

# Operational Perspective on MJO Prediction

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# Outline

- Joys of operational MJO forecasting, tools of the past
- CLIVAR MJO Index Predictions
- MJO onset in January 2009
- MJO onset in September 2008

# Assessment Products



## Madden-Julian Oscillation: Recent Evolution, Current Status and Prediction



### Overview

- The MJO is showing signs of strengthening with the enhanced phase centered across the western Pacific.
- Based on MJO model forecasts, the MJO is expected to strengthen during the next 1-2 weeks with the enhanced phase shifting eastward from the western Pacific to near Africa by the end of the period.
- The MJO is expected to contribute to dry conditions for northeast Brazil and decrease rainfall seen in recent weeks associated with La Nina across portions of Indonesia. Above-average rainfall is also expected in vicinity of the South Pacific Islands along with an increased threat for tropical cyclogenesis in the Southwest Pacific.
- The MJO may contribute to an extension of the Pacific Jet during late Week 2 leading to heightened chances for precipitation along portions of US West coast.

Additional potential impacts across the global tropics are available at:  
<http://www.cpc.ncep.noaa.gov/products/precip/CWlink/g hazards/g hazards.shtml>

Update prepared by  
Climate Prediction Center/  
December 3, 2007

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### Weekly Tropical Climate Note

at 1300 CST Tuesday 5 August 2008

**Intra-Seasonal Patterns**  
Following the last southern hemisphere summer, the central tropical Indian Ocean has seen the development of three active phases of the Madden-Julian Oscillation (MJO), evidenced by tropical convection increasing in vigour and extent over that region. These events occurred around mid March, mid April and late May. The March event had a weak signal as it progressed across the longitudes of the Maritime Continent, with little apparent impact over much of northern Australia. Active convection associated with the April event lingered about the western Pacific until the middle of May. See:  
[http://www.bom.gov.au/bmrc/clfor/cfstaff/matw/maproom/OLR\\_modes/h.6.MJO.EQ.html](http://www.bom.gov.au/bmrc/clfor/cfstaff/matw/maproom/OLR_modes/h.6.MJO.EQ.html)  
<http://www.bom.gov.au/bmrc/clfor/cfstaff/matw/maproom/RMM/phase.Last90days.html>  
 The MJO associated pulse of active convection that progressed into the equatorial Indian Ocean around late May to early June displayed slow eastward progression over the northern tropical latitudes and contributed to the onset and progress of the Indian Monsoon. The northern hemisphere monsoon remained active over

CPC Weekly MJO Update

ABOM Weekly  
Tropical Climate Note

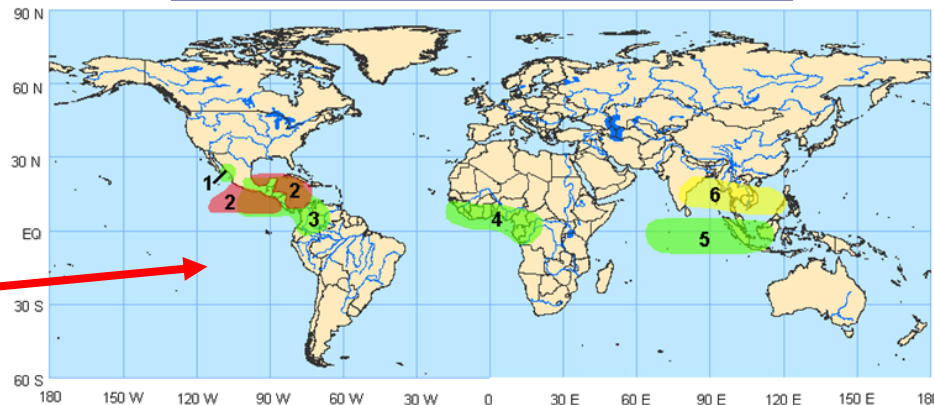
CPC Weekly GTH Assessment

## Global Tropics Hazards/Benefits Assessment - Climate Prediction Center - Issued: 10/6/2008



Product issued once per week with no updates. Conditions are subject to change after issuance time and before next outlook.  
 Product targets broad scale conditions integrated over a 7 day period for US interests only. Please also consult your local responsible forecast agency.

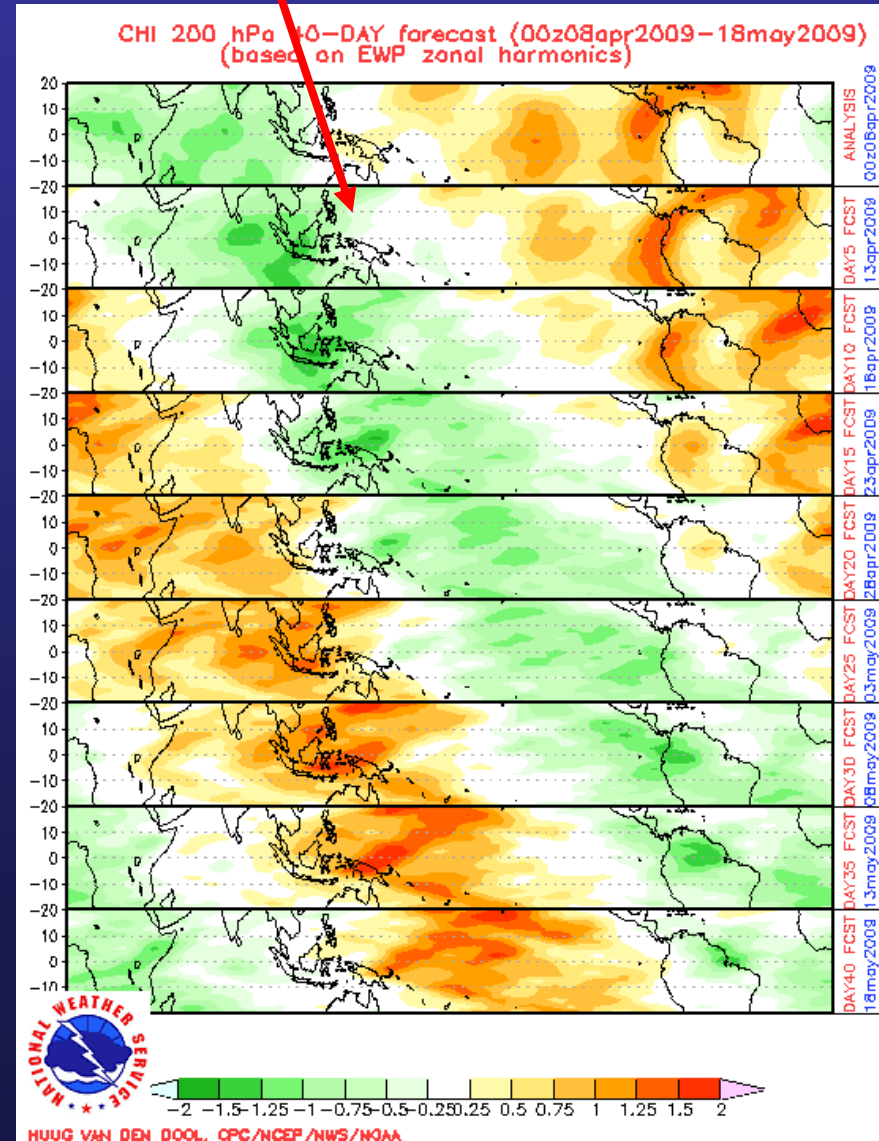
### Week 1 Outlook - Valid: October 7 - 13, 2008



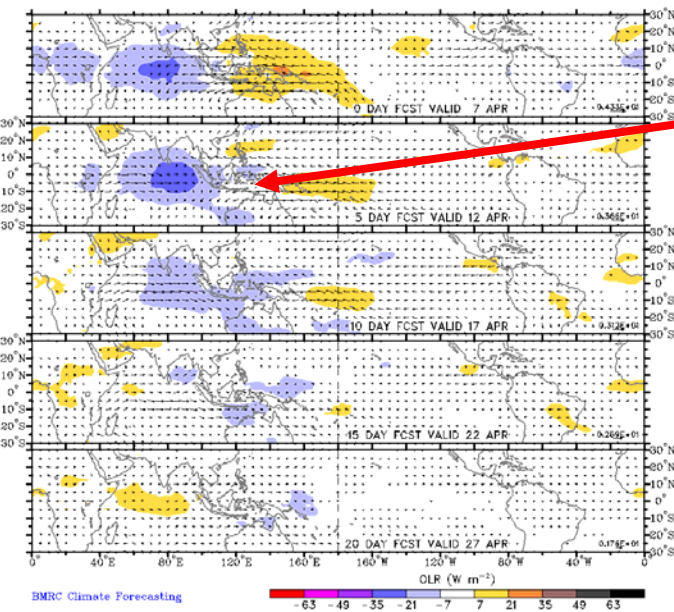
# Some Statistical Tools

- Monitoring continues to be an important component of the forecast
- Statistical model benefits have peaked and offer little practical use
- MJO composites

## Empirical Wave Propagation



Prediction of MJO-associated anomalies using lagged linear regression  
Predictors are RMM1 and RMM2 on 7 Apr 2009  
Shading for OLR anomalies (scale below). Vectors for 850-hPa wind



Lagged  
Regression

# The Future is Bright: CLIVAR MJOWG Forecasts

[http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/clivar\\_wh.shtml](http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/clivar_wh.shtml)

- 9 participating centers sending data to CPC in realtime

- 14 unique data streams

**NCEP, UKMET, ECMWF, Australian BOM, CMC, Brazil CPTC, JMA, (IMD and KMA planned)**

- Data includes:

- Operational runs

- Ensembles

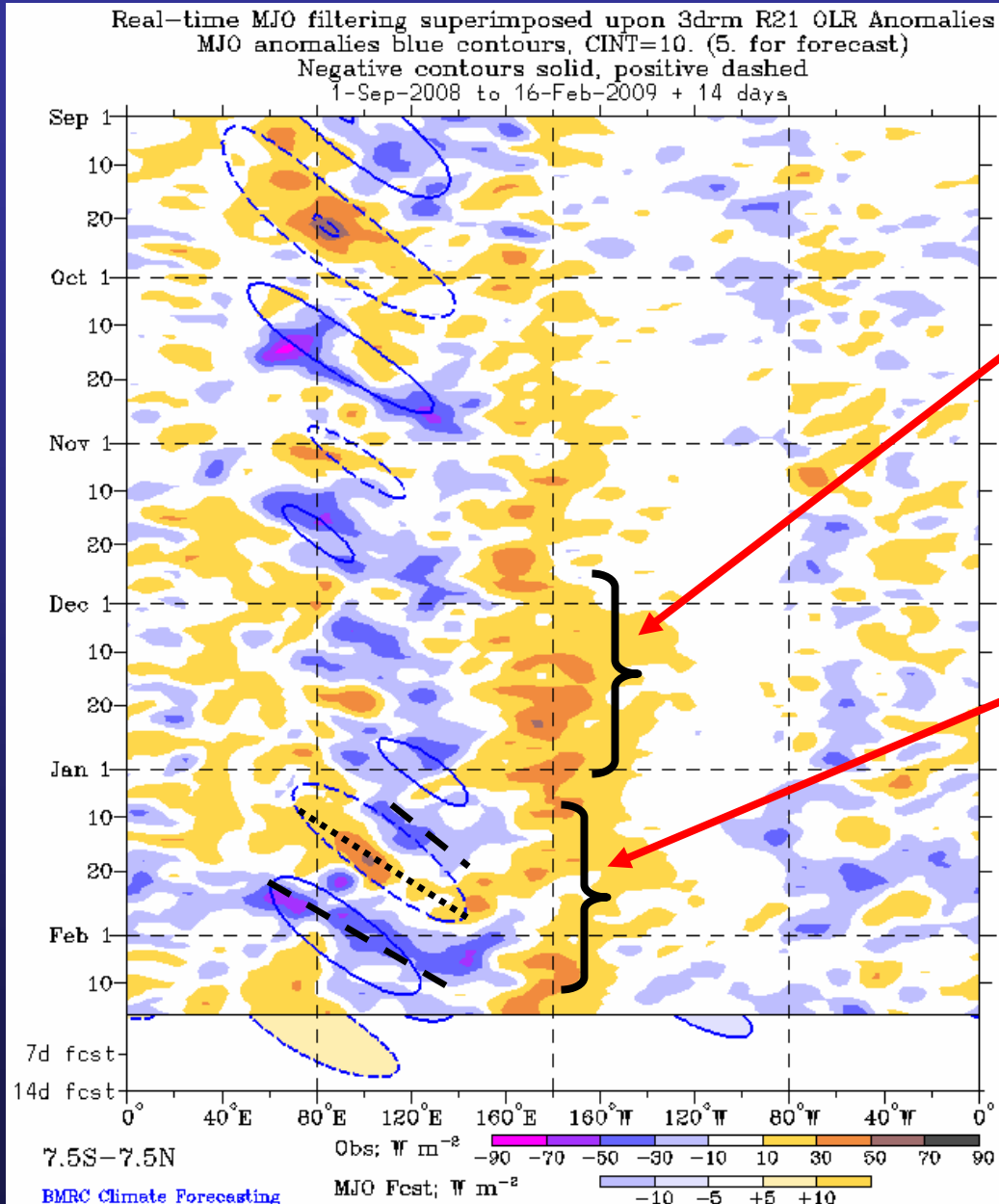
- Daily, monthly, seasonal forecasting systems

The screenshot shows the National Weather Service Climate Prediction Center website. The main heading is "US CLIVAR MJO Working Group Forecast Metrics". Below this, there are links for "Forecasts", "Methodology", "Verification", and "References". A section titled "Forecasts" contains a key for the label headings in a figure box, with a note: "Note: Move cursor over product name to display. Click for larger size and info." The key is a table with two rows of model names. Below the table is a phase plot titled "[RMM1, RMM2] 15-day forecast for 24Mar2008 to 07Apr2008". The plot shows a trajectory in the RMM1-RMM2 plane, with labels for "Western Pacific", "Indian Ocean", "Wes. Hem. and Africa", and "Maritime Continent". A green line represents the "NCEP GEFS" forecast. The plot is numbered 1 through 8, corresponding to the table above.

Phase Plots of MJO Index Forecasts					
NCPE	NCPO	NCFS	CMET	UKME	UKMA
ECMF	BOME	BOMA	BOMC	JMAN	CPTC

[RMM1, RMM2] 15-day forecast for 24Mar2008 to 07Apr2008

# January 2009 Case

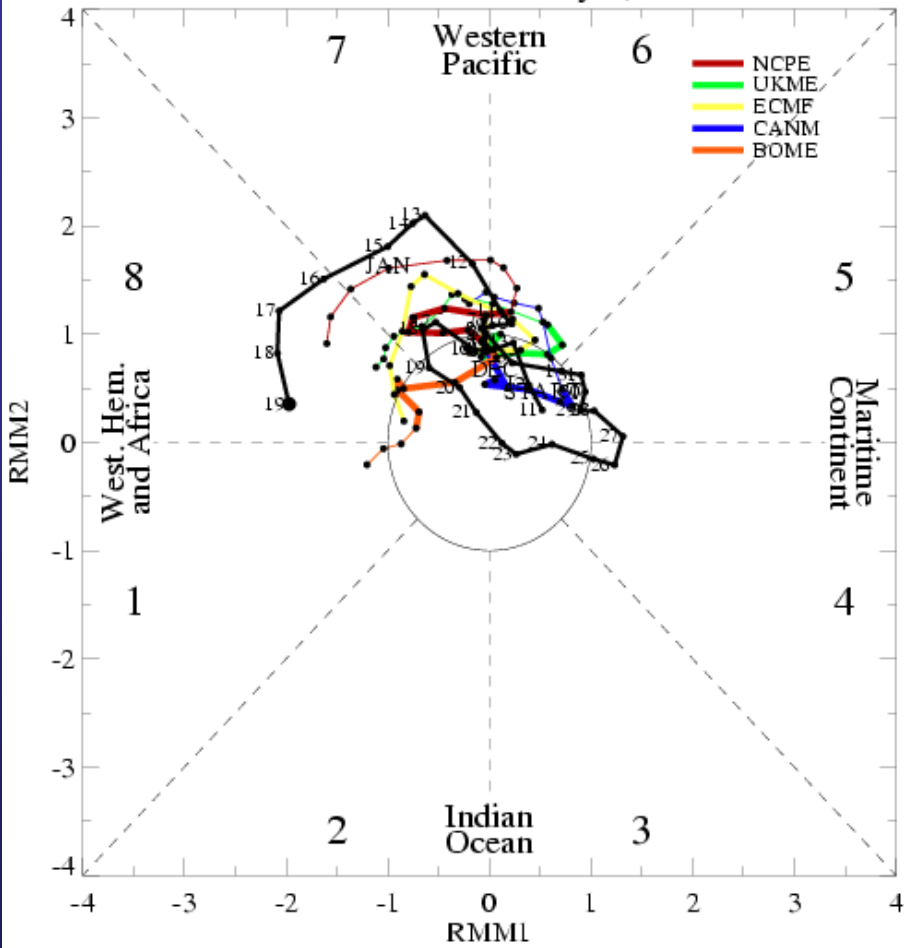


Generally stationary  
anomalous convection

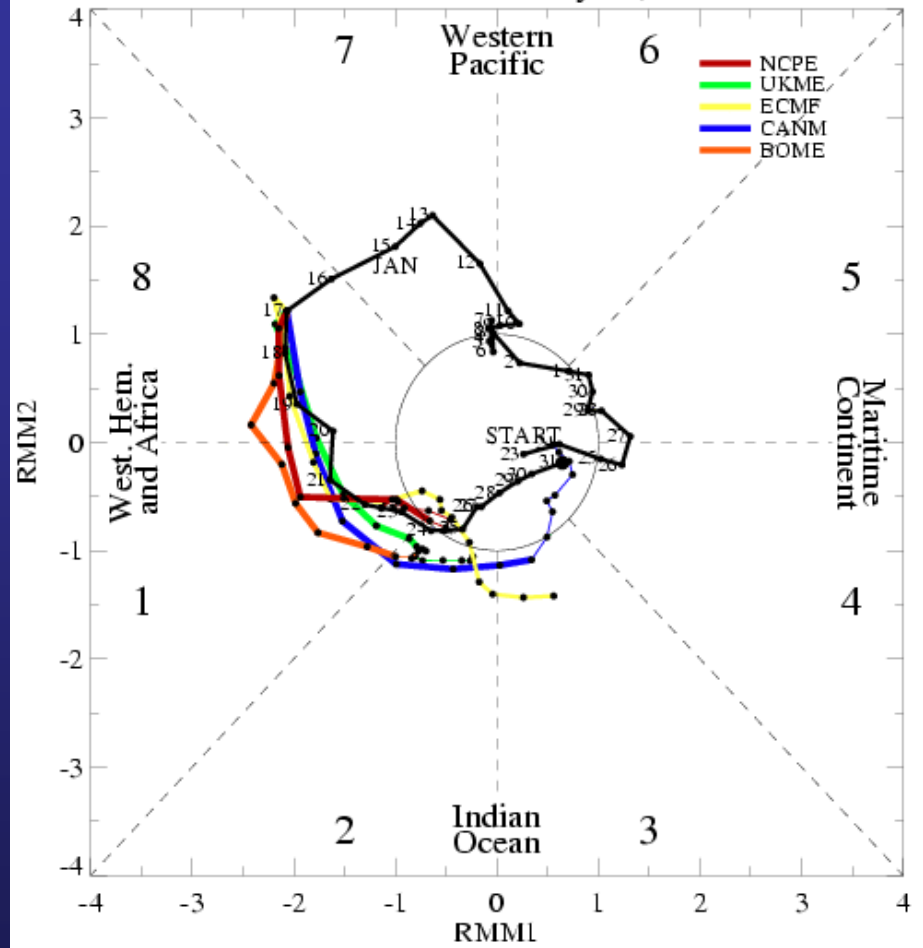
MJO strengthened

# January 2009 Case

Forecast From January 5, 2009

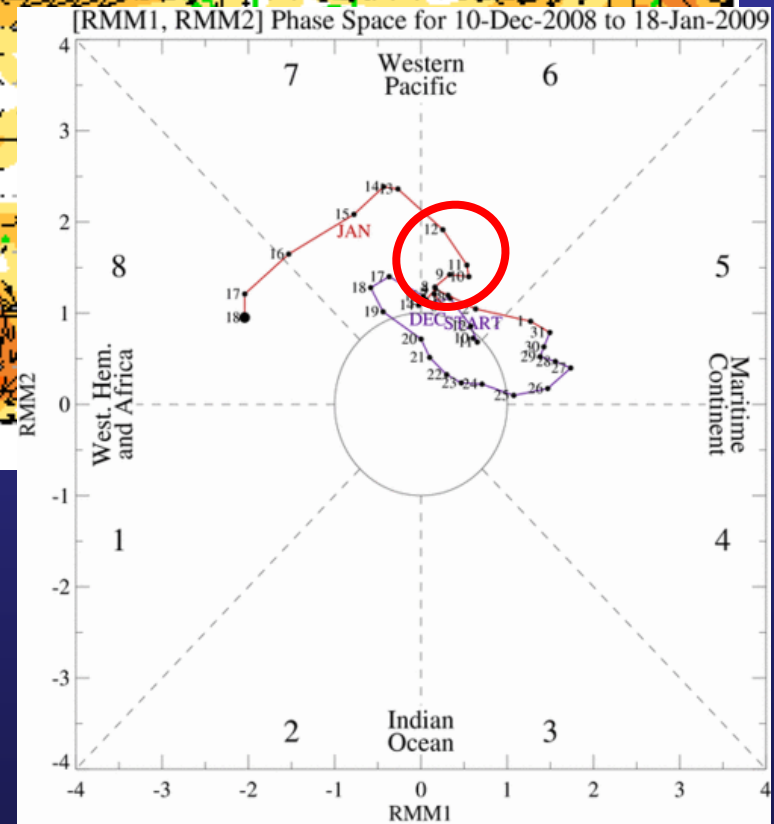
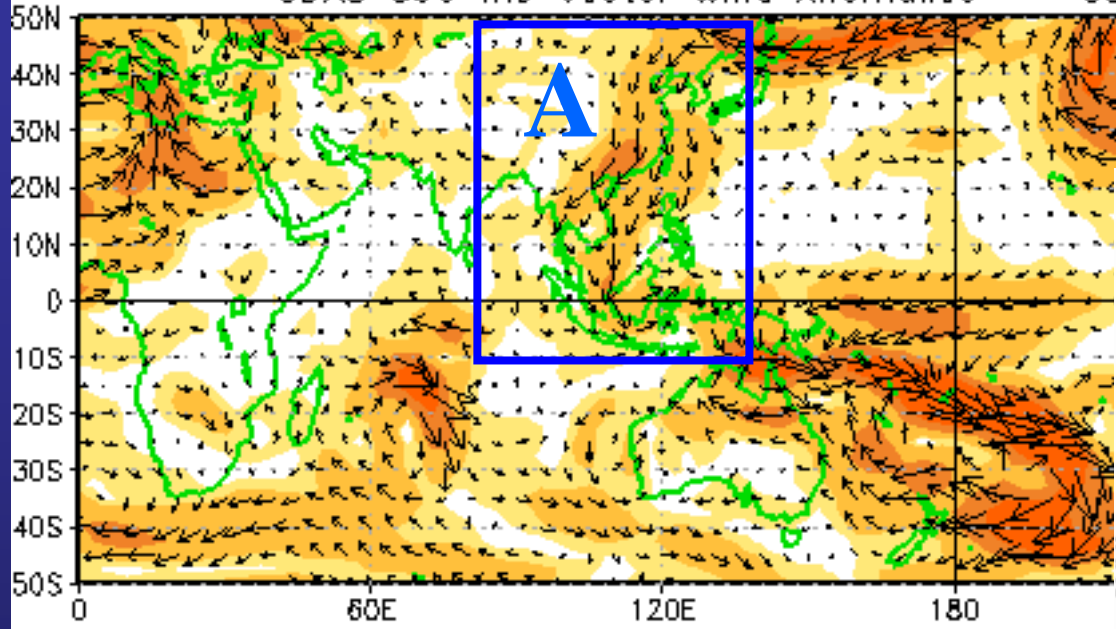


Forecast From January 17, 2009



# East Asian Cold Surge

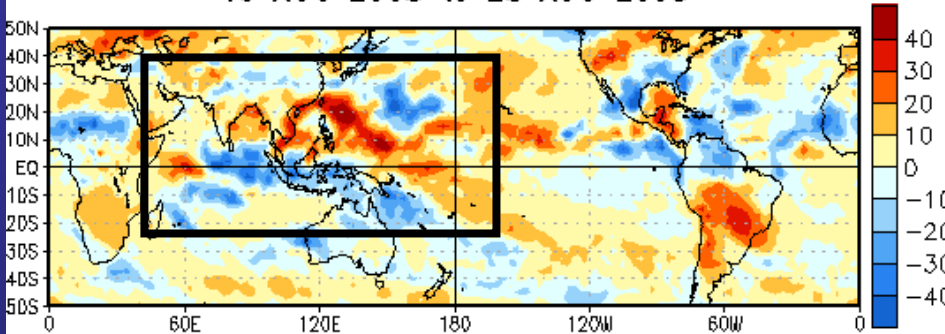
CDAS 850 mb Vector Wind Anomalies -- 08JAN2009-- 12JAN2009



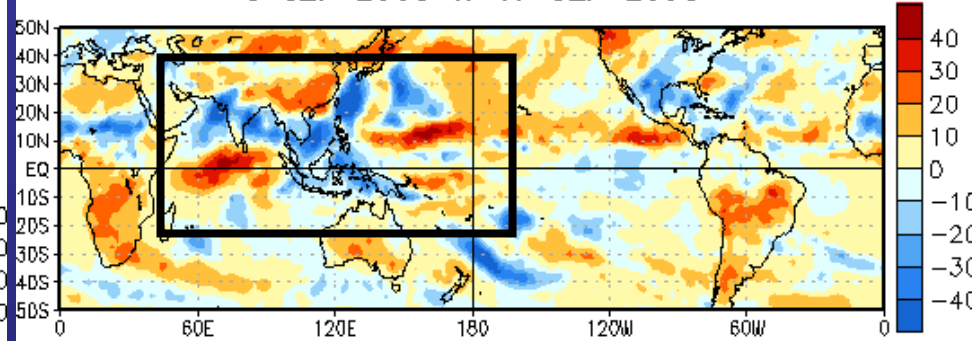


# September 2008 Case – OLR

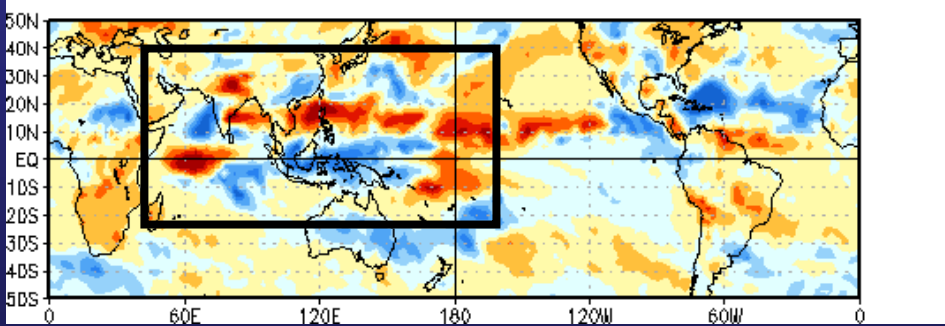
19 AUG 2008 to 28 AUG 2008



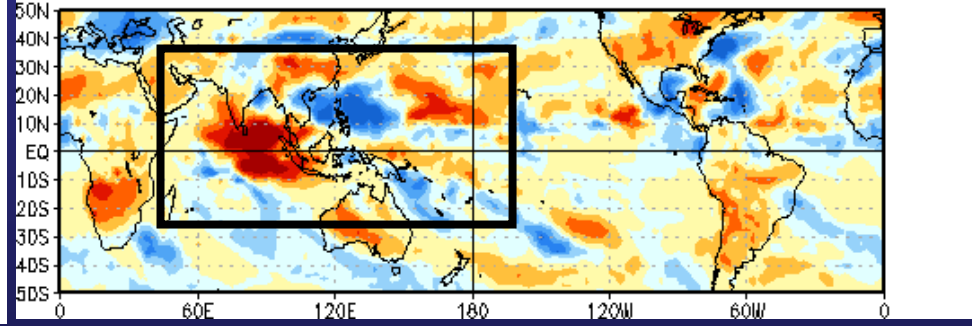
8 SEP 2008 to 17 SEP 2008



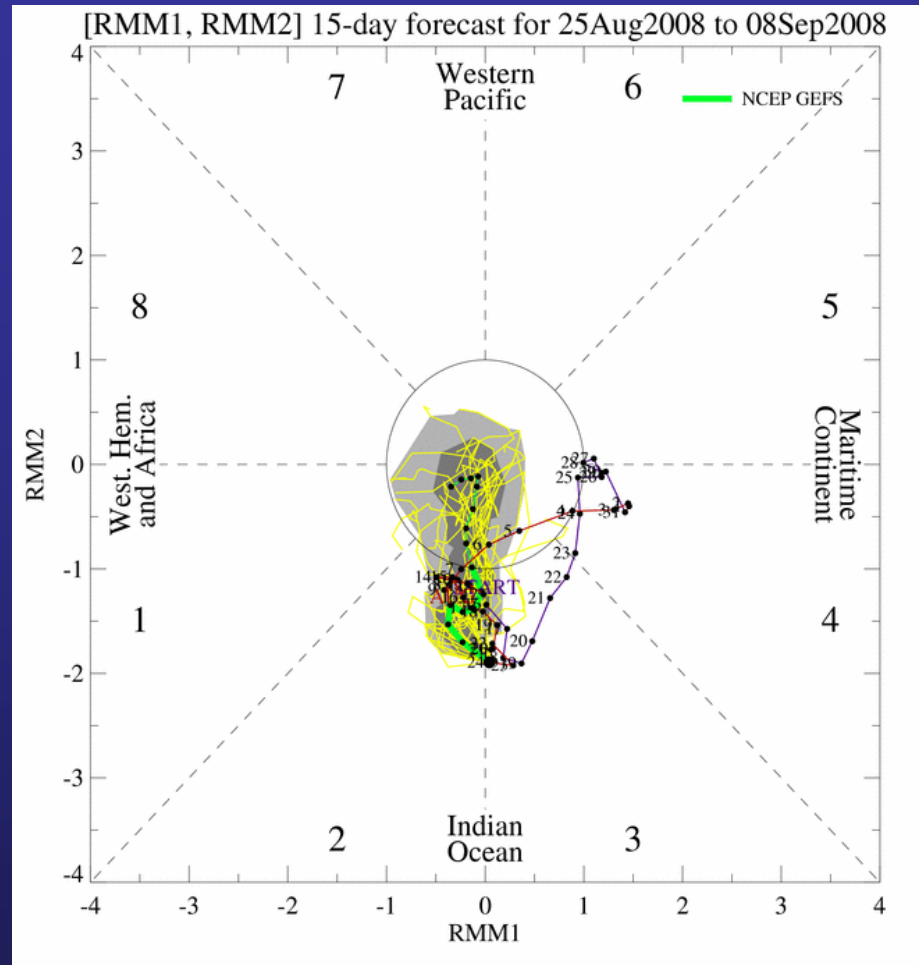
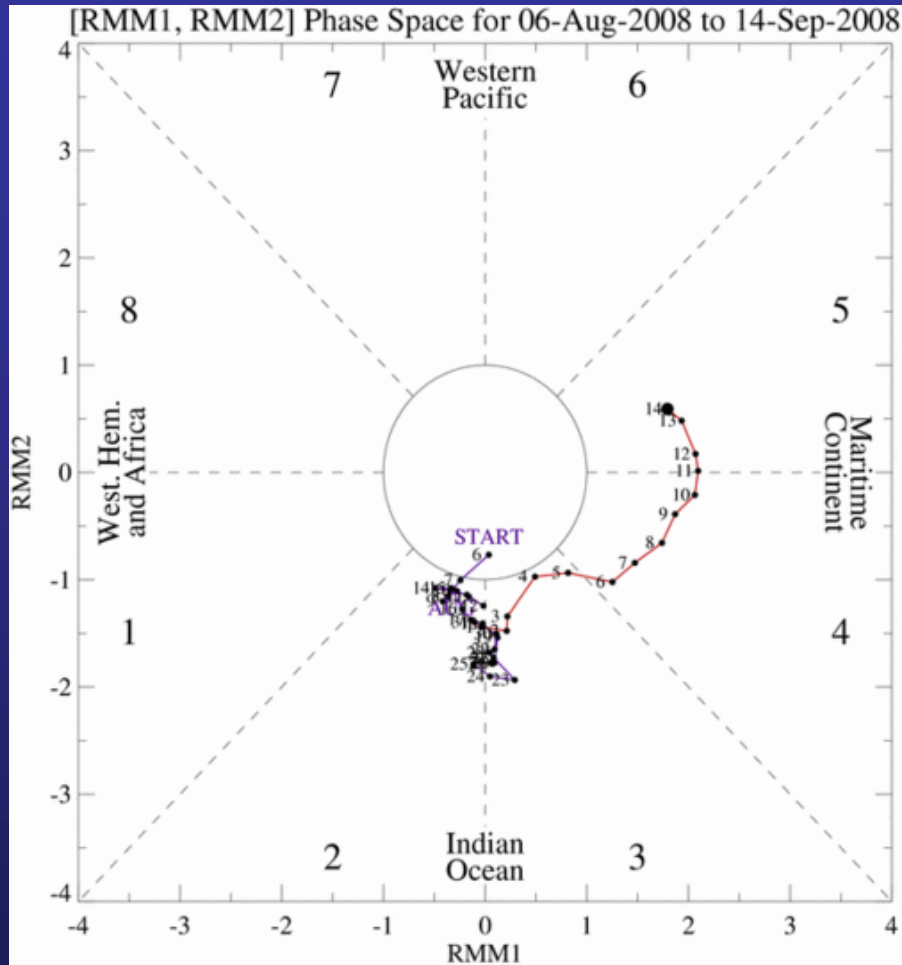
29 AUG 2008 to 7 SEP 2008



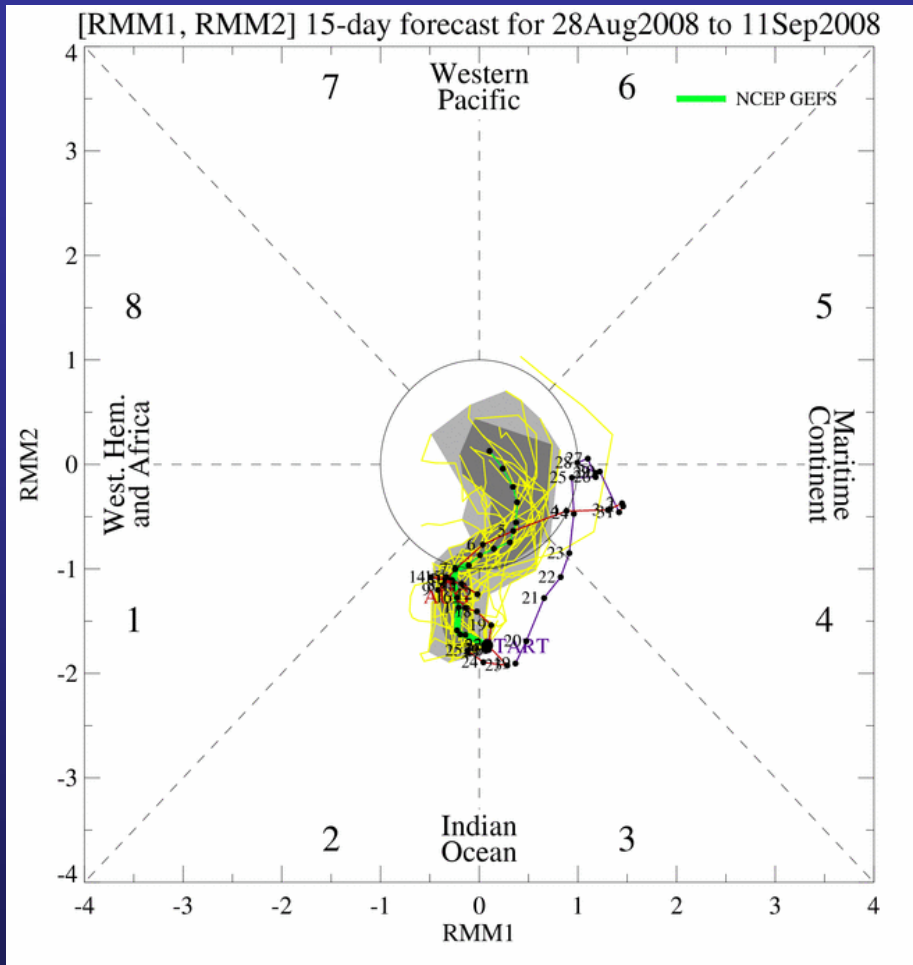
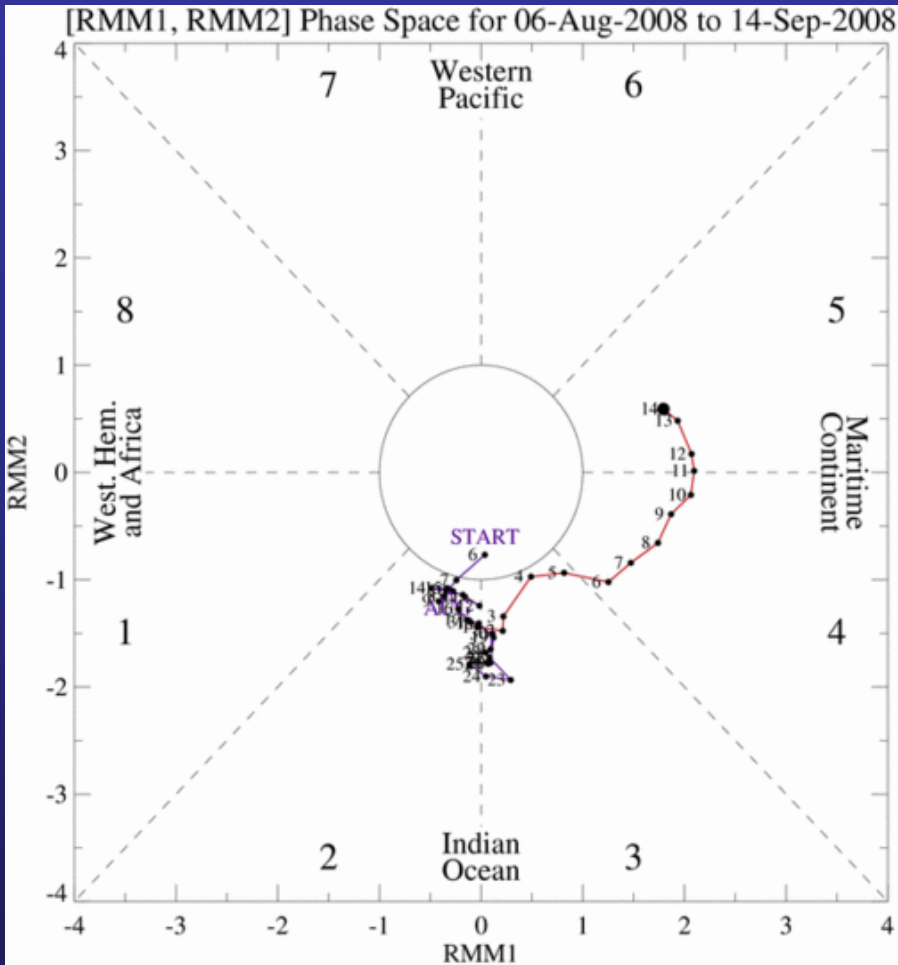
18 SEP 2008 to 27 SEP 2008



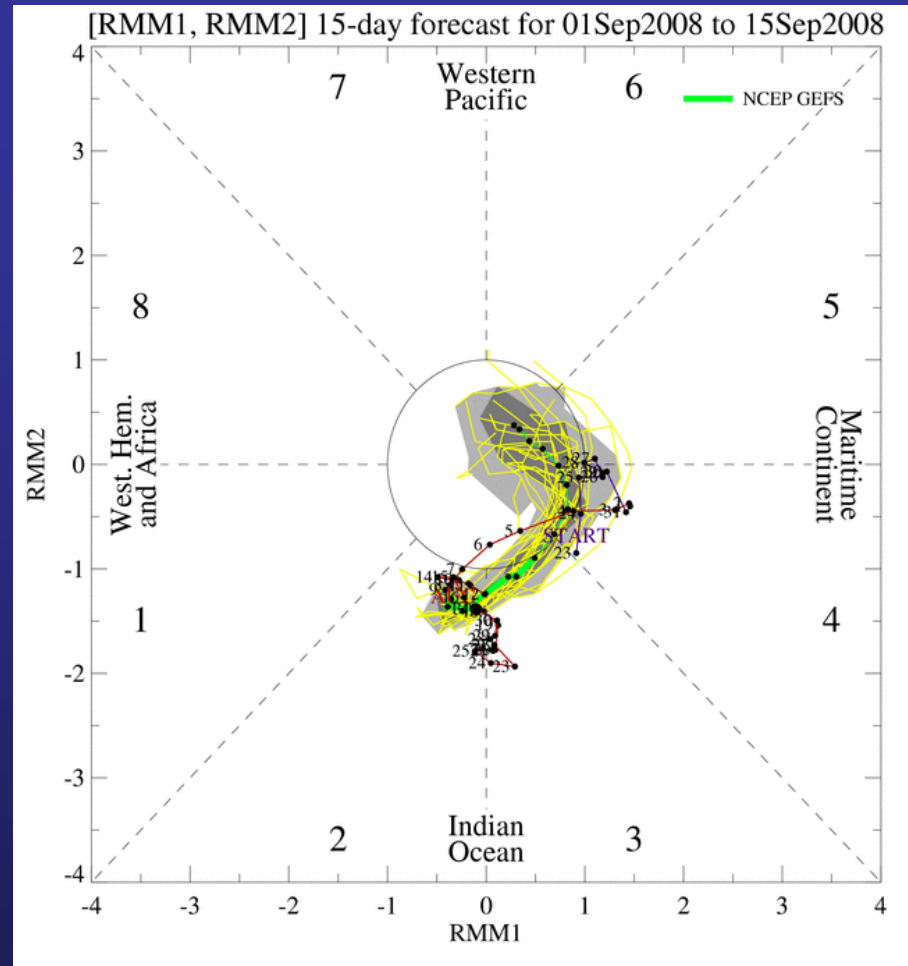
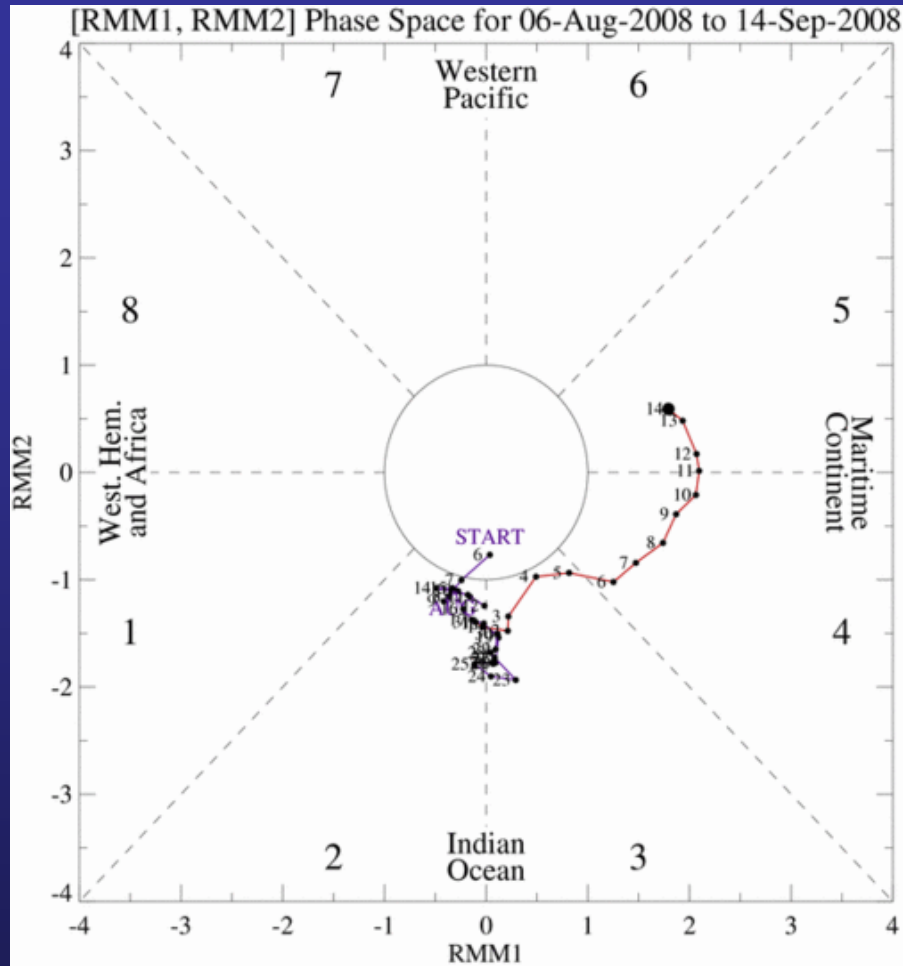
# September 2008 Case – MJO Index



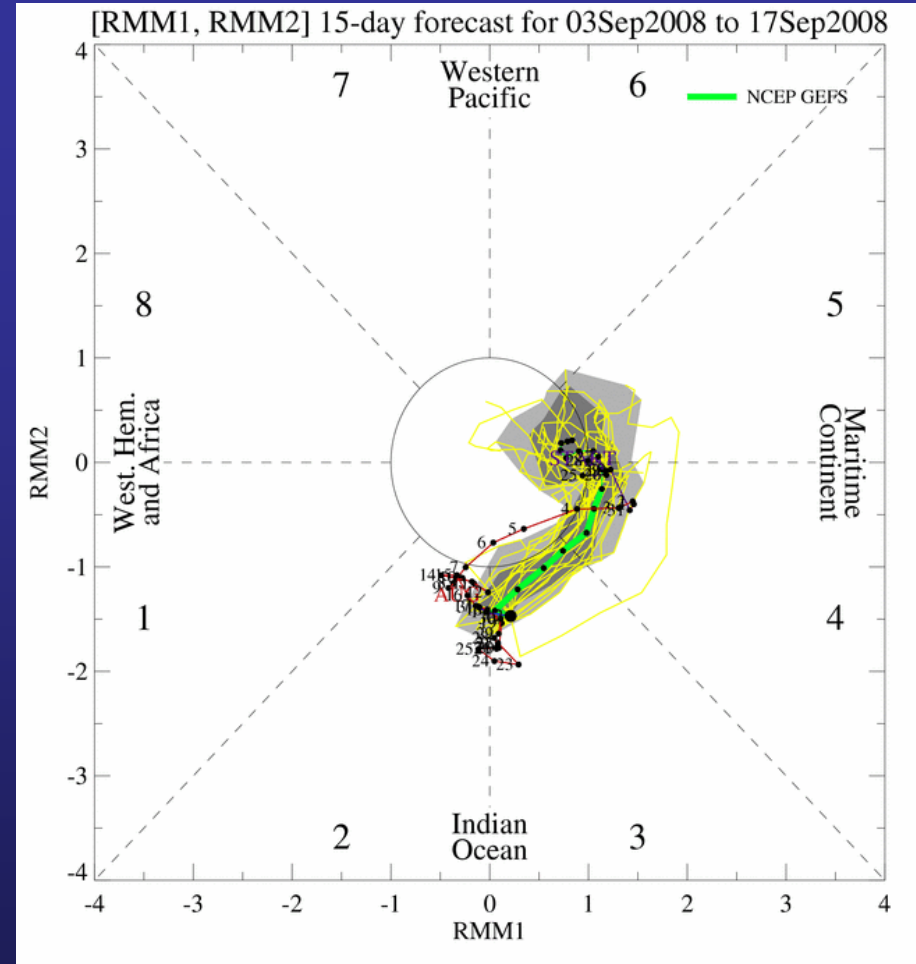
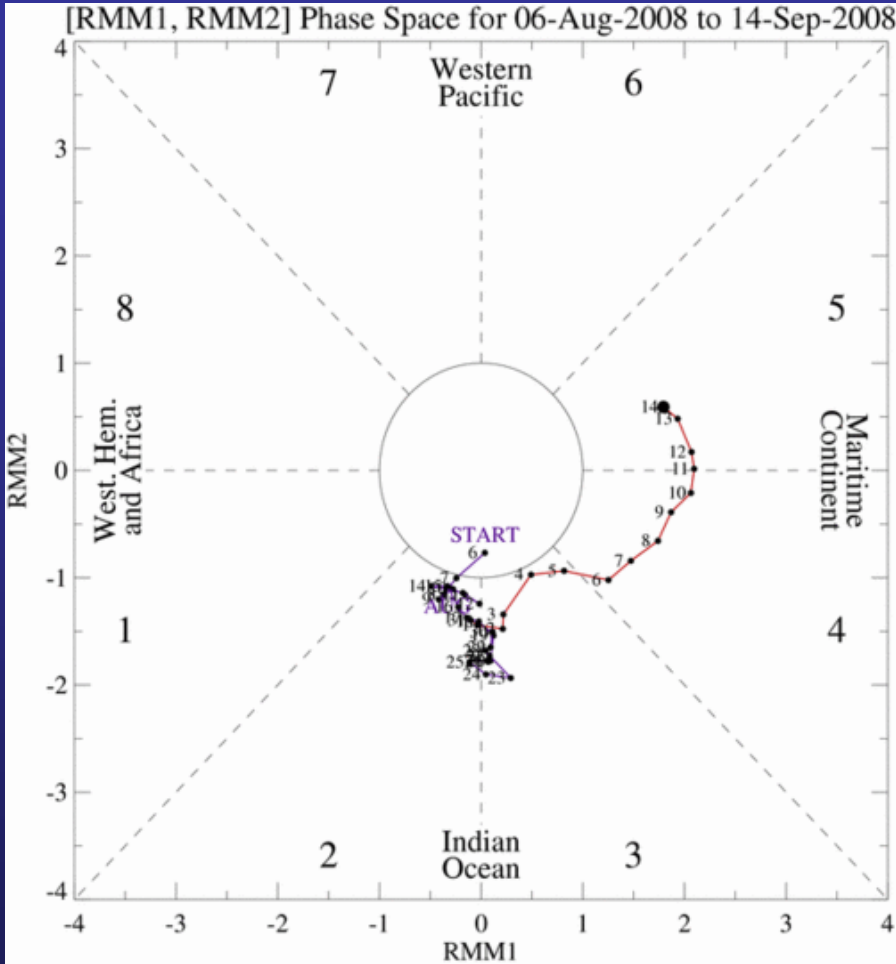
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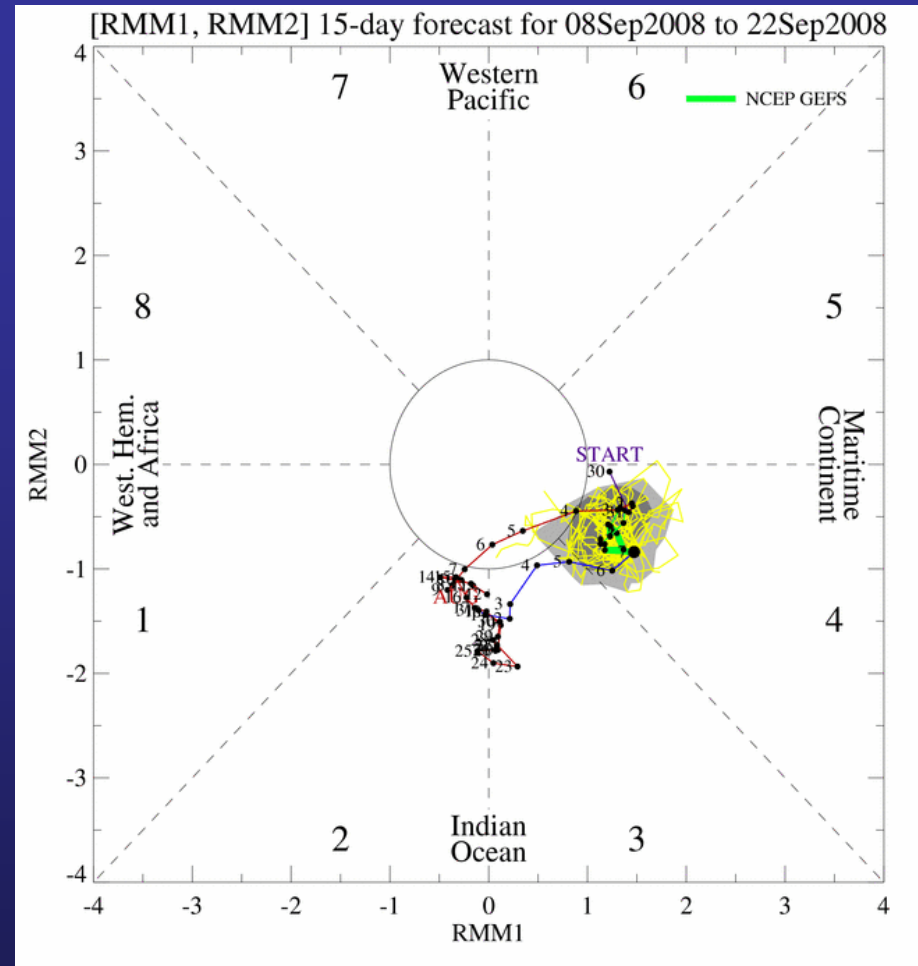
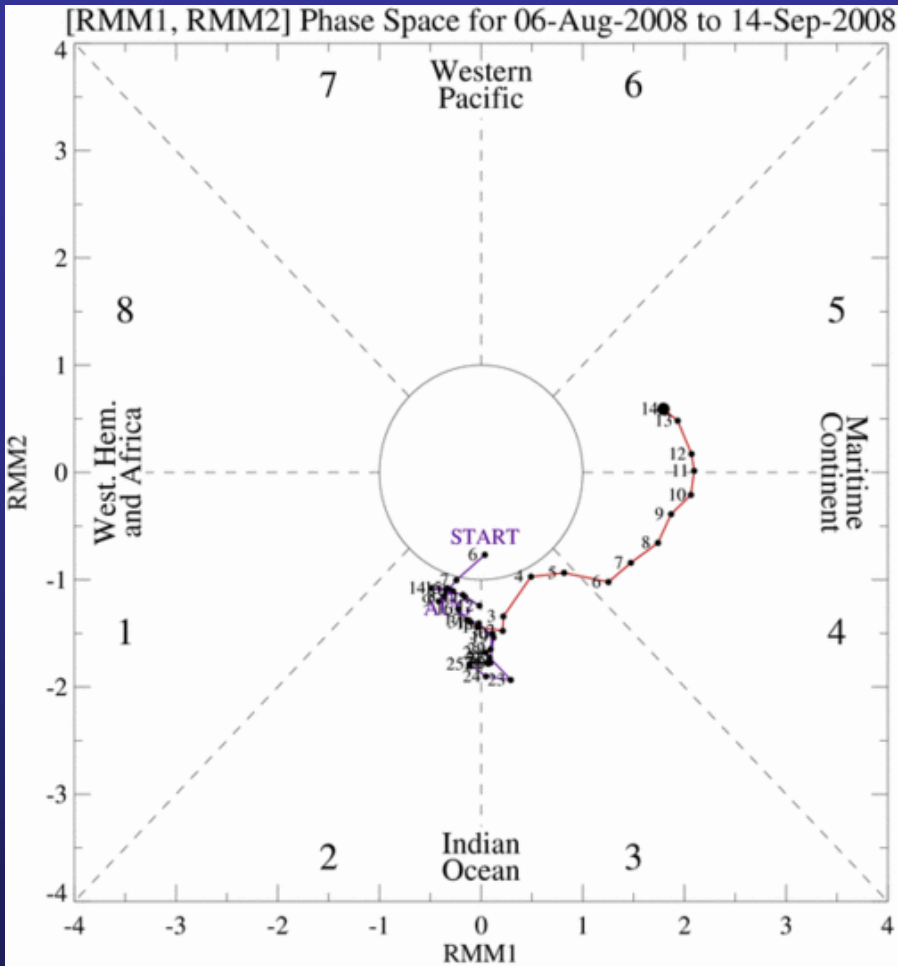
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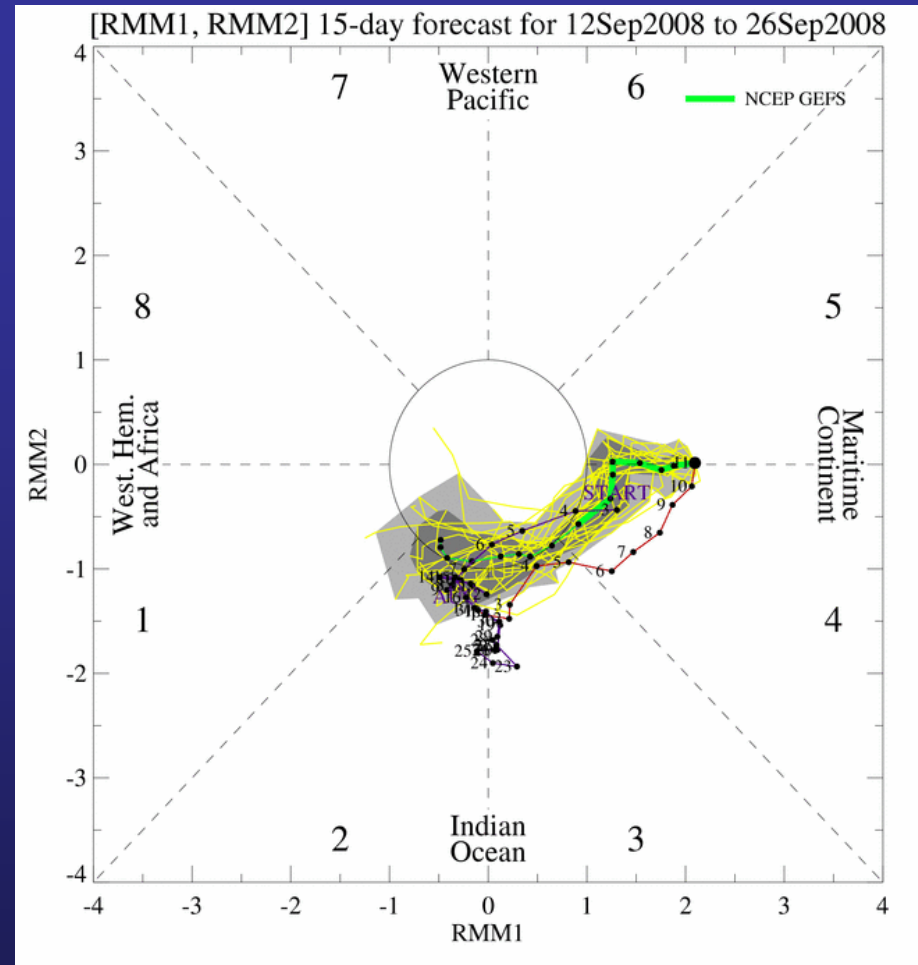
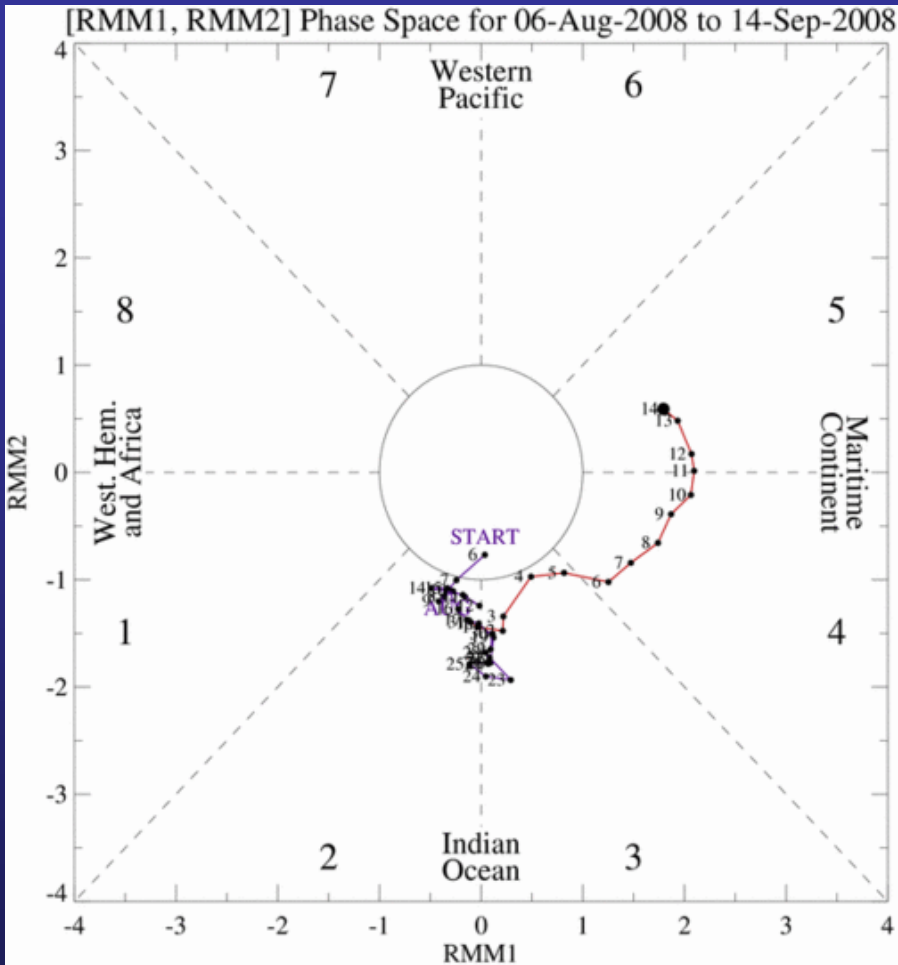
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# September 2008 Case – MJO Index



# *Questions and Comments*

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