

# Tropical-Extratropical interaction during YOTC

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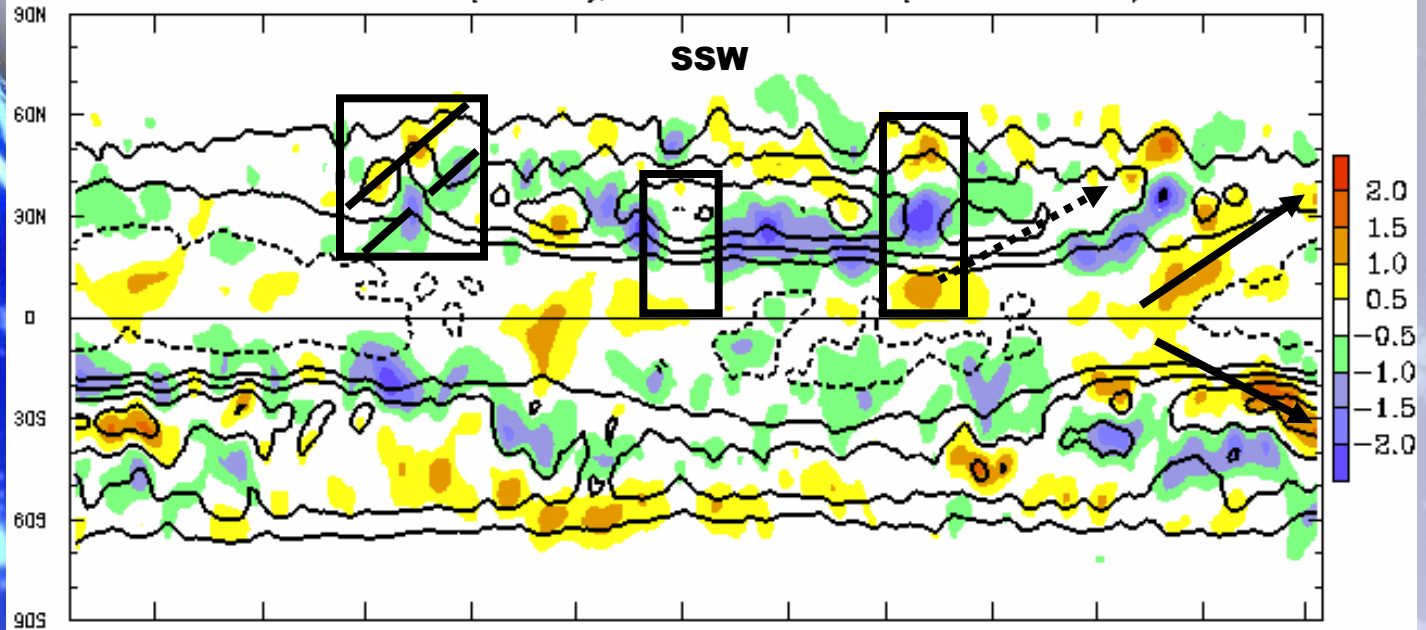
- Focus on tropical convection (OLR), and zonal and global atmospheric angular momentum (AAM)
- Major events with forecast implications
  - May 2008 - MJO and severe storm outbreak USA
  - SON 2008 - Boreal fall intraseasonals (MJO, GWO\*):  
The return of La Nina
  - XT initiation of DJFMA 2008-09 MJO activity?
  - Atmospheric Rivers and eq. Kelvin Waves: FM09
  - A warming equatorial Pacific Ocean: MAM 2009

**\*GWO - global wind oscillation**

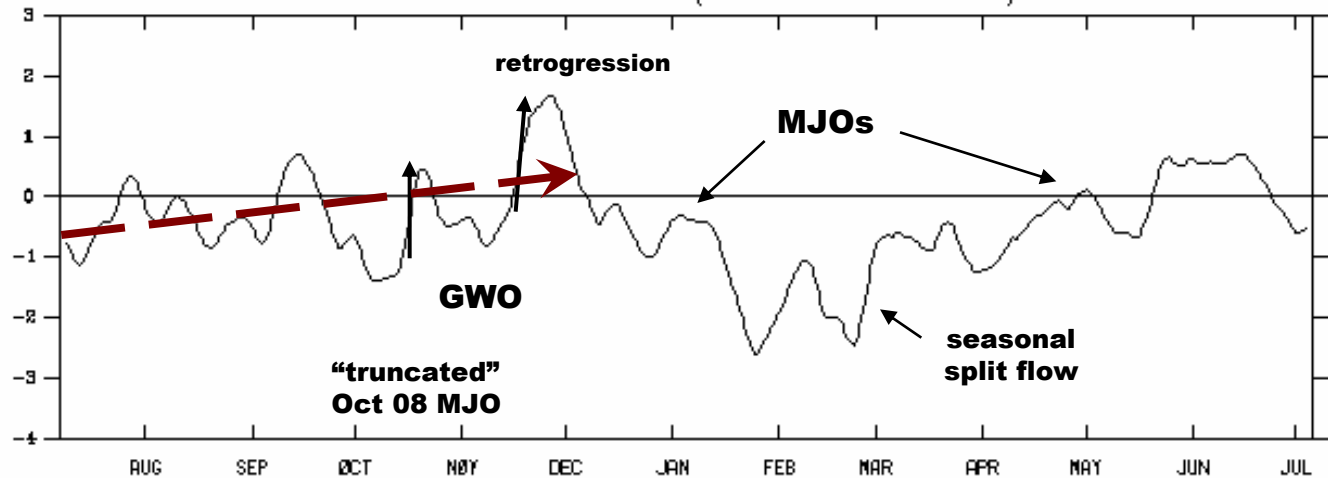
# VERTICAL AND ZONAL INTEGRAL OF RELATIVE ATMOSPHERIC ANGULAR MOMENTUM

FROM REANALYSIS U WIND, SIGMA LEVEL DATA

TOTAL FIELD CONTOURS (CI 2.E24), ANOMALIES SHADED (SCALED B 24)



## GLOBAL AAM ANOM (SCALED BY 1.E25)



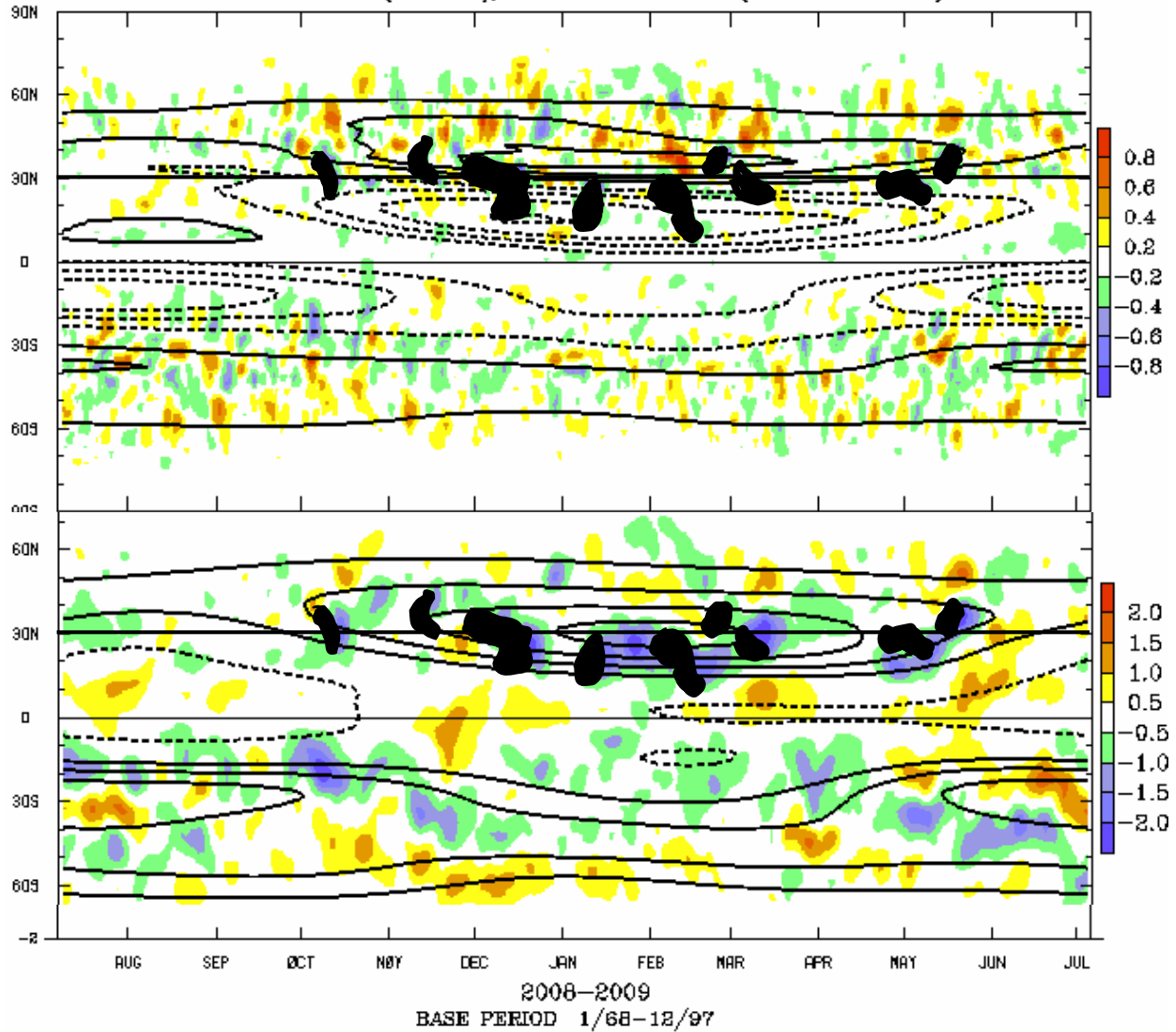
2008-2009

BASE PERIOD 1/68-12/97

# Momentum sink events: NH winter 2008-09

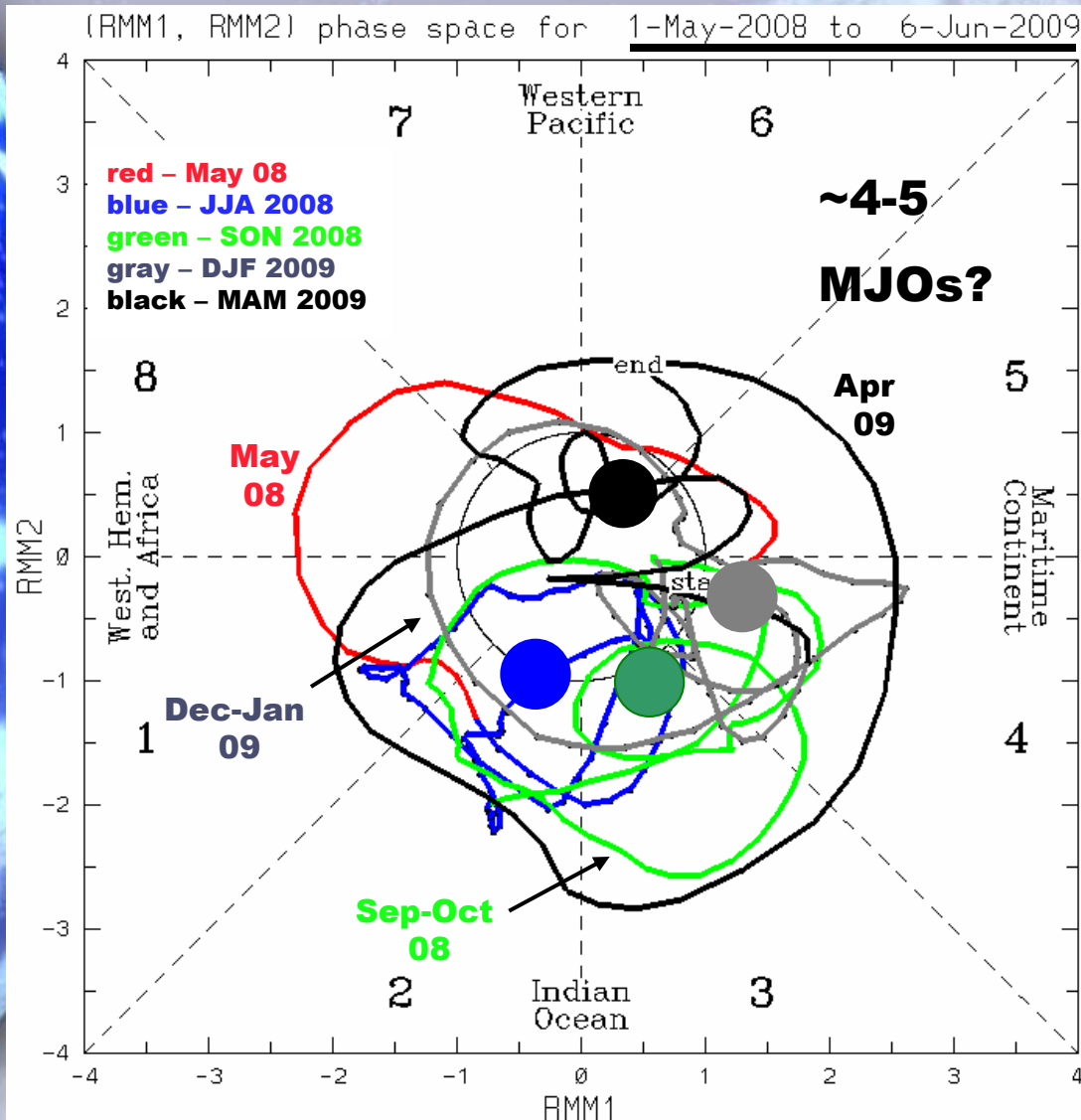
**Flux convergence of AAM ( top); AAM (bottom)  
Anomalies (colors); mean seasonal cycle (contours)**

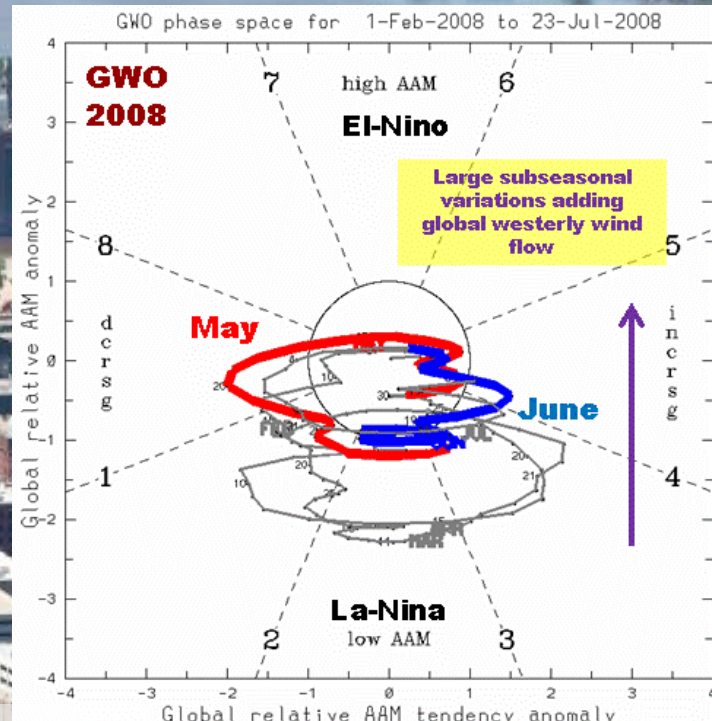
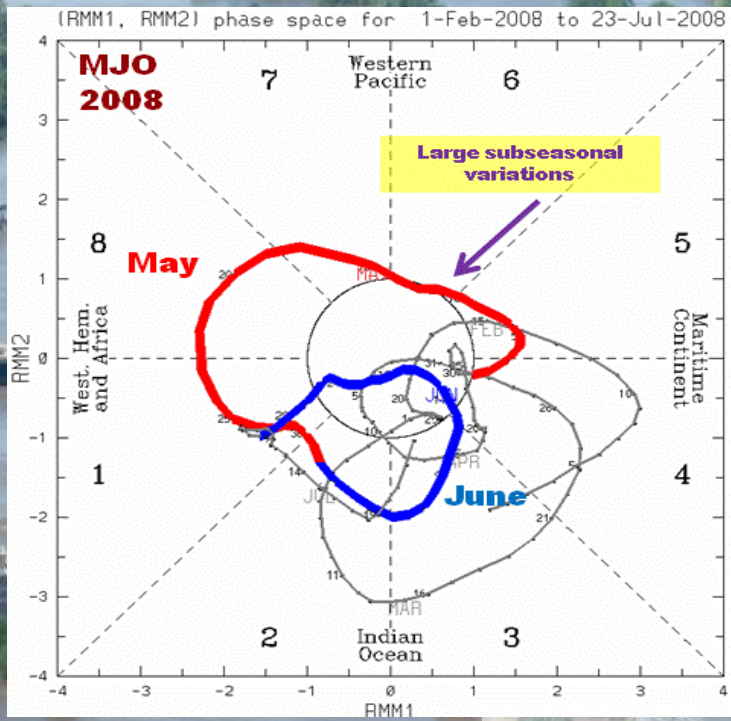
TOTAL FIELD CONTOURS (CI 2.E18), ANOMALIES SHADED (SCALED BY 1.E19)



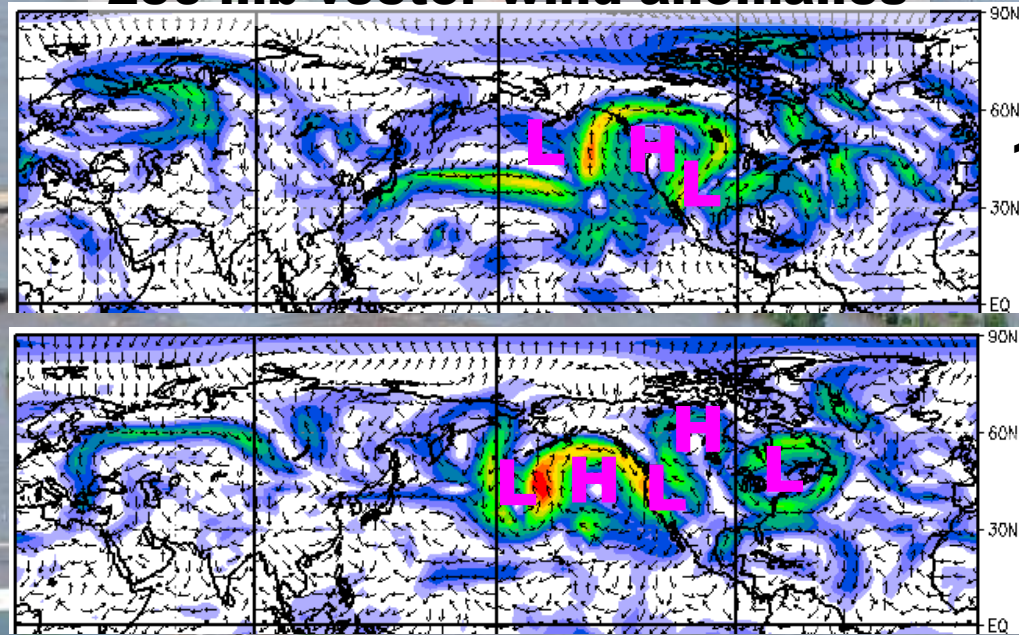


# OLR, 200 and 850 mb winds: 15N - 15S





**250 mb vector wind anomalies**



**7-8-1 transitions**

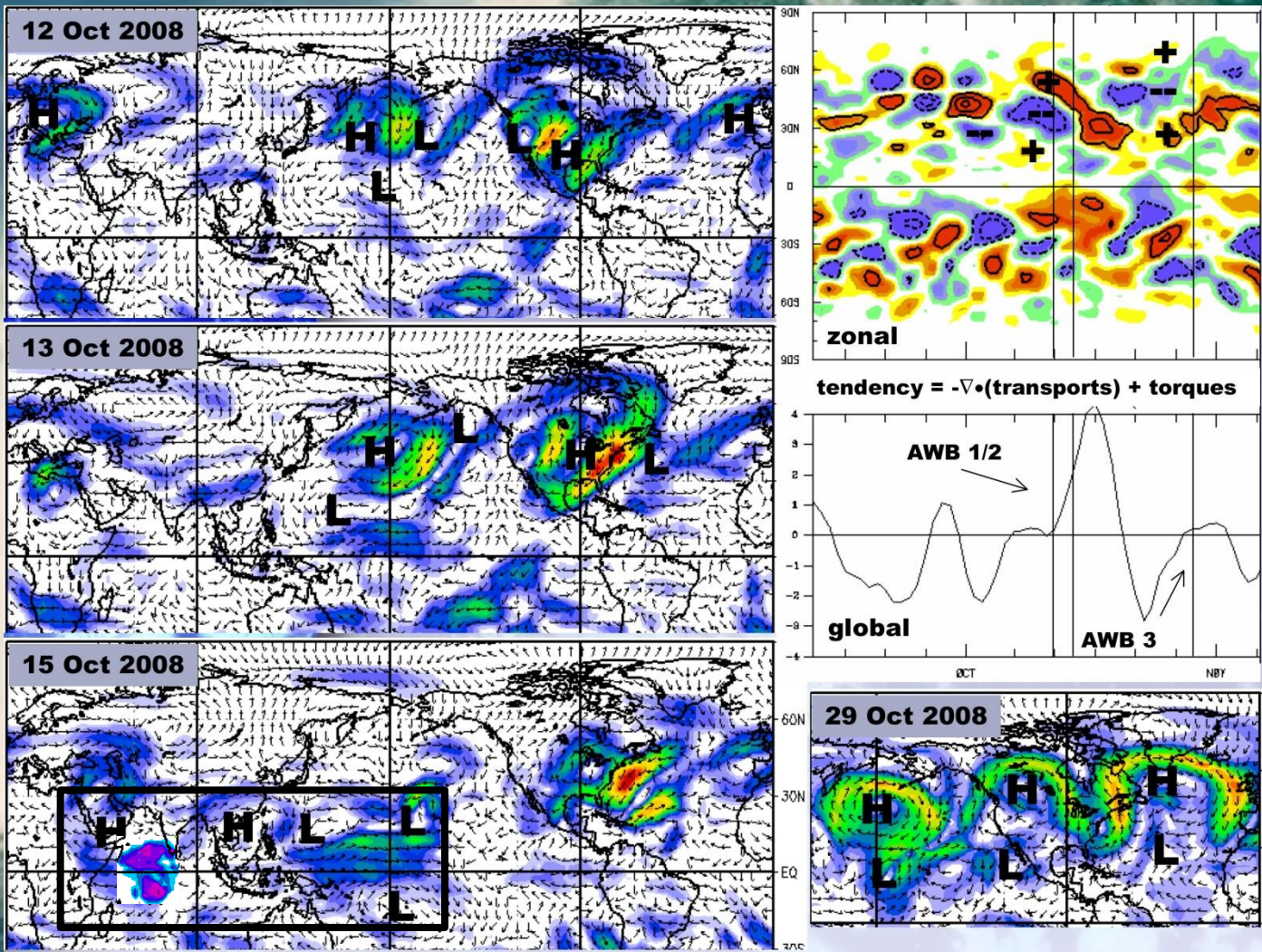
**Frequent Model Failures?**

**16 May 2008**

**22 May 2008**



# Boreal fall intraseasonals: the return of La Nina

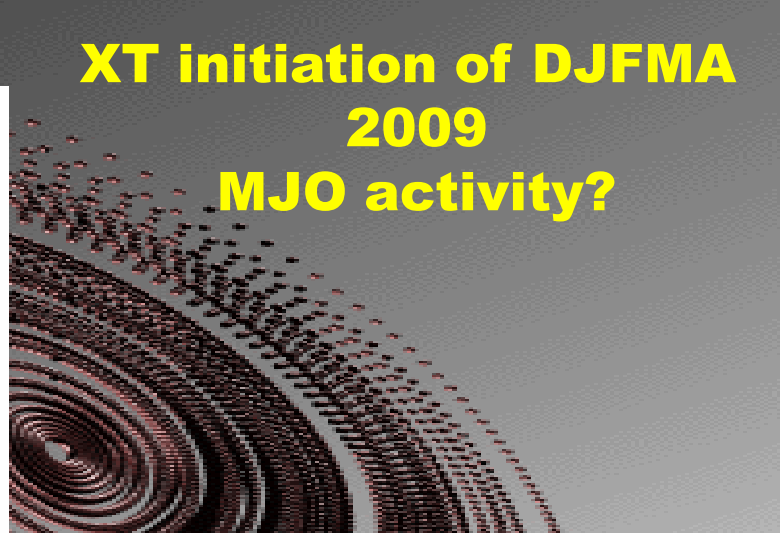


Rise in AAM SON 2008 mainly result of GWO and mountain forcing

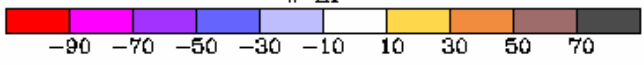
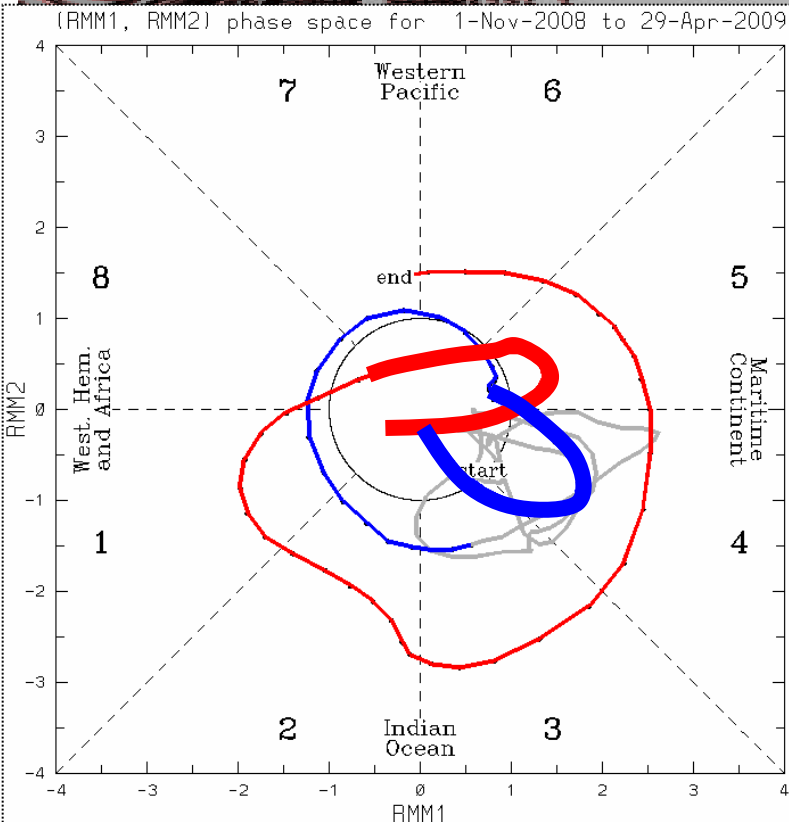
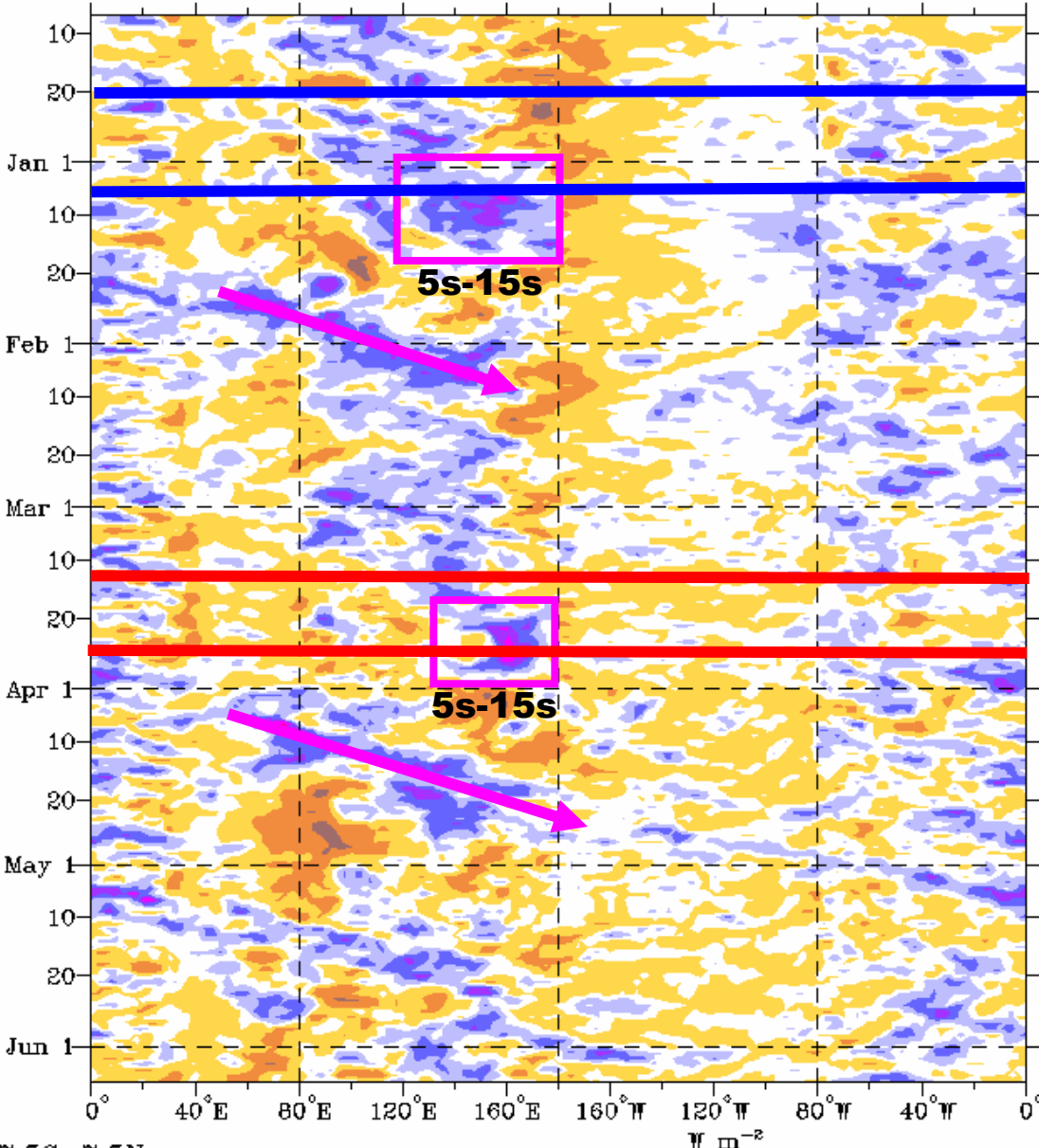


# XT initiation of DJFMA 2009

## MJO activity?

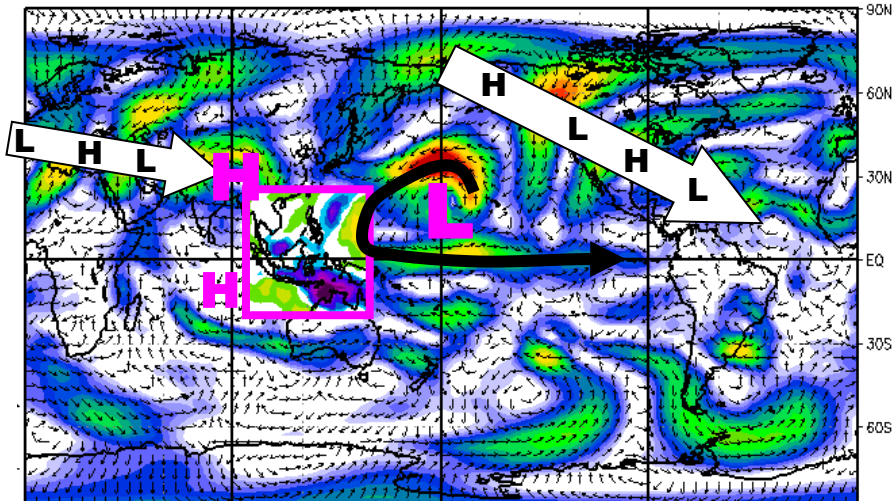


OLR Anomalies; Daily-averaged; Base period 1979-2001  
7-Dec-2008 to 7-Jun-2009

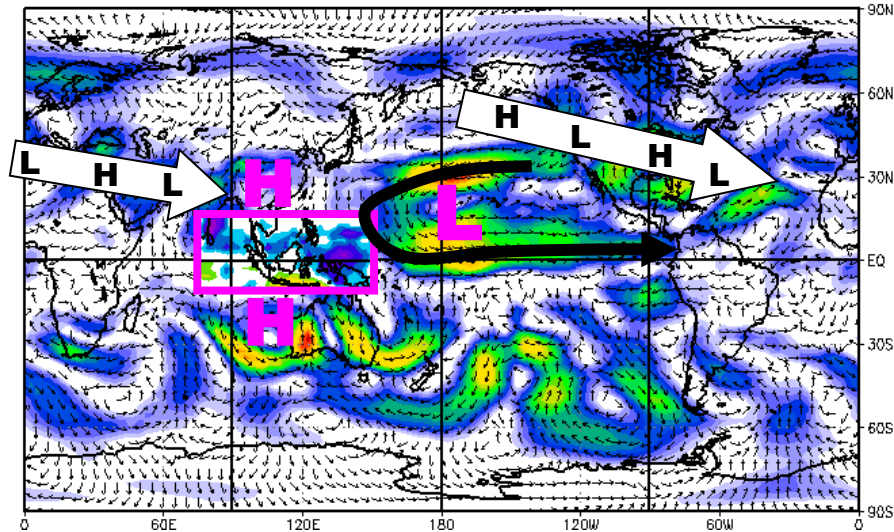


# 150 mb vector wind anomalies just before MJO initiation

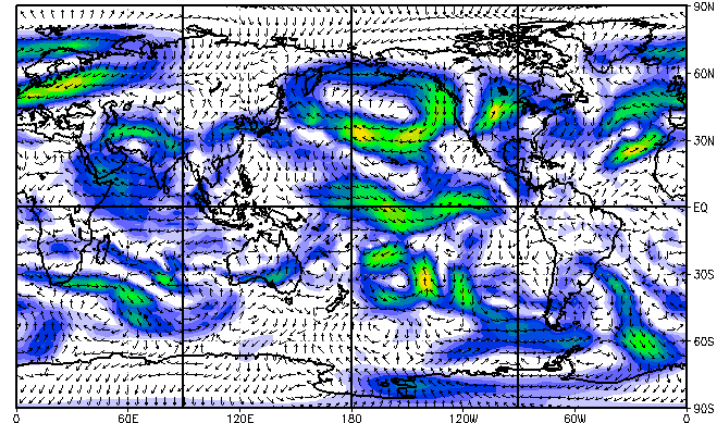
14-20  
Dec  
2008



6-12  
Mar  
2009

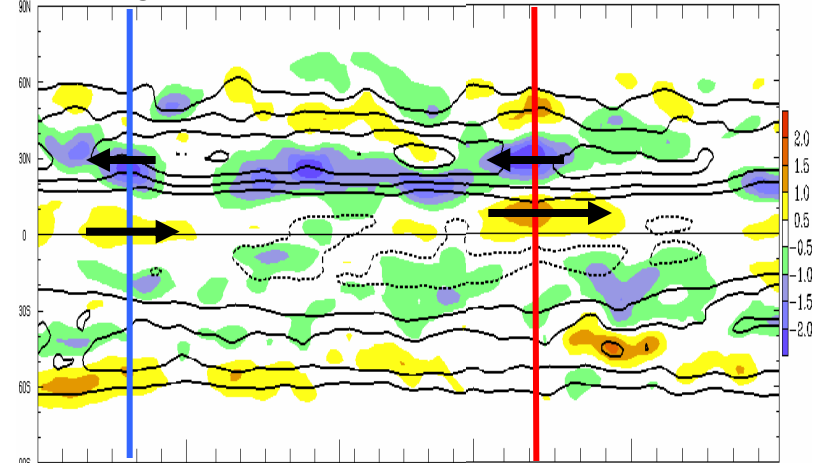


26 Dec 2008



Dec  
19

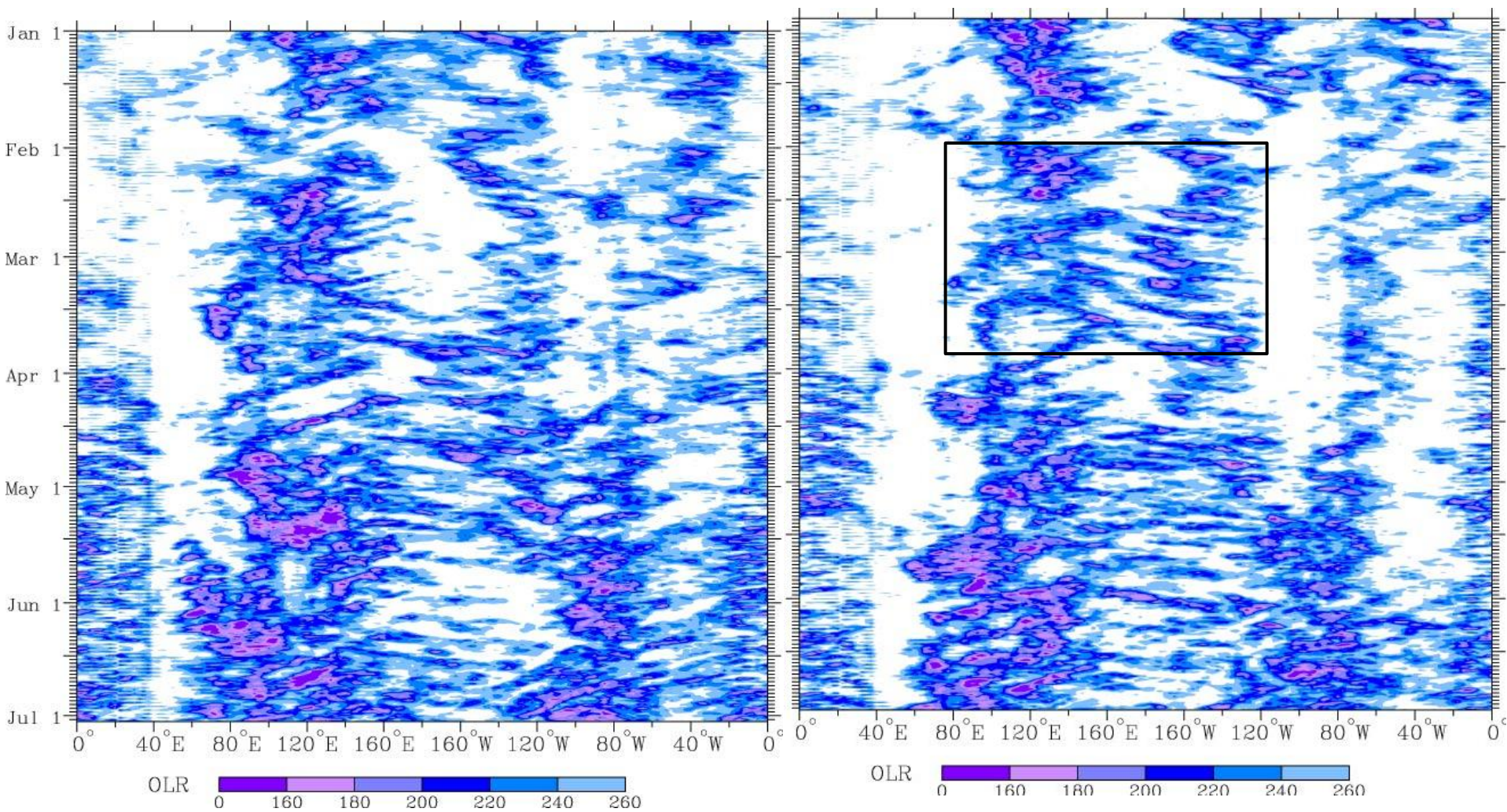
Mar  
12



Dec Jan Feb Mar Apr



# TOTAL OLR 5N-15N

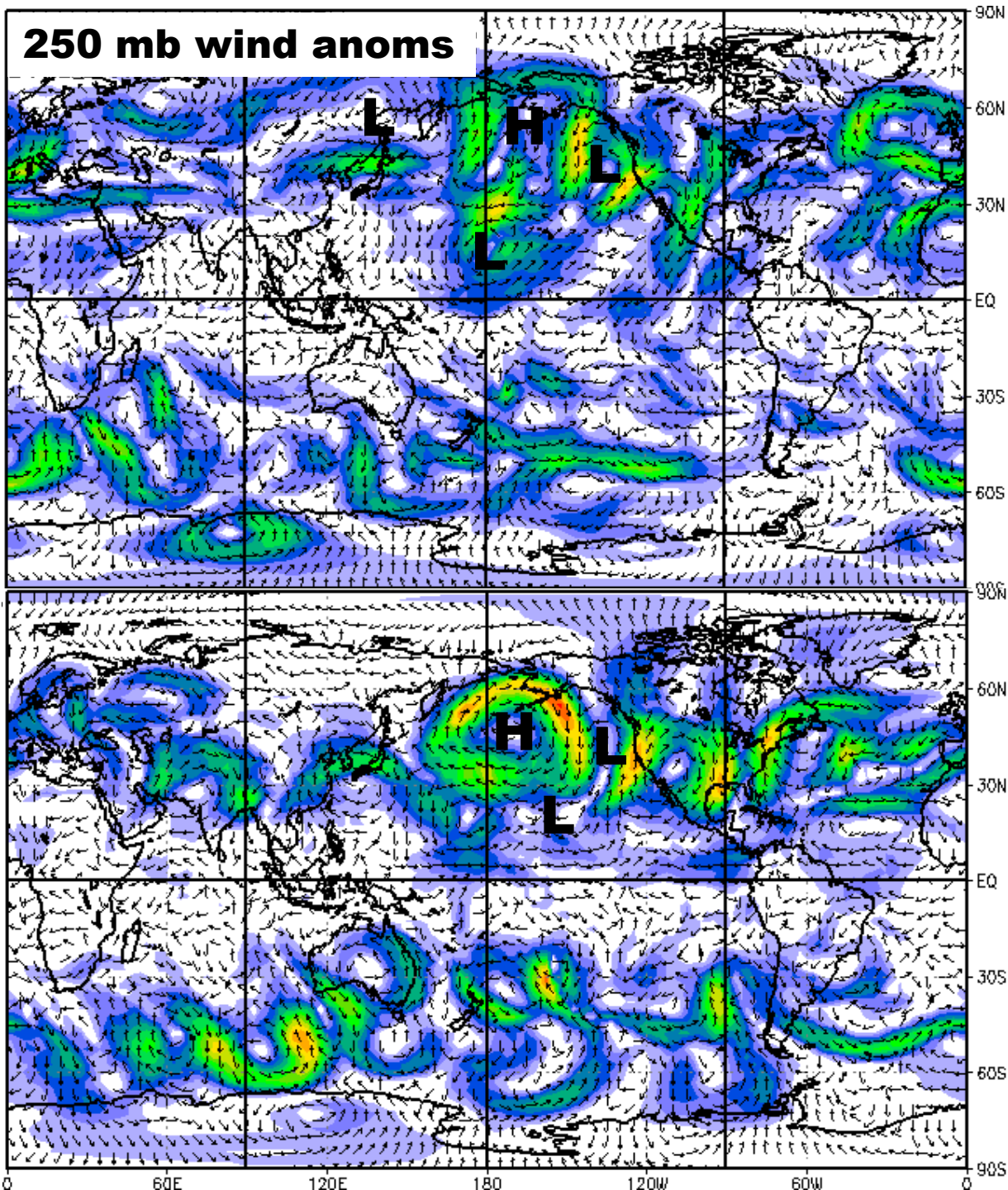


**Jan-Jun 2008**

**Jan-Jun 2009**



# 250 mb wind anom



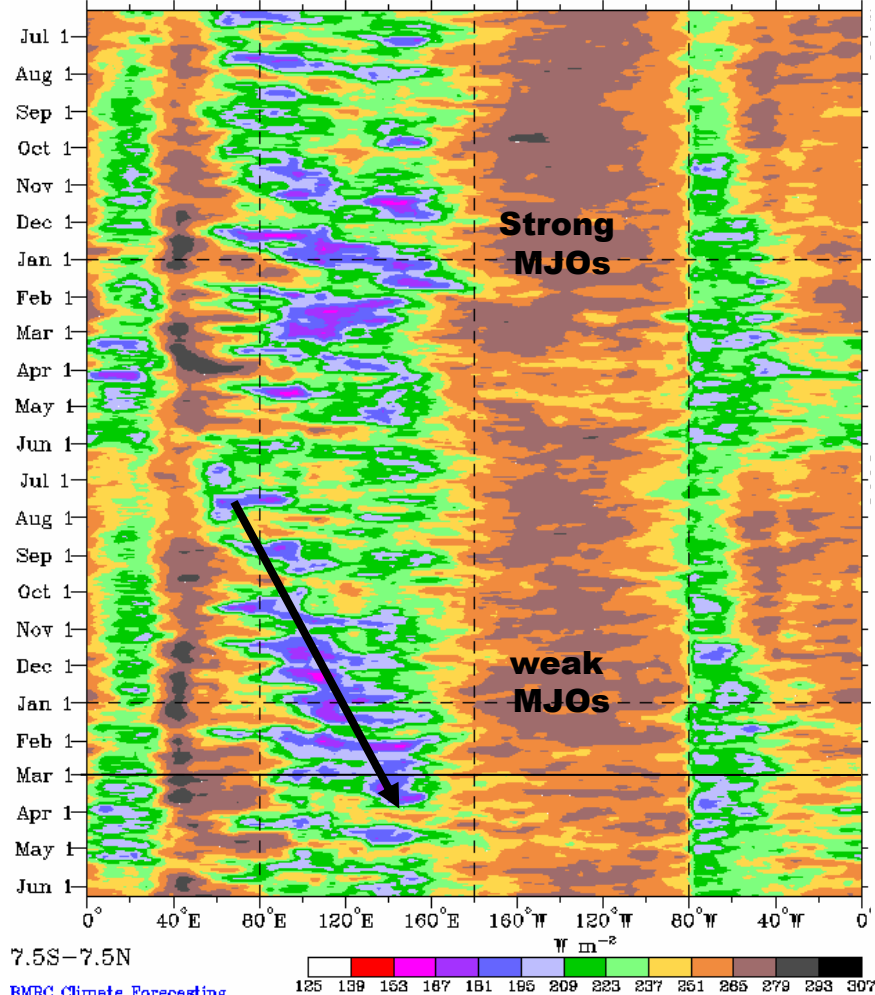
**22 Feb  
2009**

**3 Mar  
2009**

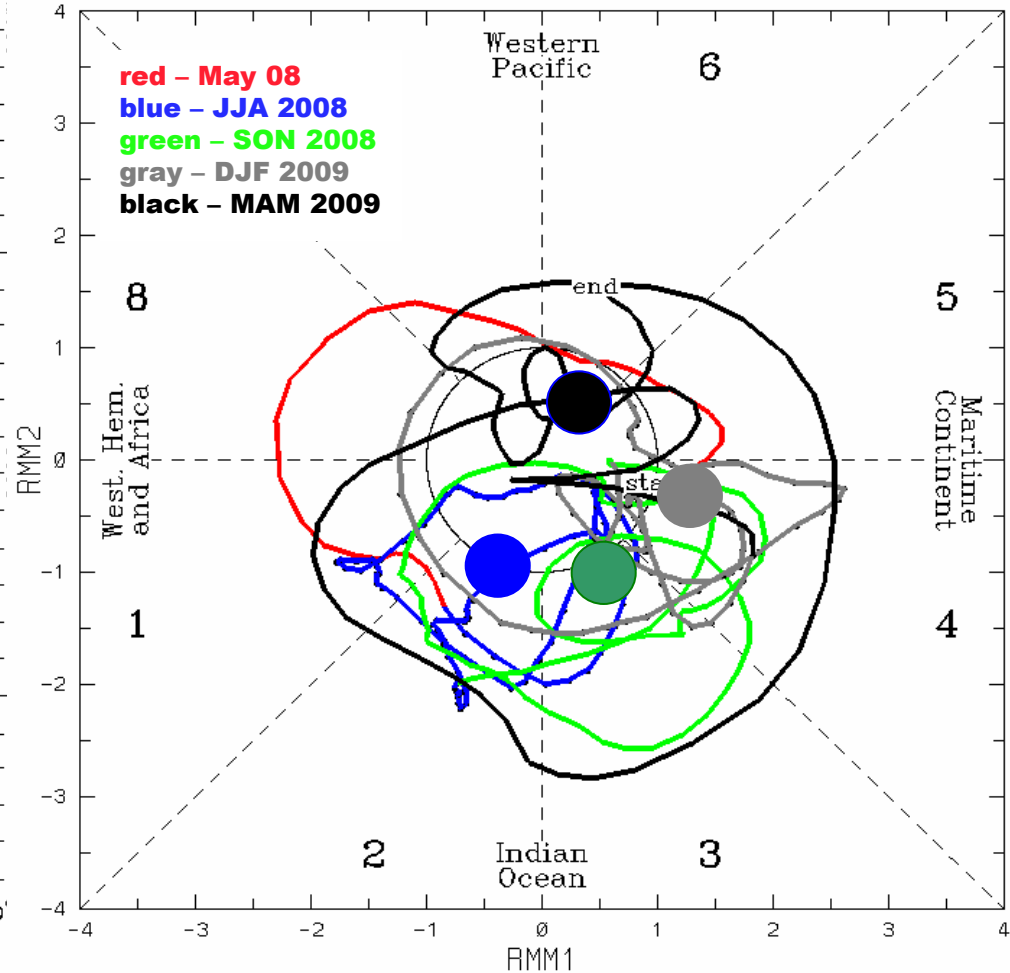


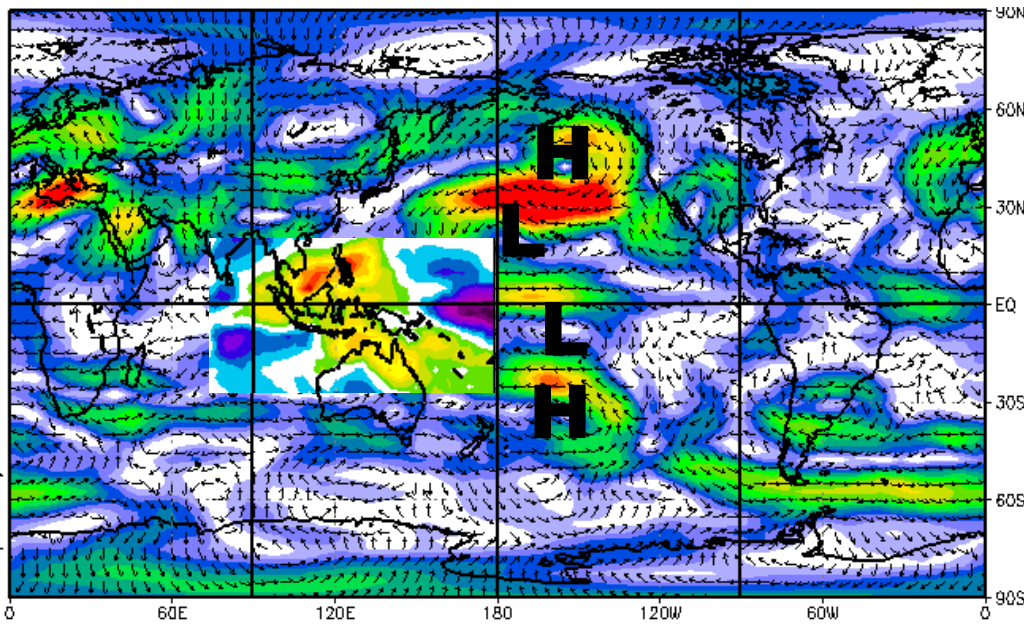
# Slow eastward movement of convection and early March breakdown of NH wintertime jet stream

OLR Totals; 7-day running mean; Daily-averaged  
10-Jun-2007 to 9-Jun-2009



(RMM1, RMM2) phase space for 1-May-2008 to 6-Jun-2009

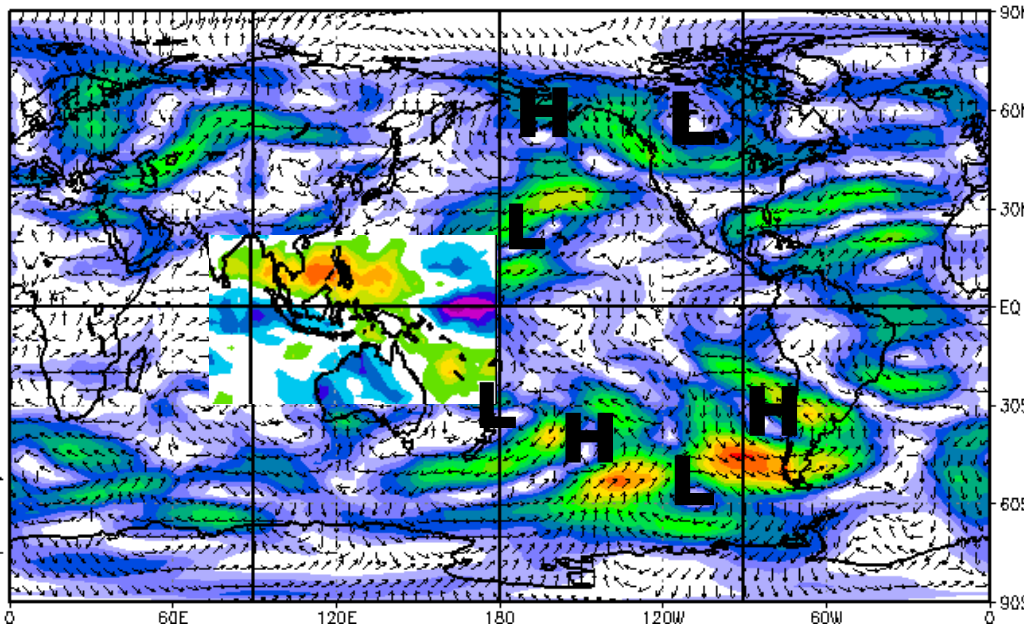




**250 mb seasonal  
mean wind and OLR  
anomalies**

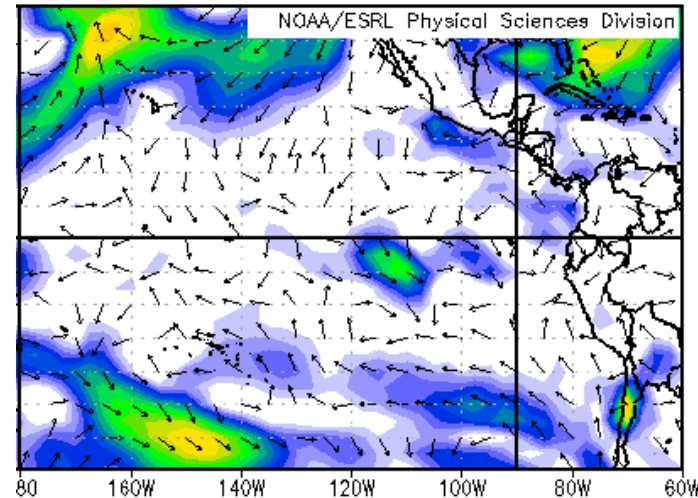
**W  
E  
W**

**DJF 2009  
vs  
MAM 2009**



**surface wind**

**W  
E  
W**



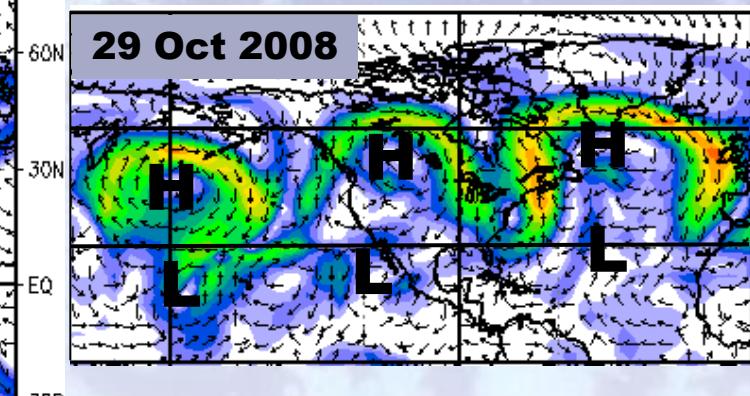
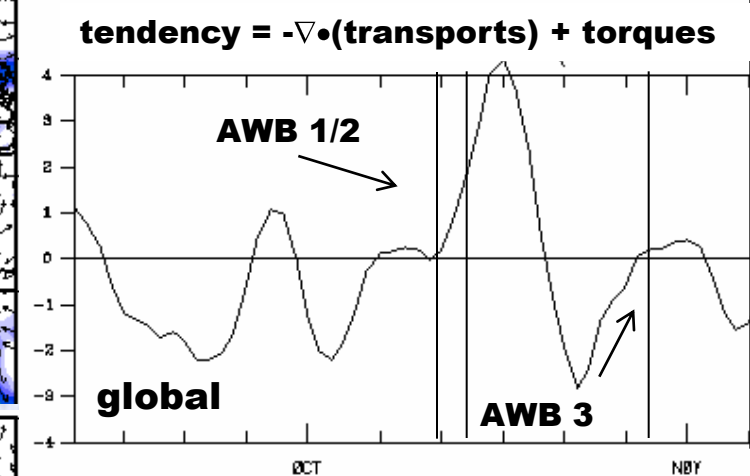
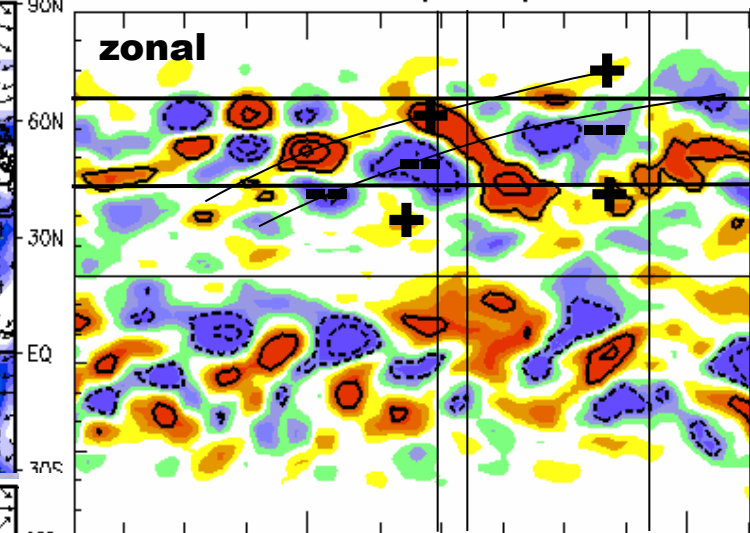
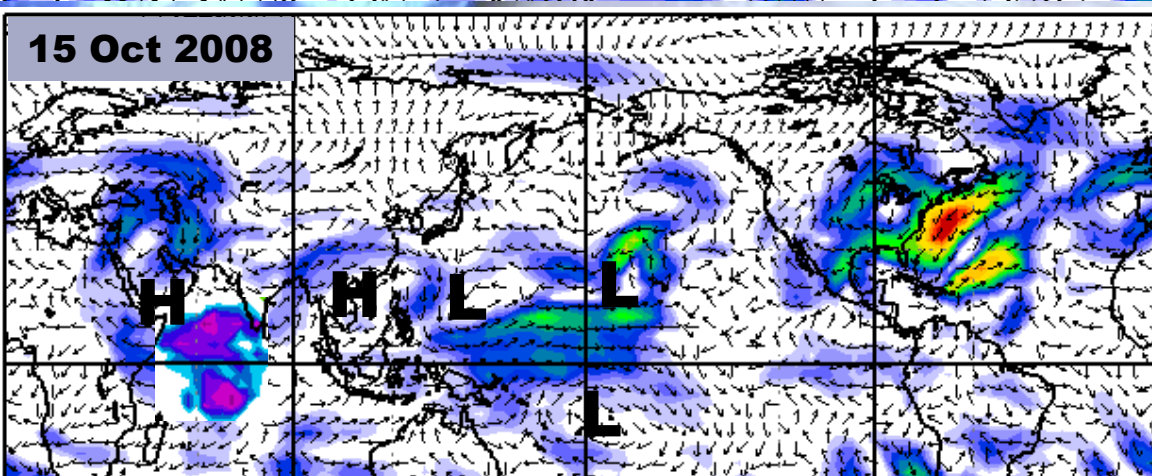
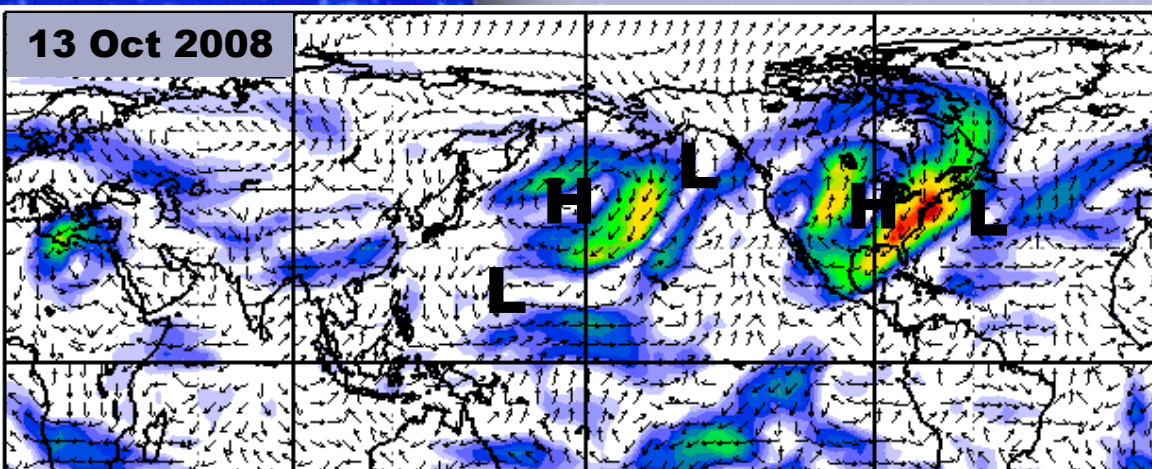
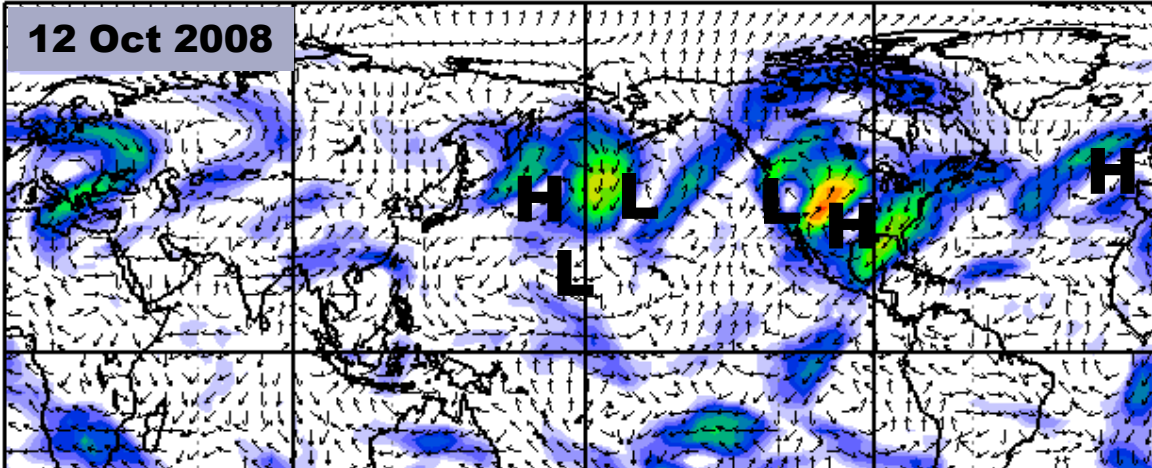
**19-26 Mar 09**

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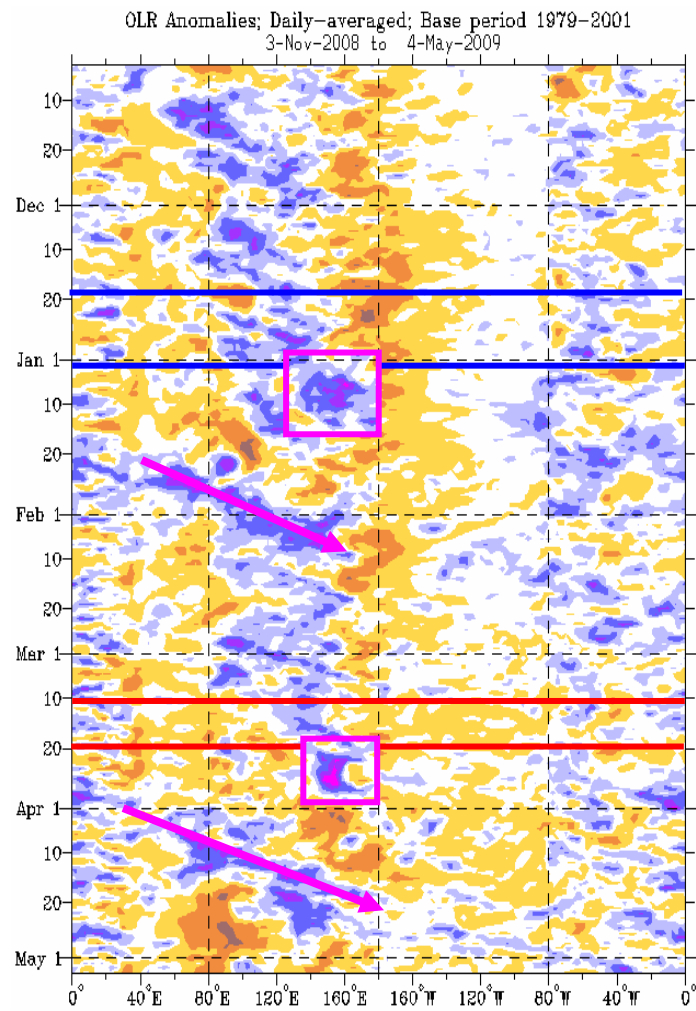
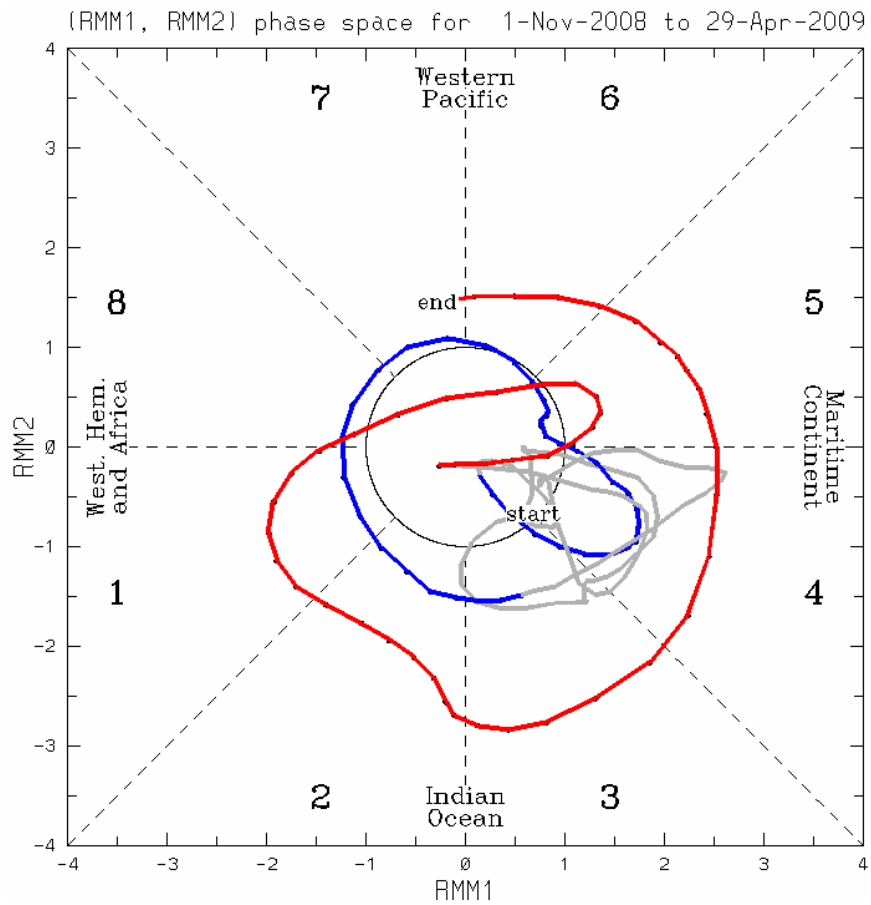


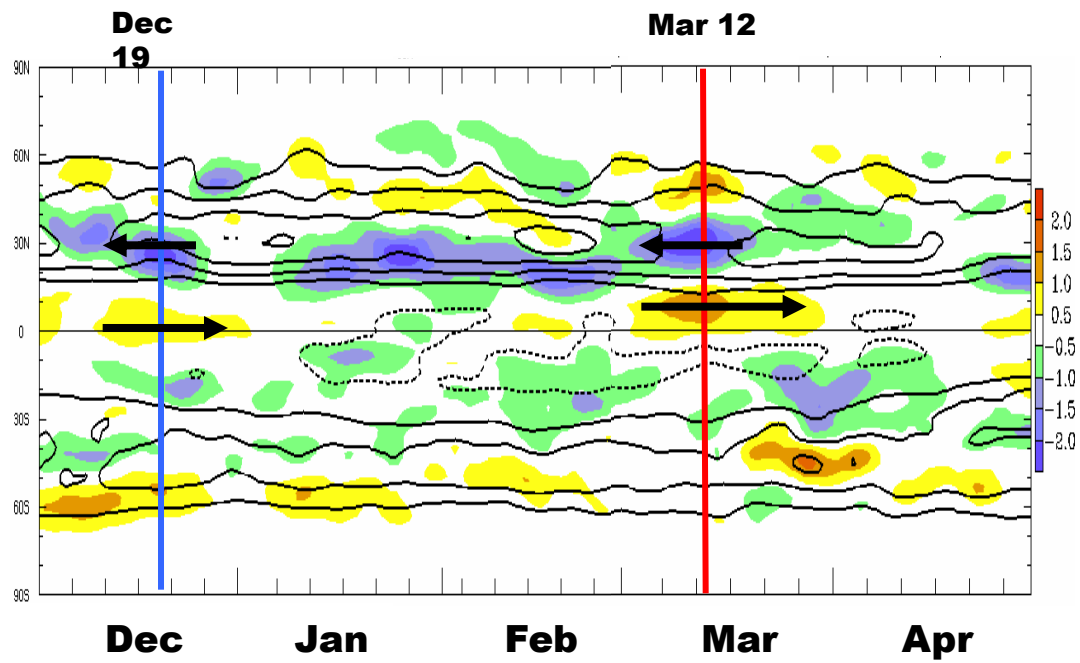
# SUMMARY

- May-June 2008 MJO
- Boreal Fall 2008 intraseasonals
  - “truncated” Oct MJO → La Nina
  - 15 Oct, 15 Nov Indian Ocean convective flareups
  - circulation retrogression (Dec 08, cold USA)
- Initiation of DJ09 and MA09 MJOs?
  - SSW, major cold outbreak USA Jan 09
- Slow eastward movement of convection
  - contribution to early March 09 “split flow”?



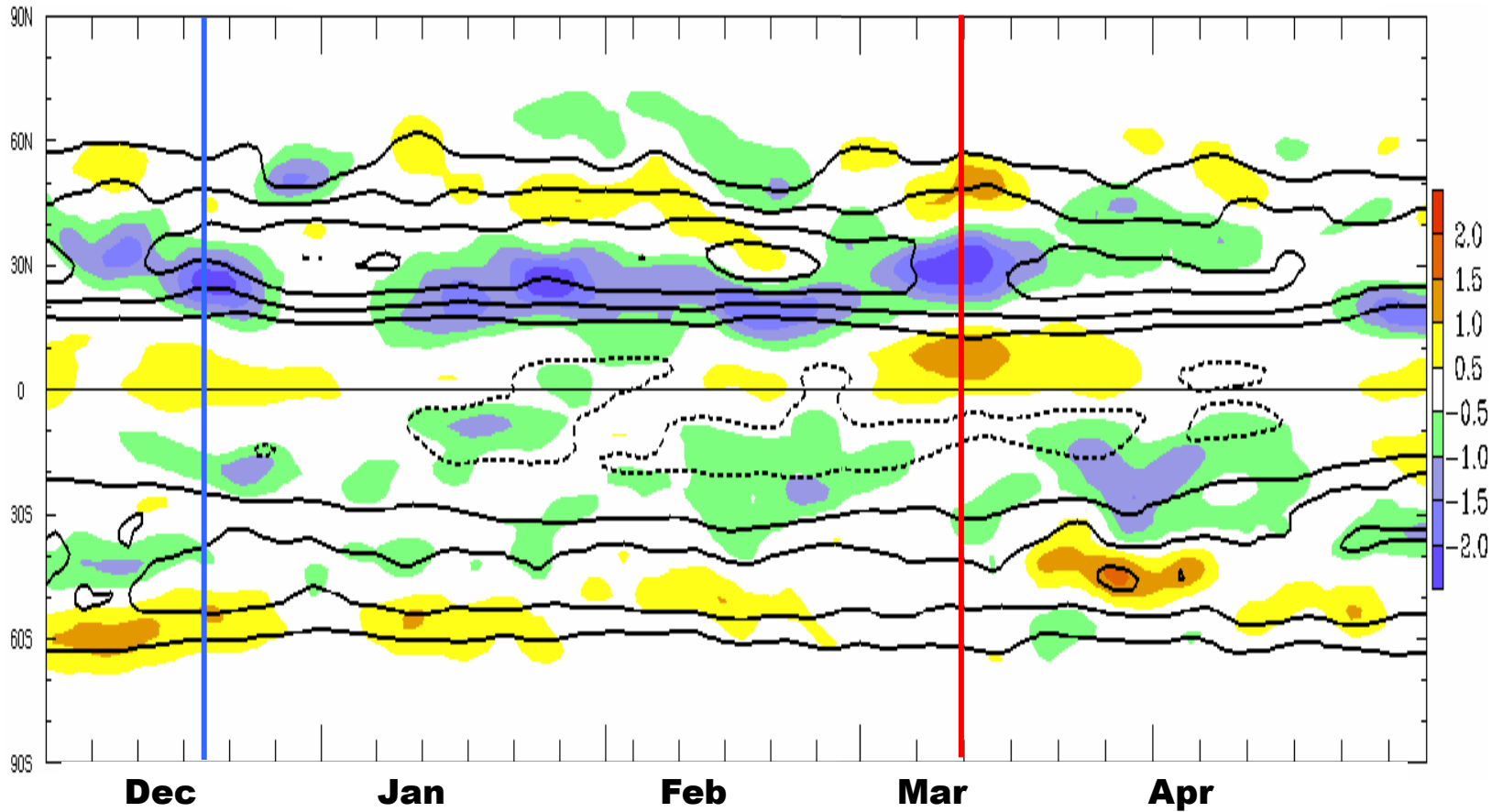








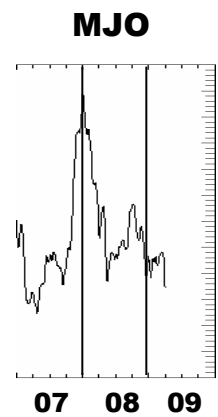
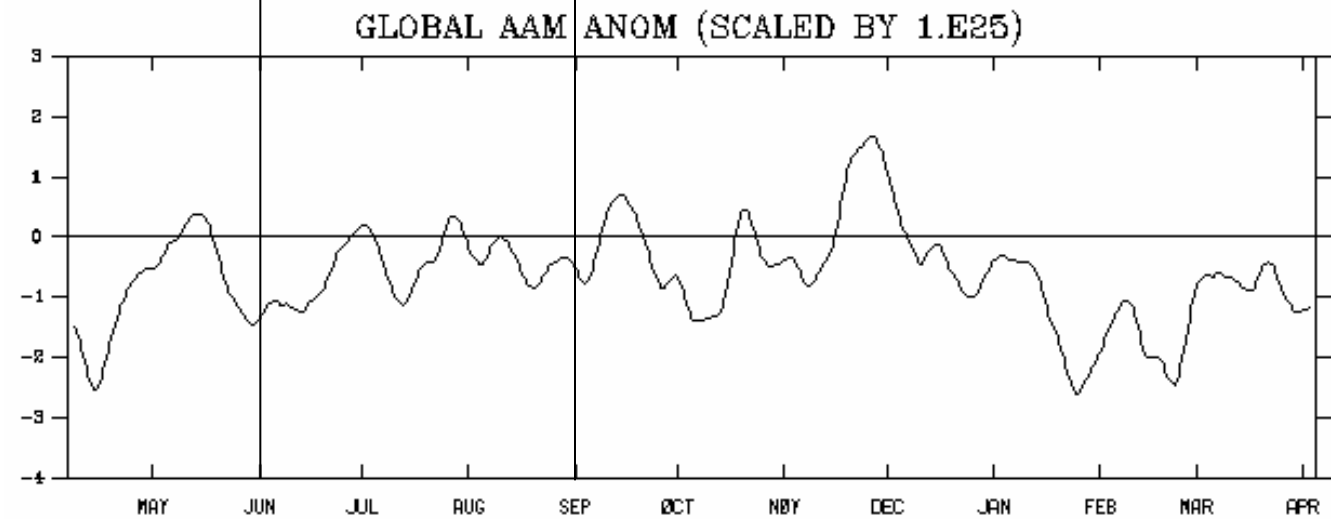
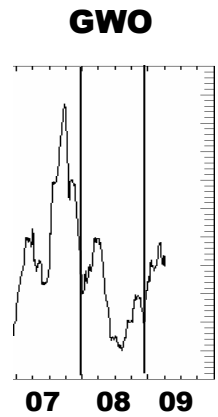
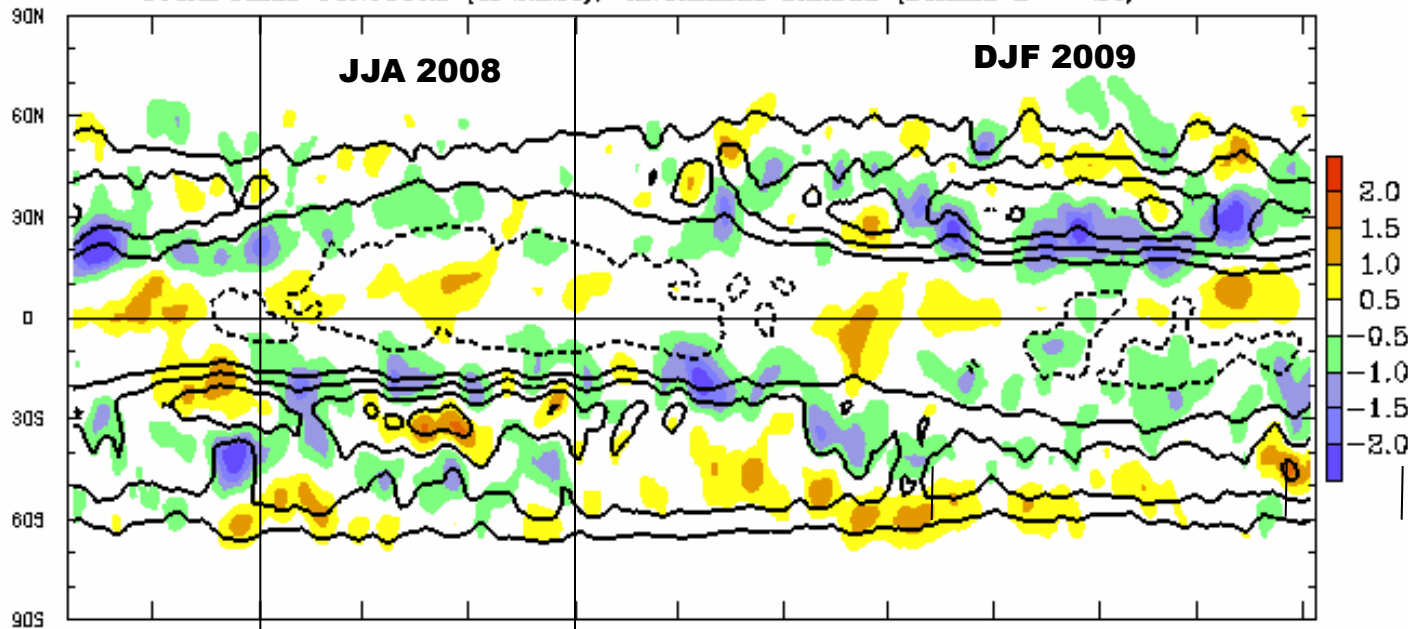
## Zonal Mean AAM: 2008-09



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