

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

**Update prepared by
Climate Prediction Center / NCEP
November 20, 2006**

Outline

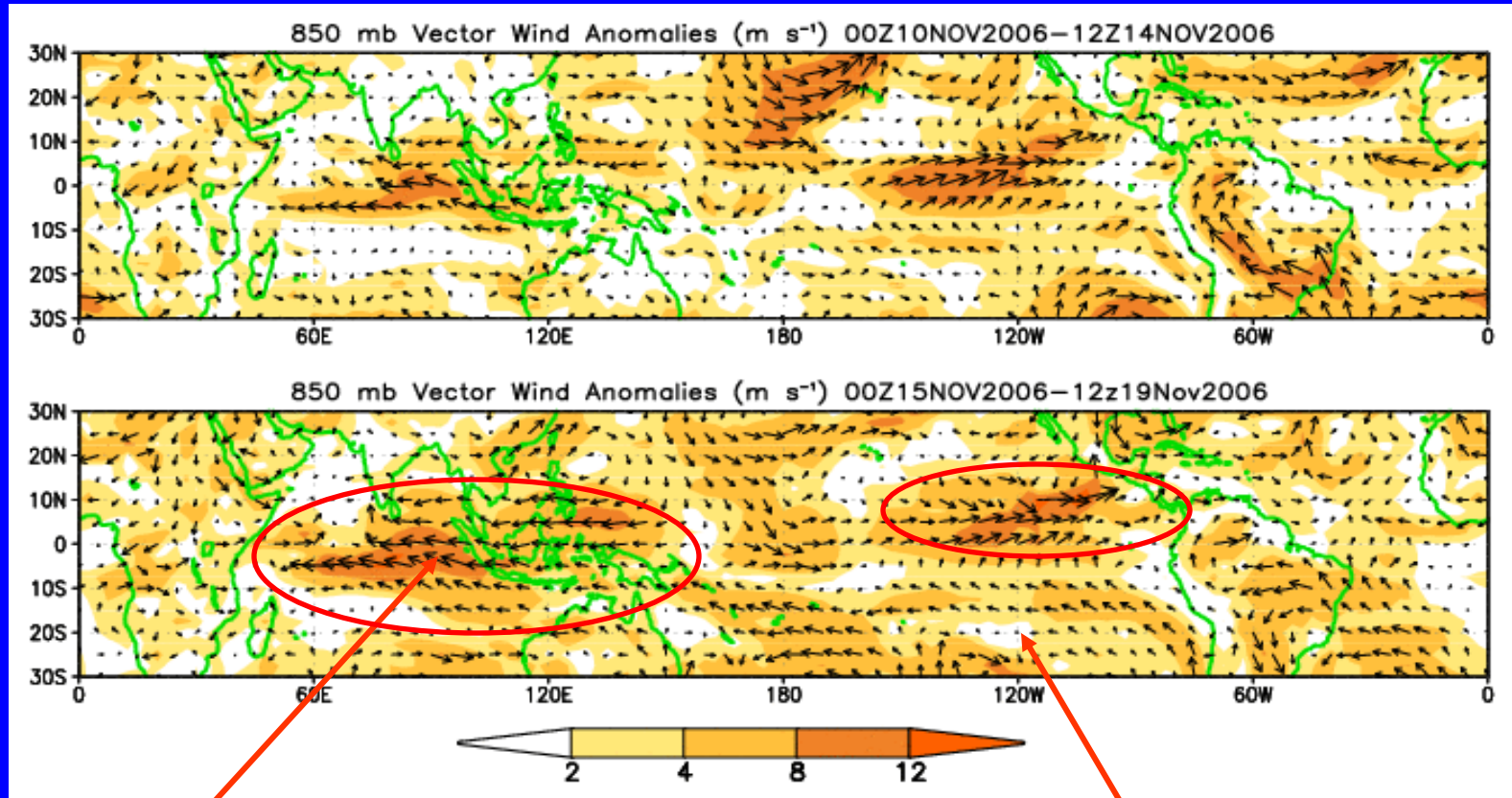
- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**

Overview

- The latest observations indicate that the MJO may once again be strengthening and needs to be closely monitored during the upcoming week.
- During week 1, wetter than normal conditions are expected for the equatorial Pacific in the vicinity of the Date Line, over portions of the Greater Horn of Africa (Kenya and Somalia), most of the equatorial Indian Ocean and the Philippines. There is an increased chance for drier than normal conditions for the Maritime Continent, surrounding waters and northern Australia.
- Storm activity is expected to produce periods of heavy rainfall, strong winds and heavy surf for the US Pacific Northwest and sections of the eastern US and western Atlantic.
- During week 2, wet conditions are expected to continue for sections of the Indian Ocean, the Philippines, and the western Pacific Ocean while dry conditions will persist across much of the Maritime Continent.
- Although less likely, there does exist the potential for above average rainfall across northern South America and for tropical cyclogenesis in the western Indian Ocean south of the equator.

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

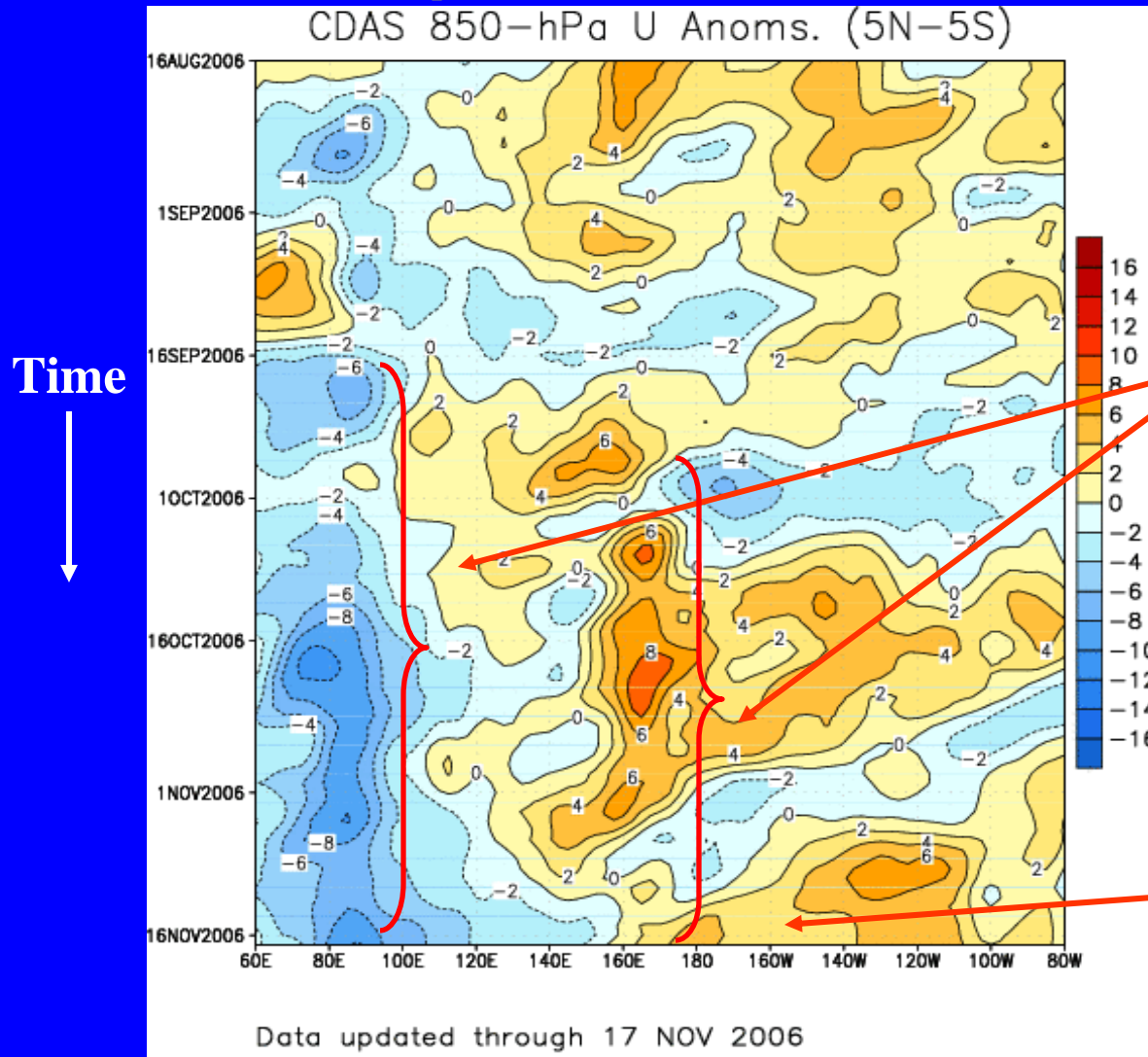
Note that shading denotes the magnitude of the anomalous wind vectors



Easterly anomalies across the Indian Ocean and Maritime Continent have strengthened.

Westerly anomalies have persisted in the eastern Pacific.

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



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

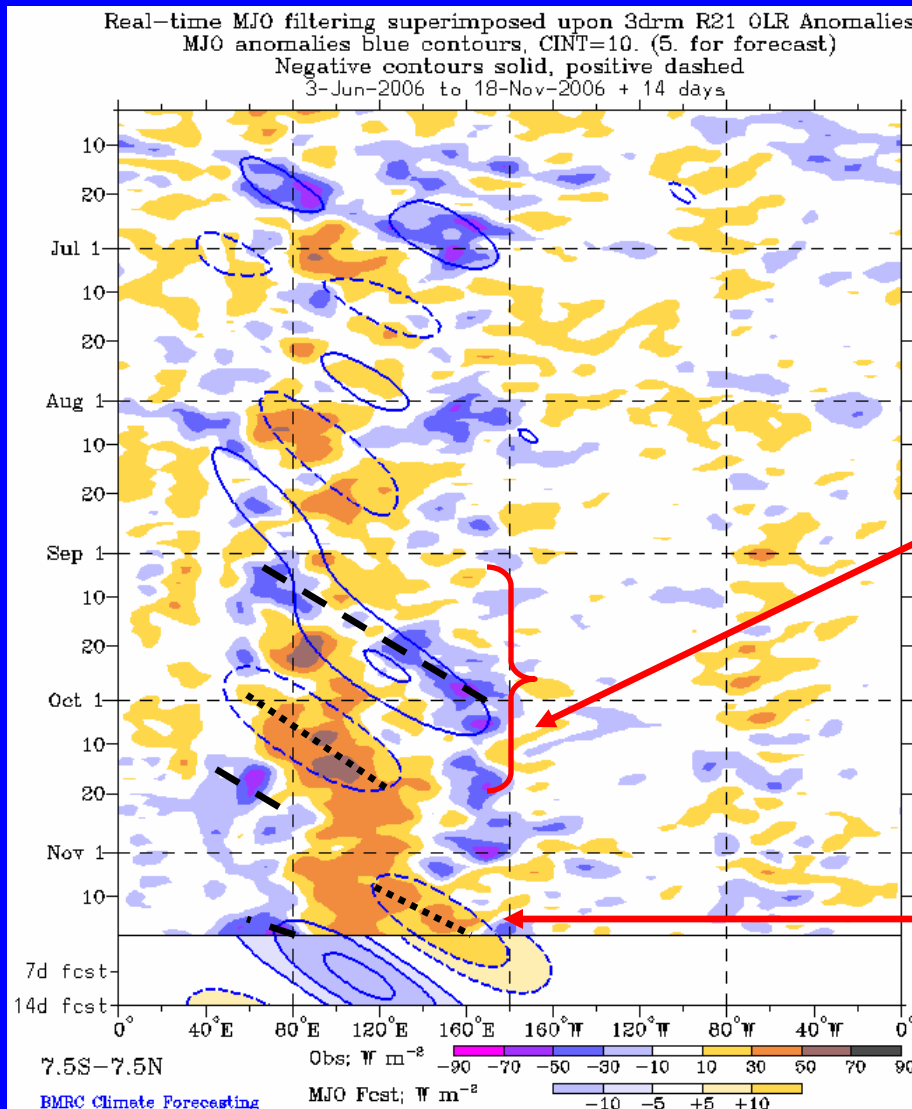
Stronger-than-average easterlies (blue shading)

Easterly anomalies in the Indian Ocean continued to persist and have shifted eastward. Westerly anomalies west of the Date Line have weakened.

Recently, westerly anomalies along the equator have expanded westward.

Longitude

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



Time
 ↓

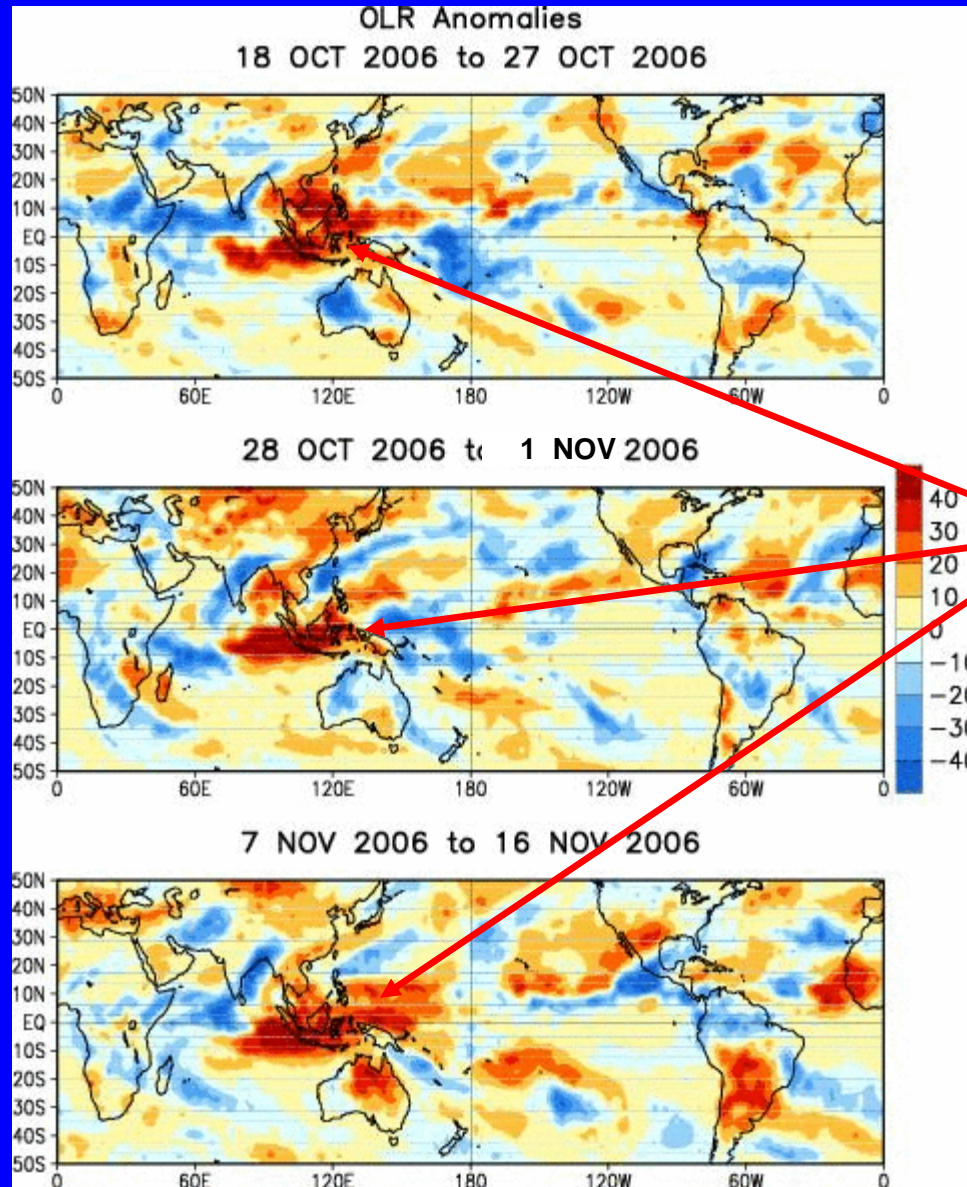
Drier-than-average conditions (/red shading)
 Wetter-than-average conditions (blue shading)

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, enhanced (suppressed) convection is located across the Indian Ocean (Maritime Continent).

Longitude

Anomalous OLR: Last 30 days



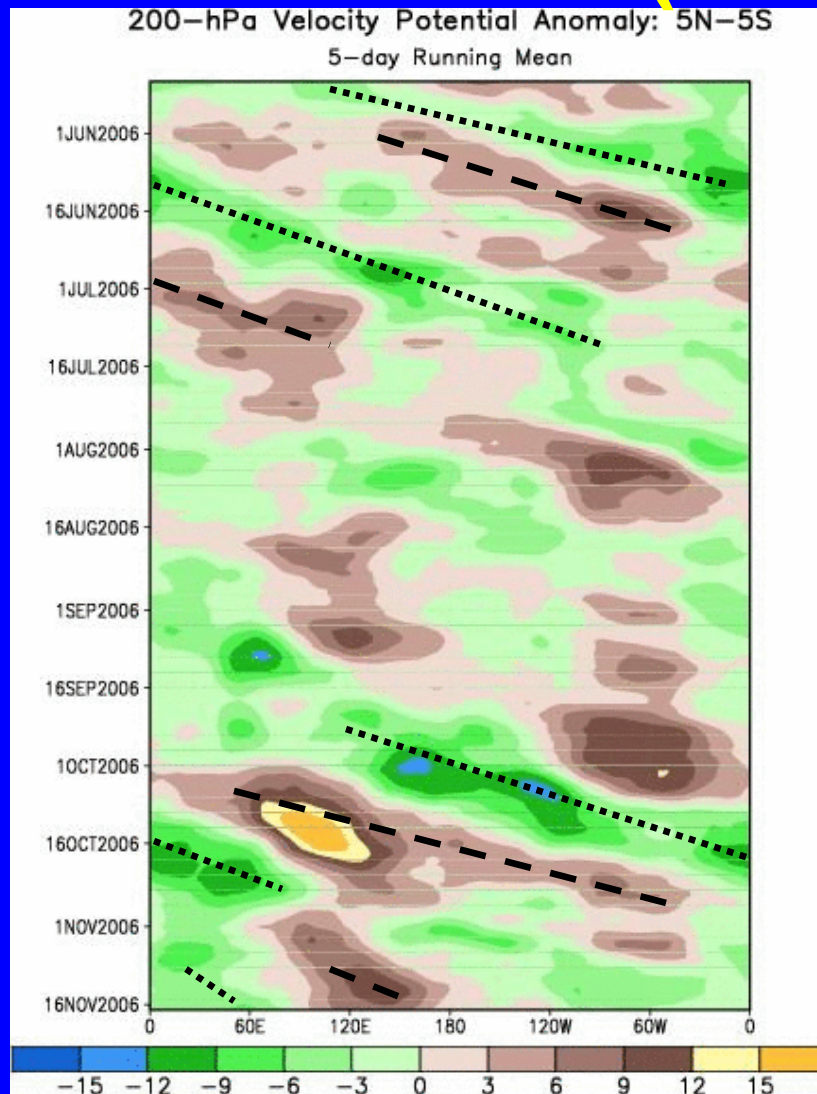
Drier-than-average conditions (red shading)
Wetter-than-average conditions (blue shading)

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

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



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

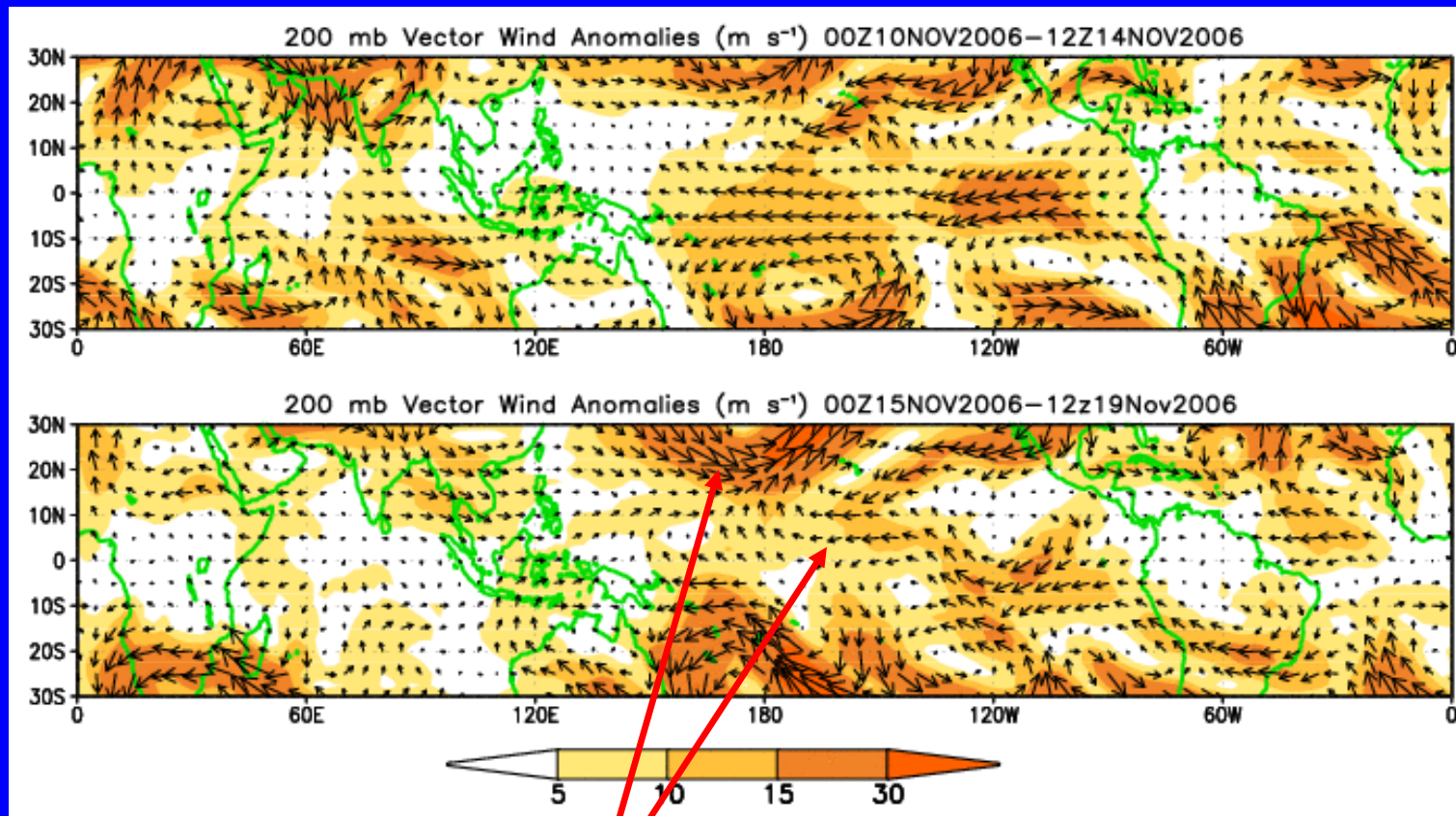
Moderate to strong MJO activity was observed from late-September to mid-October.

Recently, the MJO has shown signs of strengthening.

Longitude

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

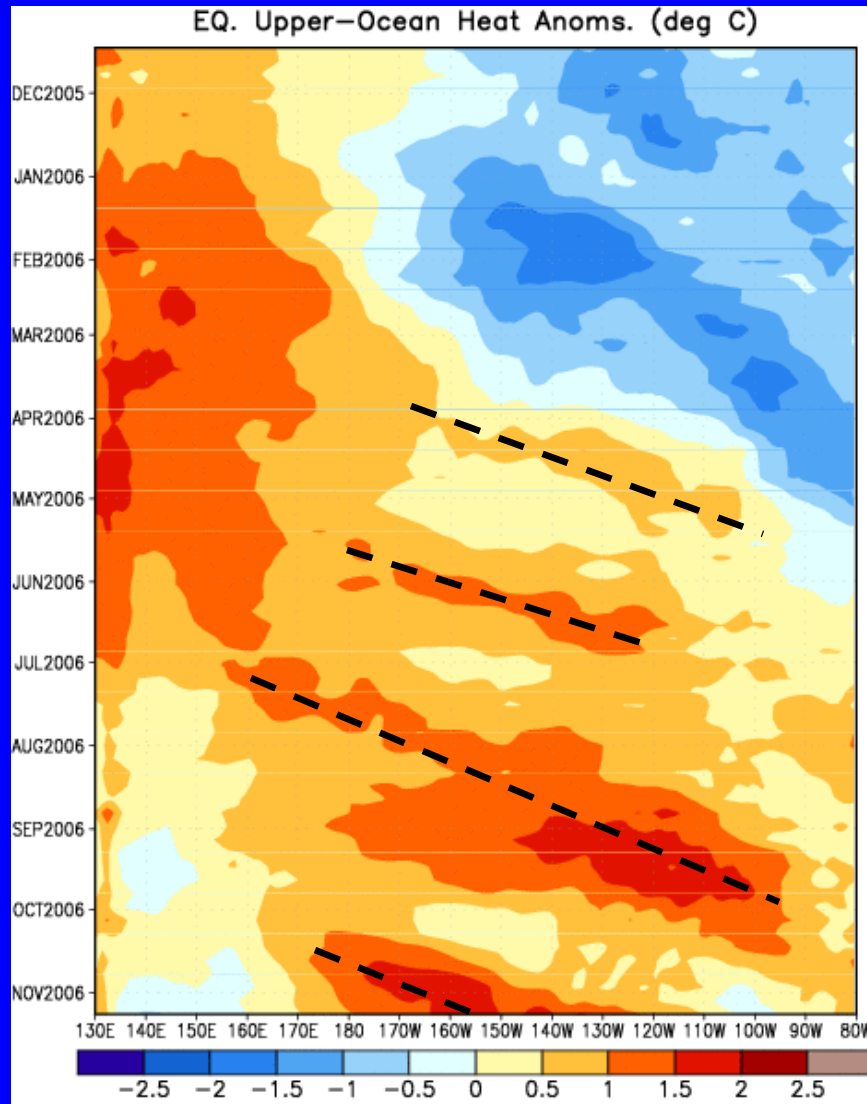
Note that shading denotes the magnitude of the anomalous wind vectors.



Easterly anomalies have weakened across much of the Pacific Ocean. An upper level trough over the north central Pacific remains.

Heat Content Evolution in the Eq. Pacific

Time



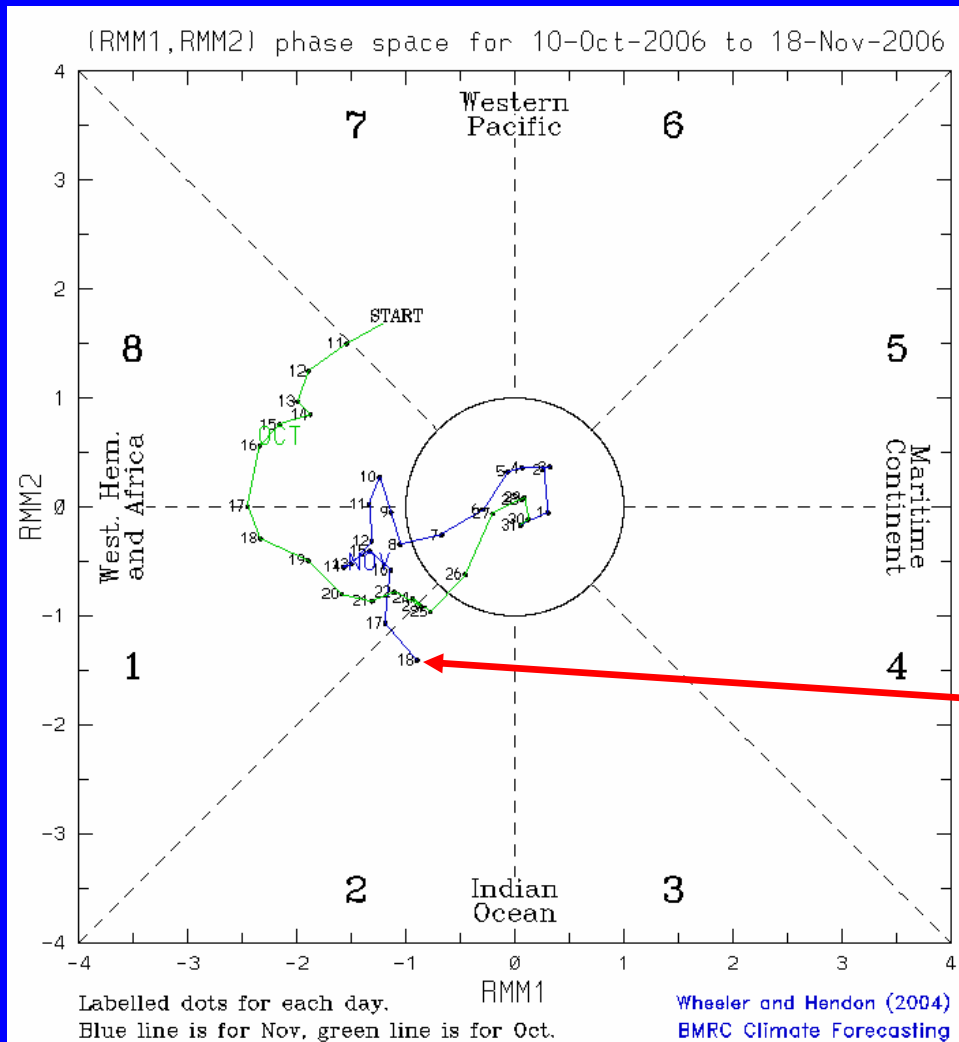
Longitude

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)

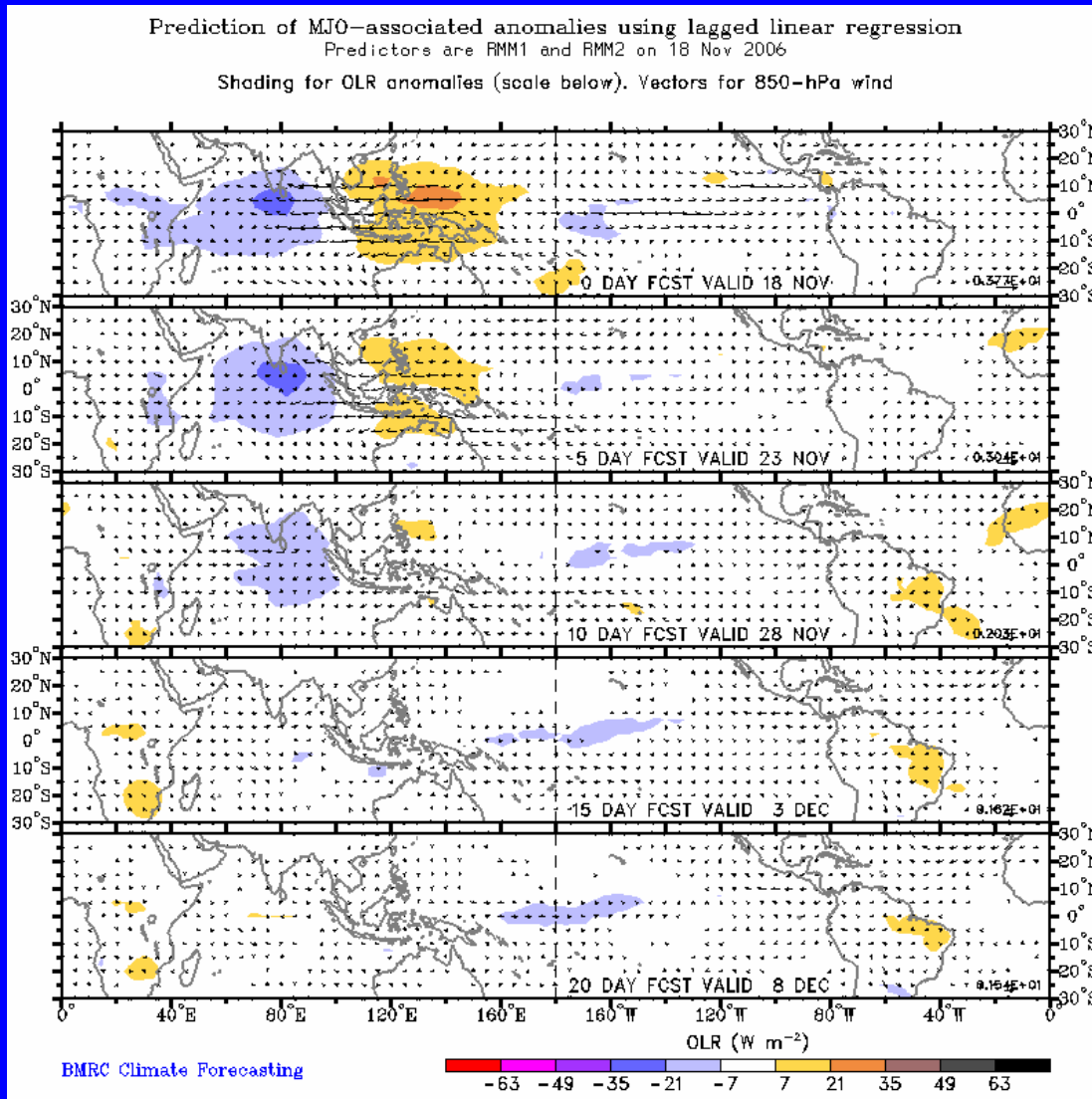
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850 hPa zonal wind, 200 hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

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 in recent days.

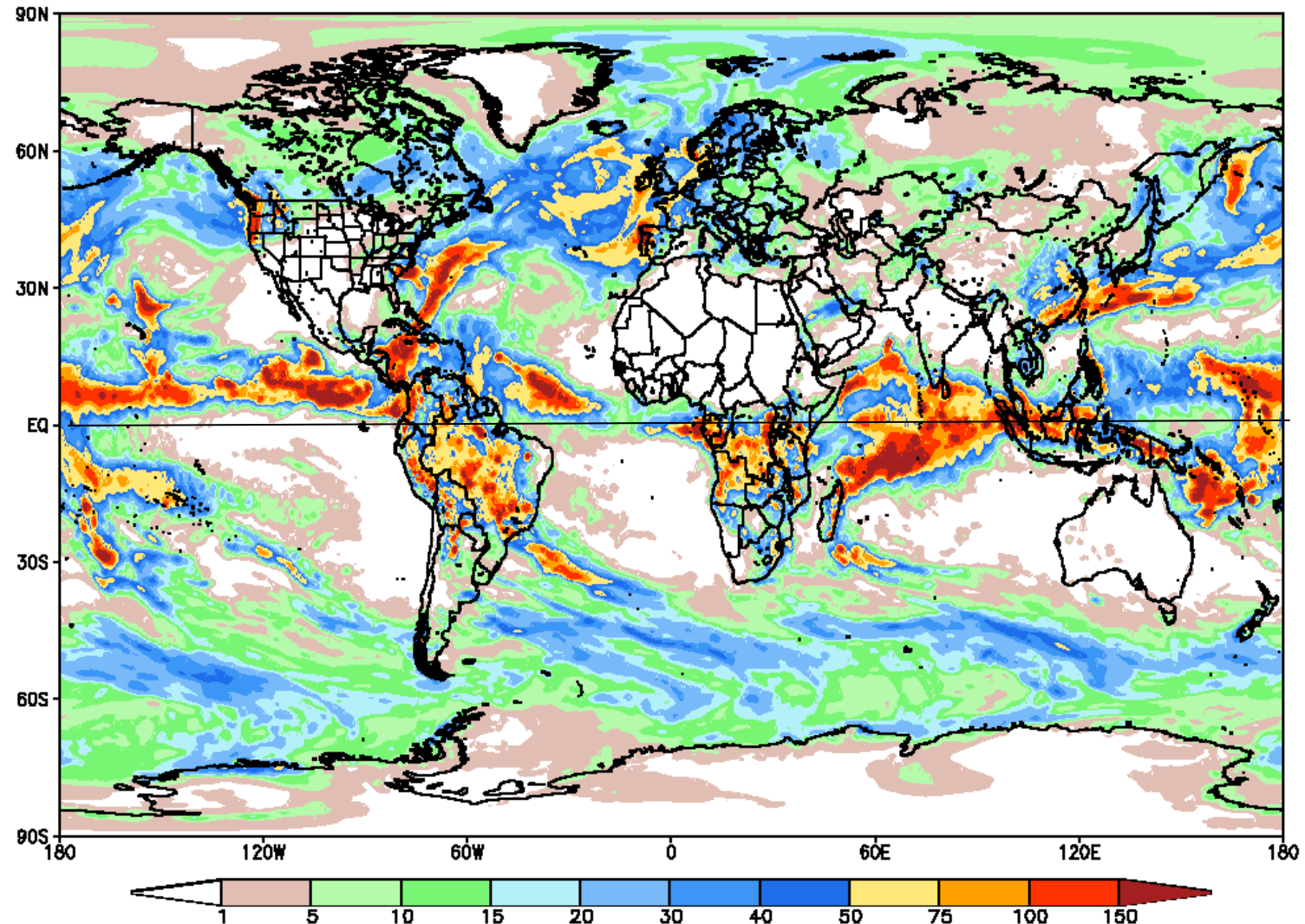
Statistical OLR MJO Forecast



The MJO forecast indicates wet (dry) conditions across the Indian Ocean (Maritime Continent) during the next ten days.

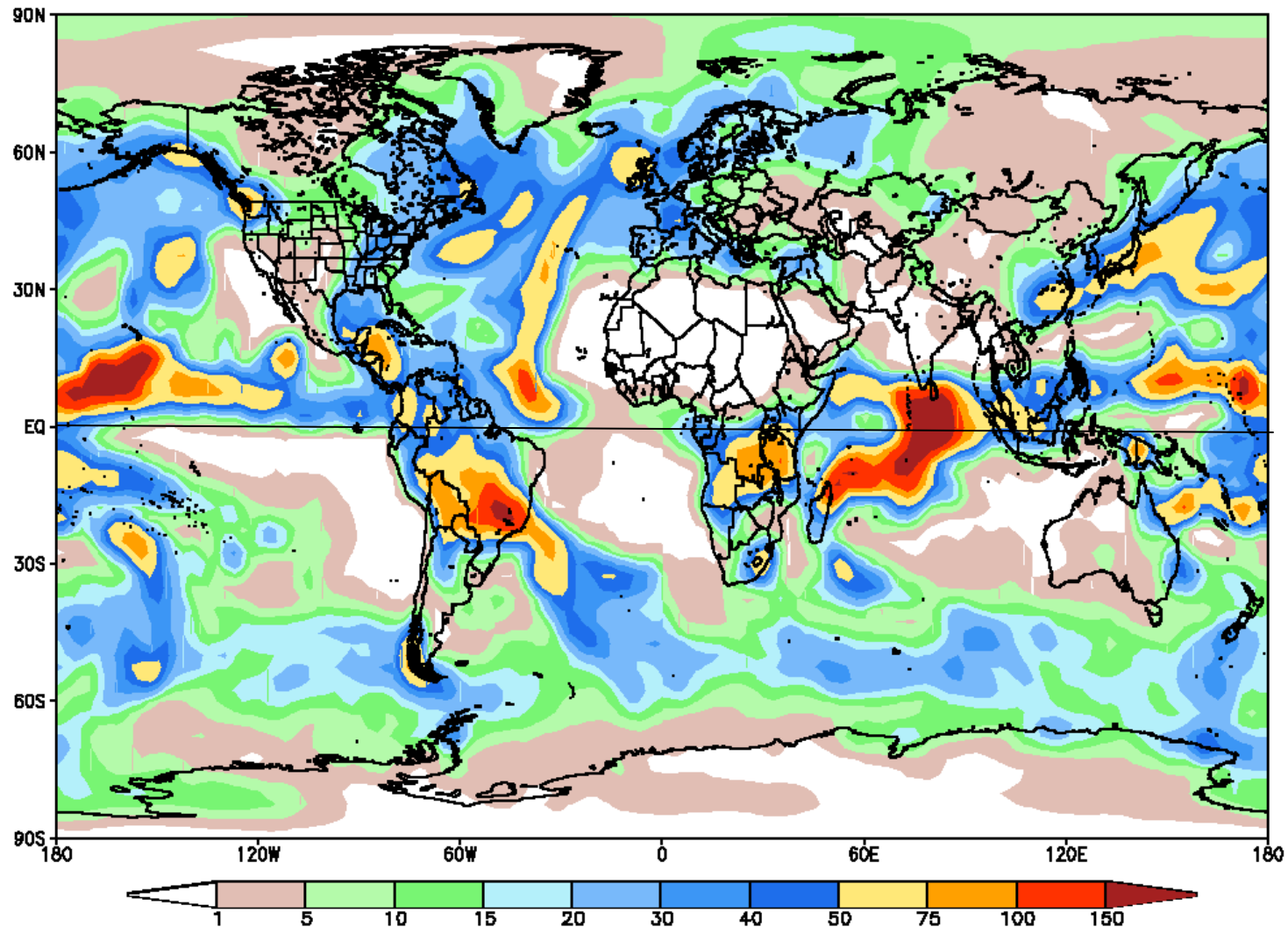
Global Forecast System (GFS) Week 1 Precipitation Forecast

NOAA GFS 37.5 km Week 1 Total Precipitation (mm)
Issued at Nov 20 2006 00Z for the period ending at Nov 27 2006 00Z



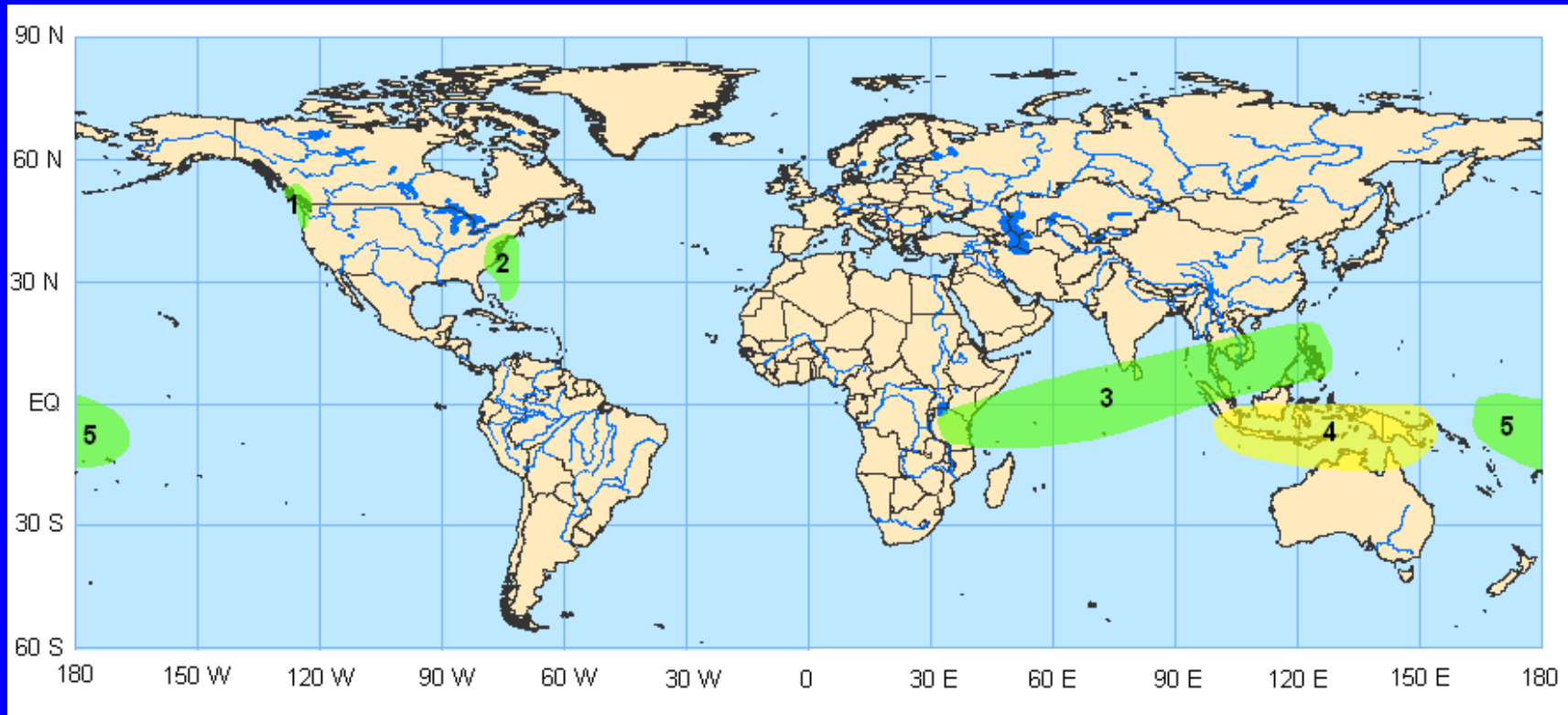
Global Forecast System (GFS) Week 2 Precipitation Forecast

NOAA GFS 100 km Week 2 Total Precipitation (mm)
Issued Nov 20 2006 00Z for the period ending at Dec 3 2006 00Z



Potential Benefits/Hazards – Week 1

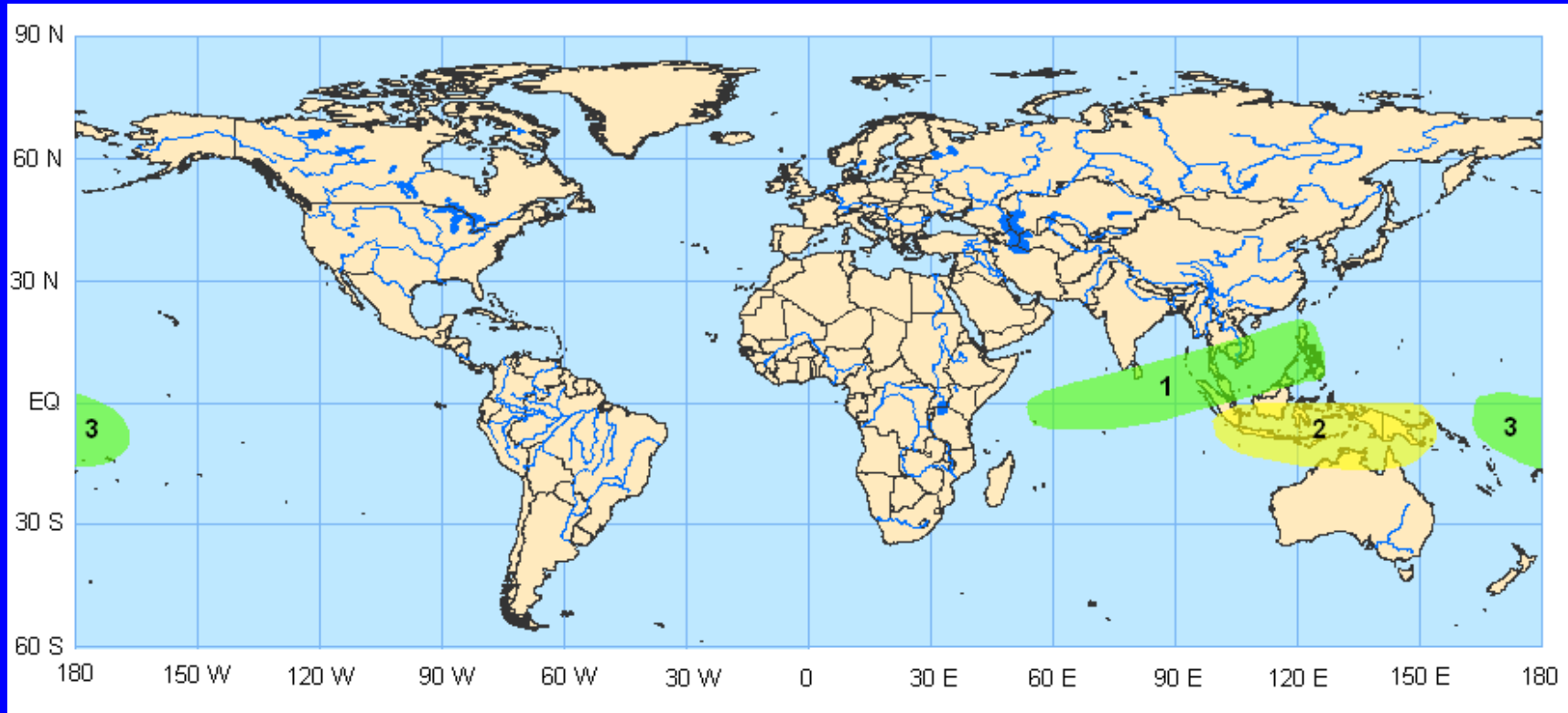
Valid November 21 – November 27, 2006



1. Periods of heavy rainfall, strong winds and heavy surf early in the period for the US Pacific northwest and western Canada
2. An increased chance for above normal rainfall for sections of the eastern US and western Atlantic Ocean. Heavy surf and beach erosion possible.
3. An increased chance for above normal rainfall for sections of equatorial eastern Africa, the Indian Ocean, Southeast Asia and the Philippines.
4. An increased chance for below normal rainfall across the southern Maritime Continent and northern Australia.
5. An increased chance for above normal rainfall for sections of the equatorial western Pacific Ocean near the Date Line.

Potential Benefits/Hazards – Week 2

Valid November 28 – December 4, 2006



1. An increased chance for above normal rainfall for sections of the Indian Ocean, Southeast Asia and the Philippines.
2. An increased chance for below normal rainfall across the southern Maritime Continent and northern Australia.
3. An increased chance for above normal rainfall for sections of the equatorial western Pacific Ocean near the Date Line.

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