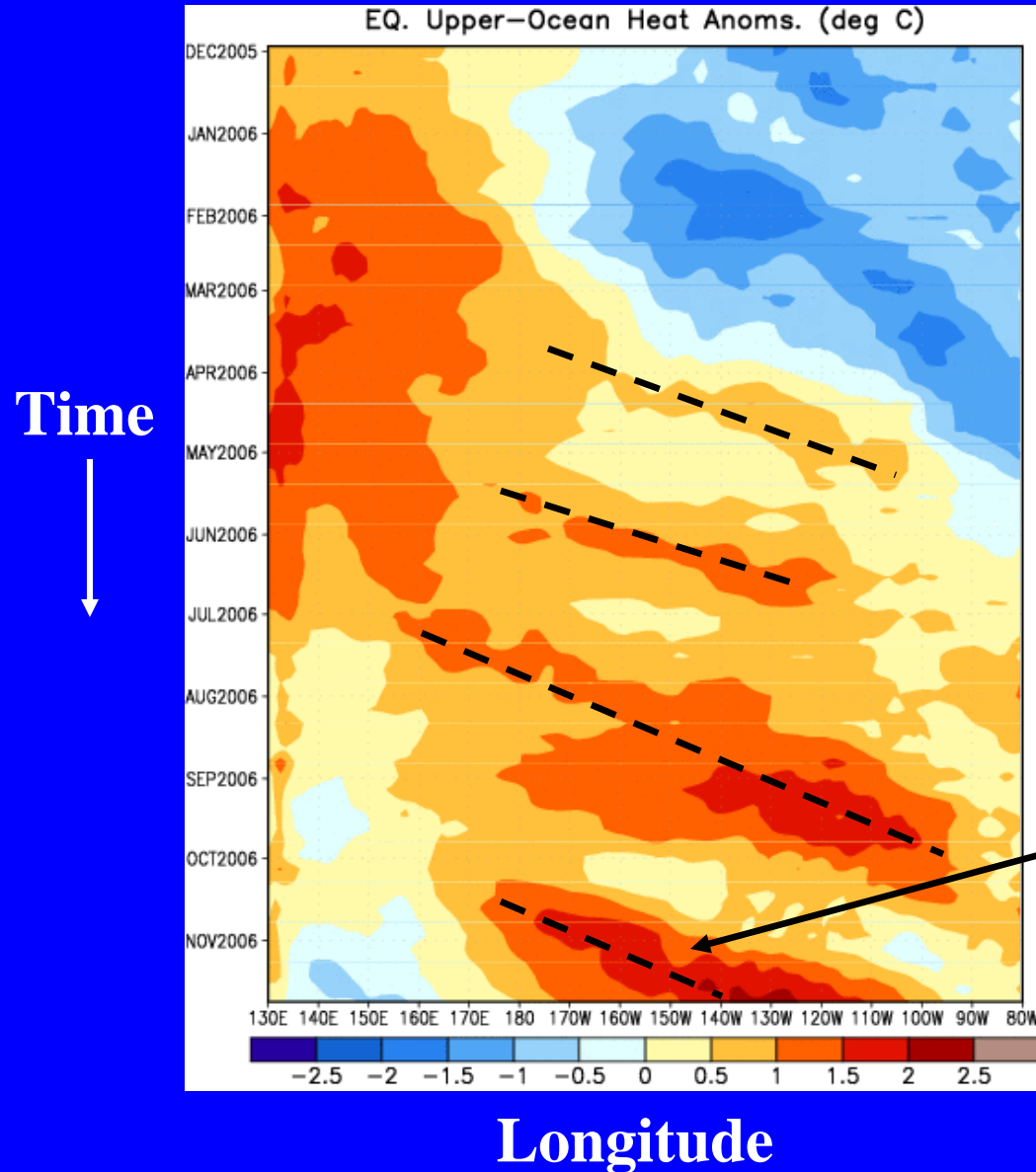
200-hPa Vector Winds and Anomalies (m s^{-1})

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



Cyclonic circulation remains in the Pacific Ocean north of the equator.

Heat Content Evolution in the Eq. Pacific



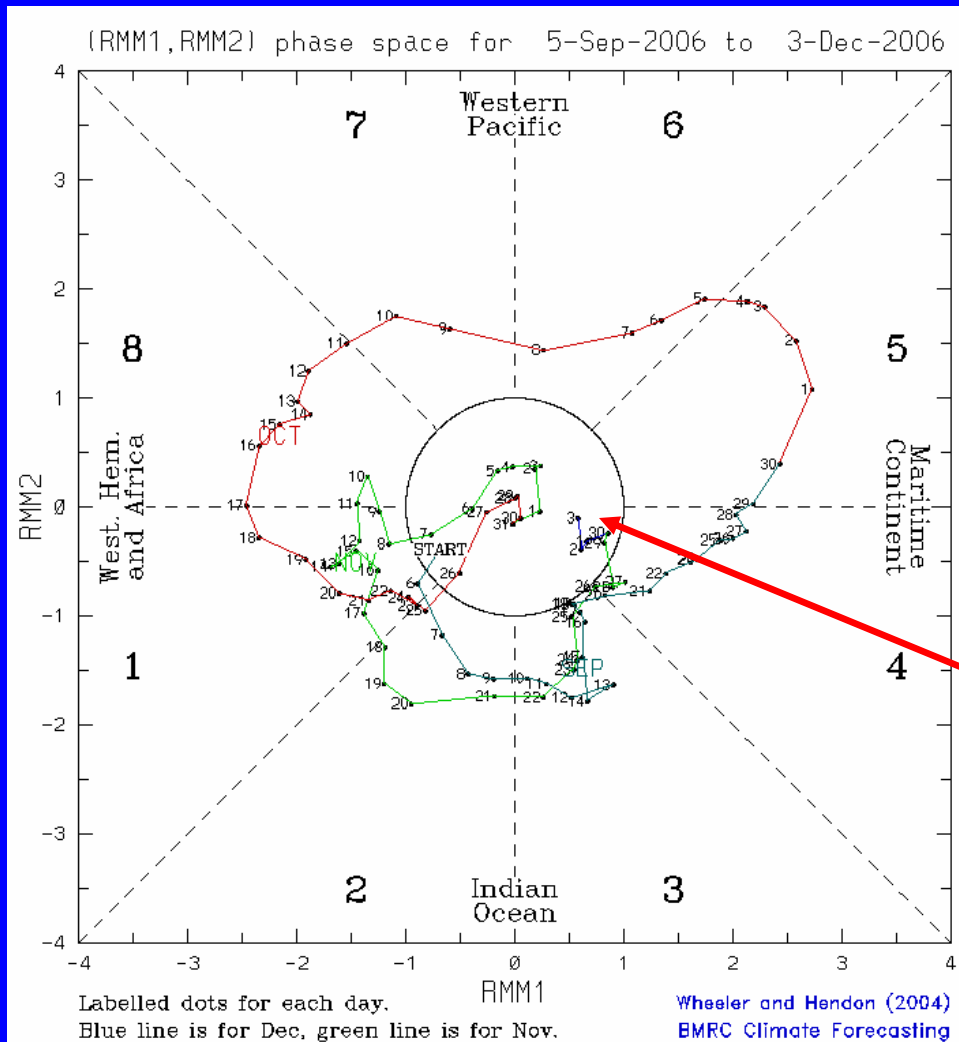
Starting in April, above normal upper oceanic water temperatures expanded from the western Pacific into the eastern Pacific in part due to Kelvin wave activity.

The latest downwelling Kelvin wave was initiated in early October and appears to be the strongest in over a year.

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).

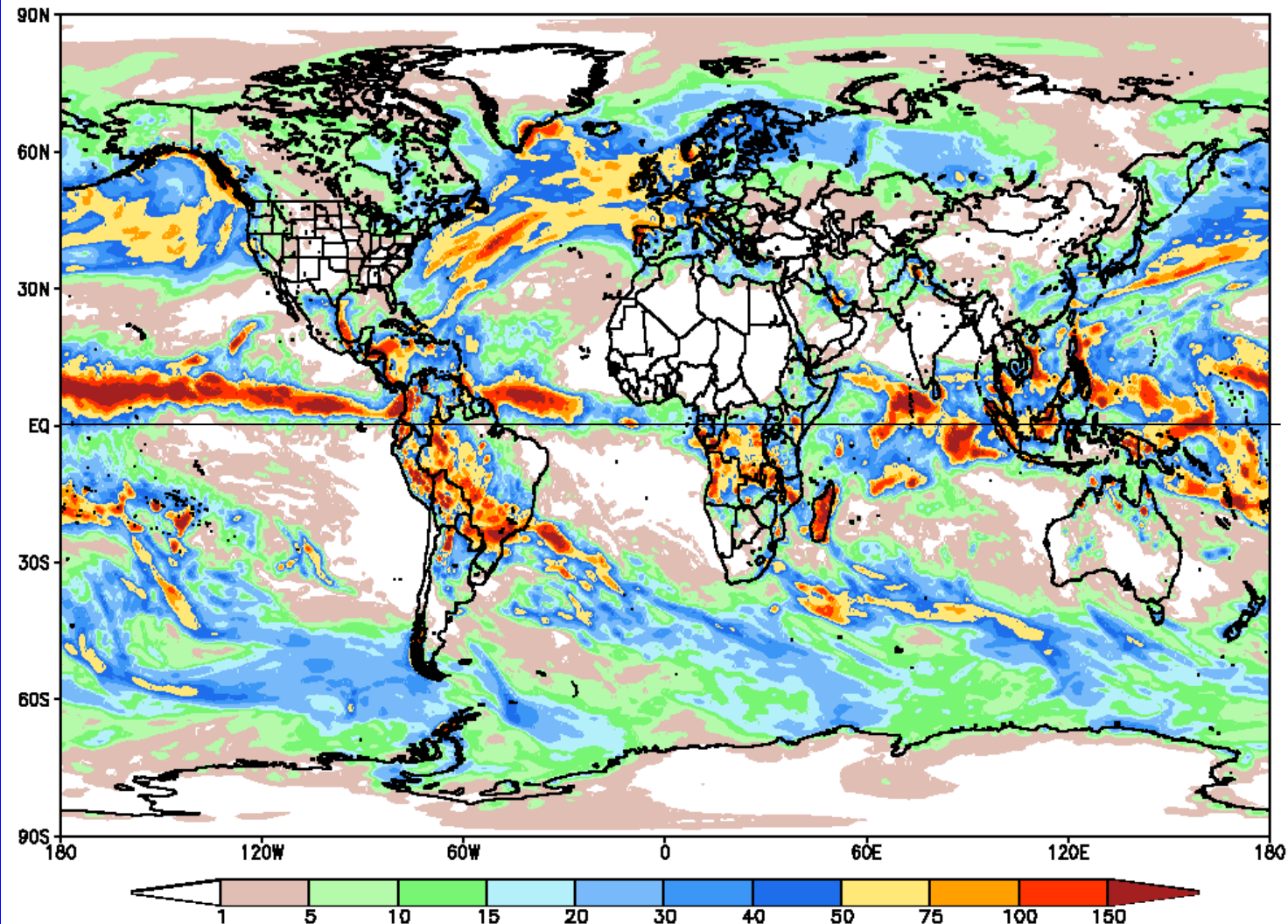
The axes represent the time series of the two leading modes of variability and are used to measure the amplitude while the triangular areas indicate the phase or location of the enhanced phase of the MJO. The farther away from the center of the circle the stronger the MJO. Different color lines indicate different months.



The MJO is currently weak.

Global Forecast System (GFS) Week 1 Precipitation Forecast

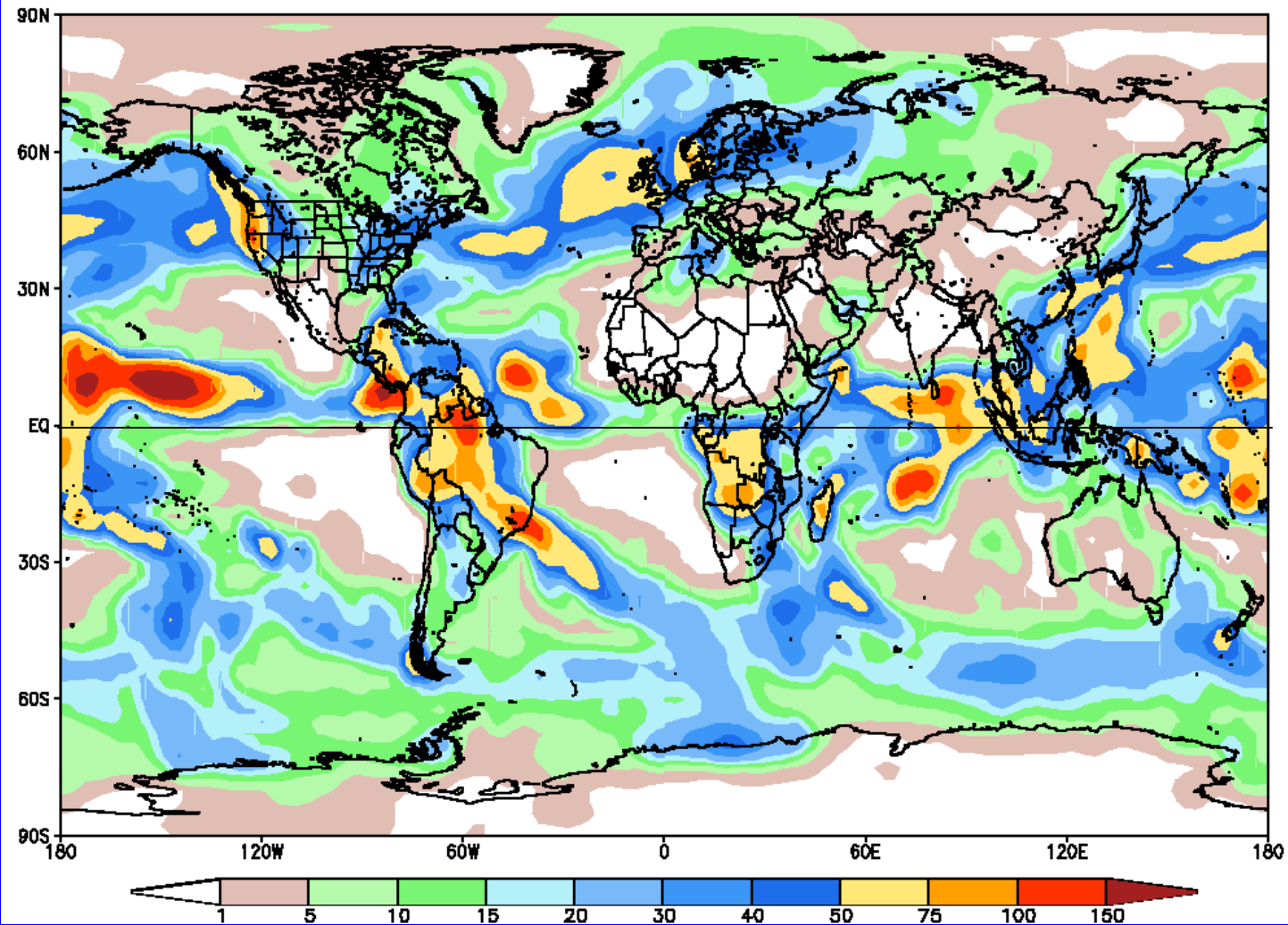
NOAA GFS 37.5 km Week 1 Total Precipitation (mm)
Issued at Dec 04 2006 00Z for the period ending at Dec 11 2006 00Z



Global Forecast System (GFS) Week 2

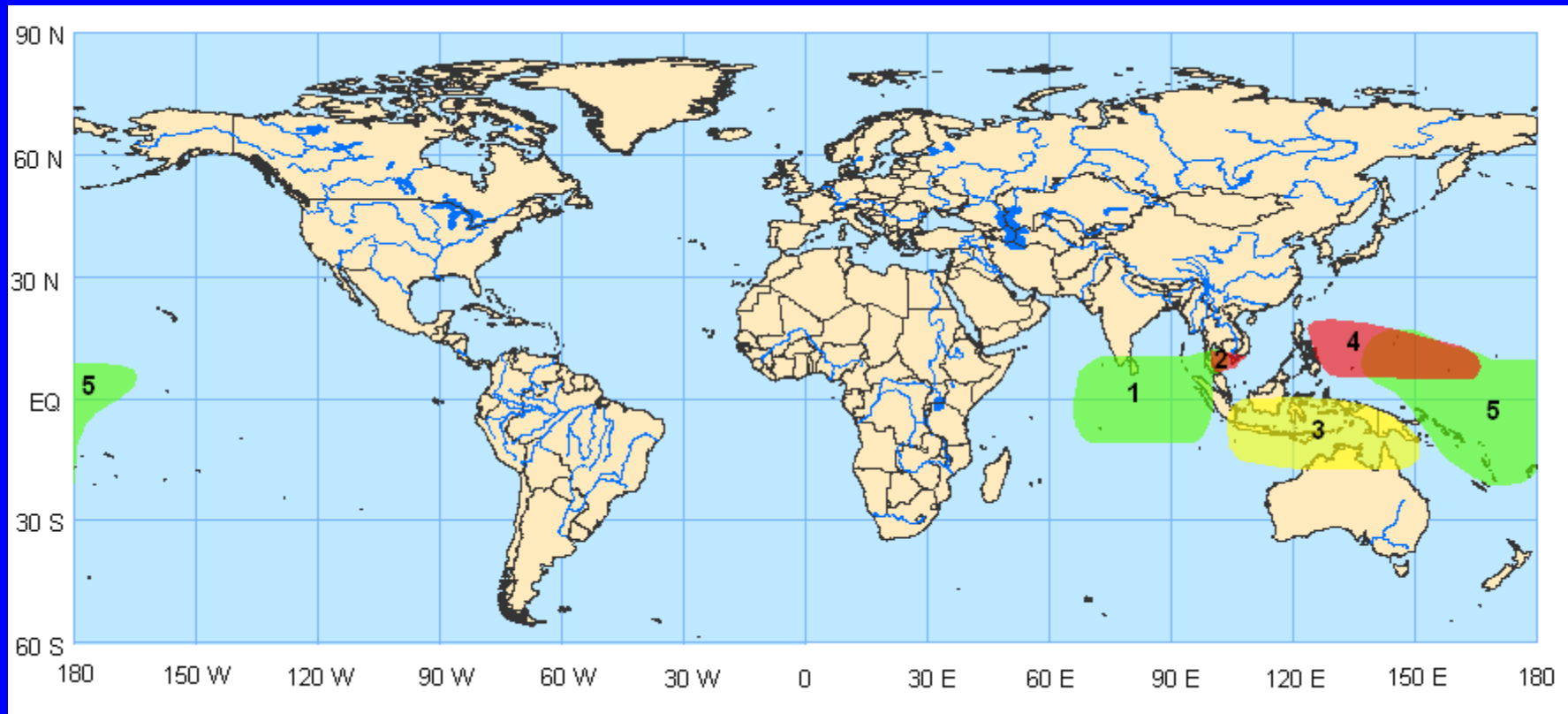
Precipitation Forecast

NOAA GFS 100 km Week 2 Total Precipitation (mm)
Issued Dec 4 2006 00Z for the period ending at Dec 17 2006 00Z



Potential Benefits/Hazards – Week 1

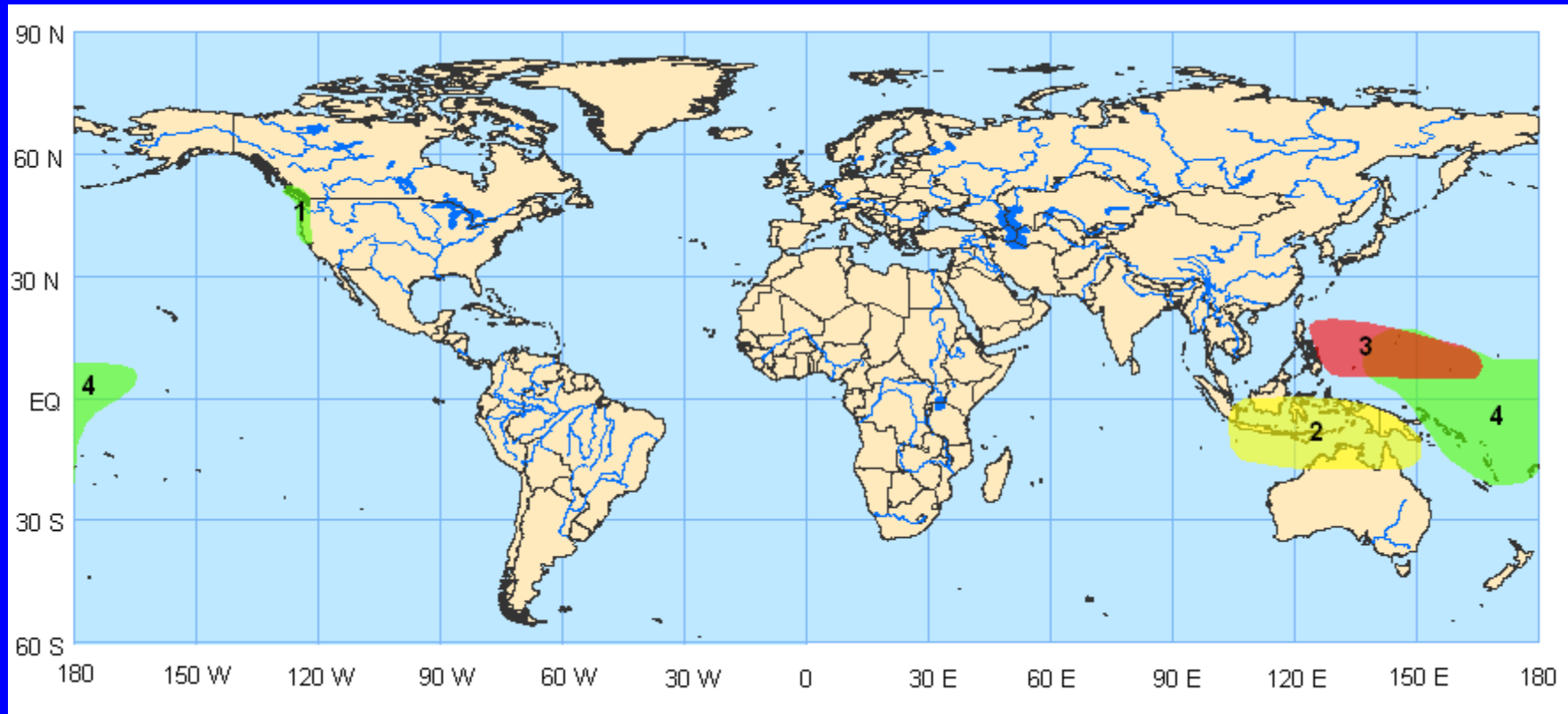
Valid December 5 – December 11, 2006



1. An increased chance for above normal rainfall for the equatorial Indian Ocean.
2. A weakening Tropical storm Dorian is expected to impact southern sections of Southeast Asia early in the period.
3. An increased chance for below normal rainfall across the southern Maritime Continent and northern Australia.
4. Favorable conditions exist for tropical cyclogenesis in the western Pacific.
5. An increased chance for above normal rainfall for sections of the western Pacific Ocean.

Potential Benefits/Hazards – Week 2

Valid December 12 –18, 2006



1. An increased chance for periods of above normal precipitation, strong winds, and heavy surf.
2. An increased chance for below normal rainfall across the southern Maritime Continent and northern Australia.
3. Favorable conditions exist for tropical cyclogenesis in the western Pacific.
4. An increased chance for above normal rainfall for sections of the western Pacific Ocean.

Summary

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