

# MJO and convectively coupled waves in Navy models

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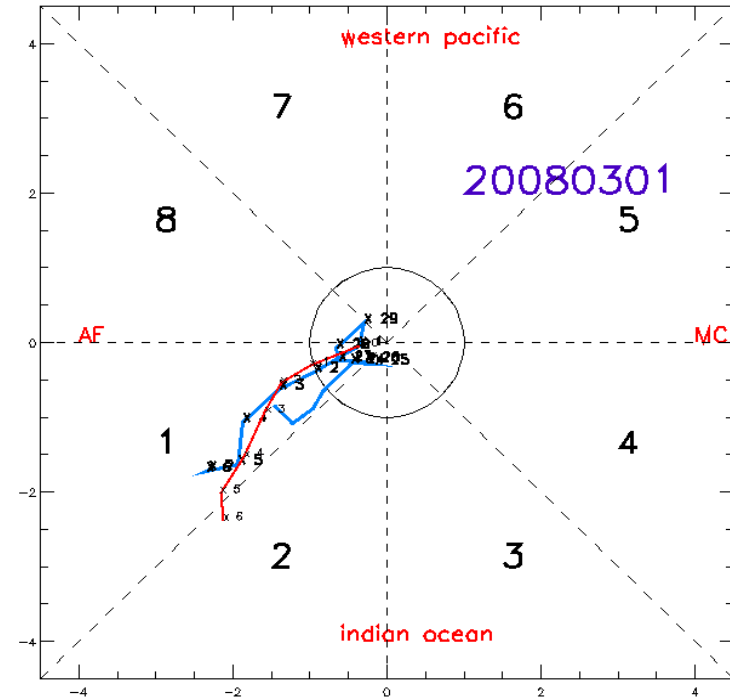
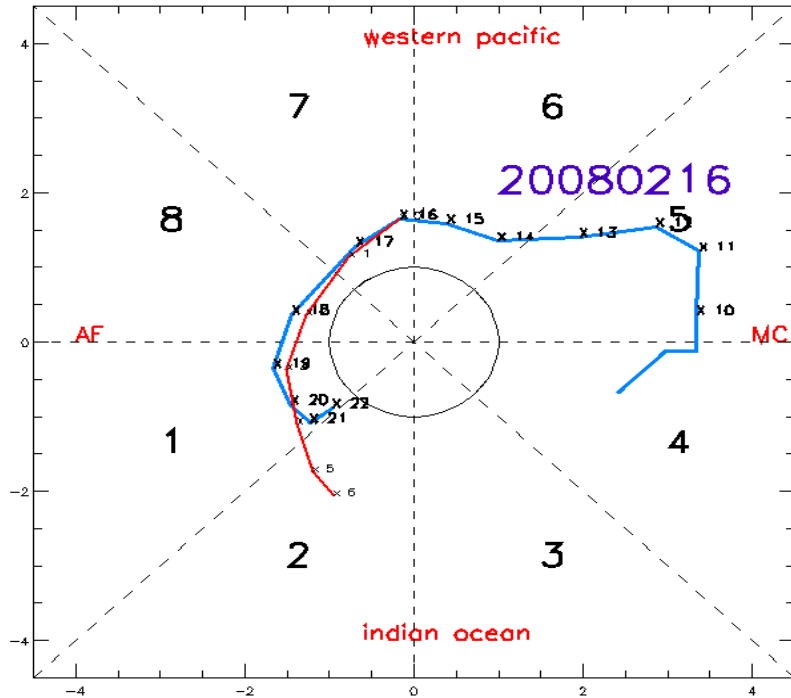
**Piotr Flatau**

**James Ridout**

DYNAMO workshop April 13-14, 2009

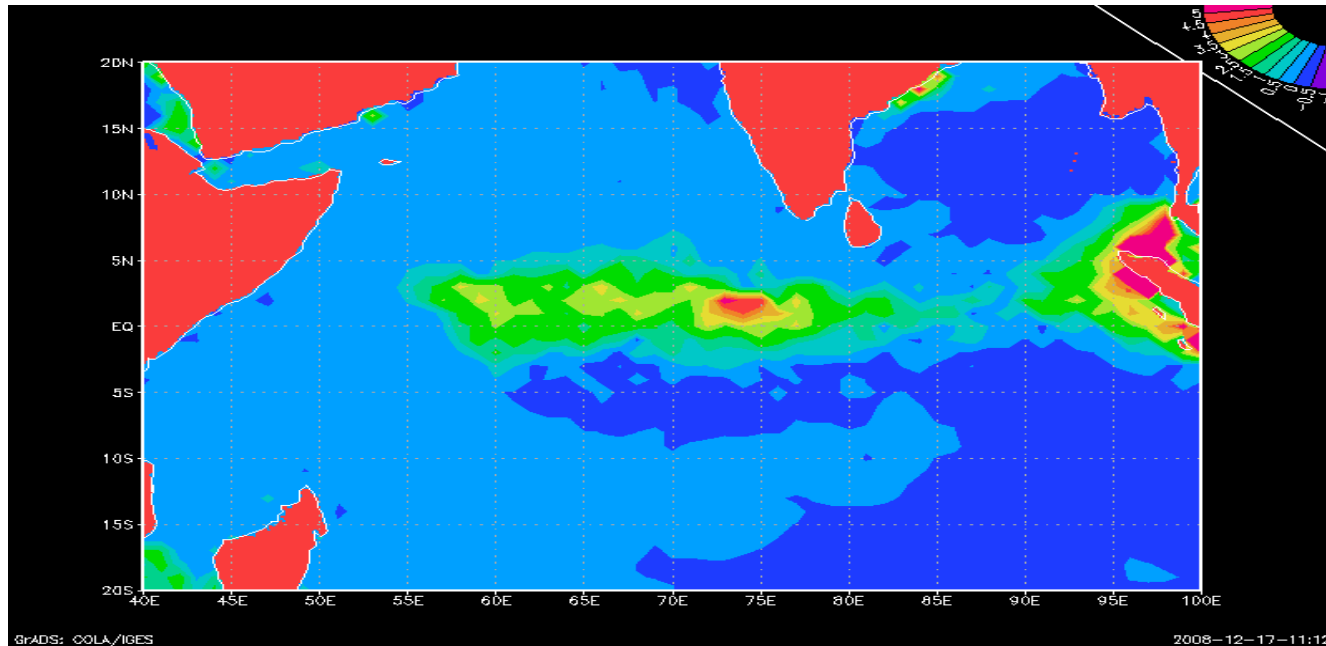
# Operational deterministic forecast

## RMM index (Wheeler and Hendon 2004)



- Good forecasts for MJO initiation in winter
- More problems in summer
- Propagation over Indian Ocean
- Maritime continent barrier
- Reduced amplitude over WP
- Similar results from ensemble runs (May – Oct 2007 and 2008)

# The effect of diurnal SST change?



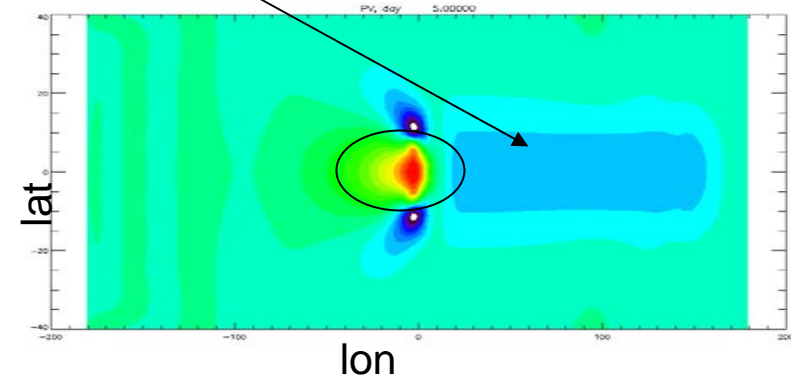
- Average SST change August 1-5 2008

Diurnal warming of “skin SST” as simulated in NOGAPS, using Zeng and Beljaars (2005) scheme

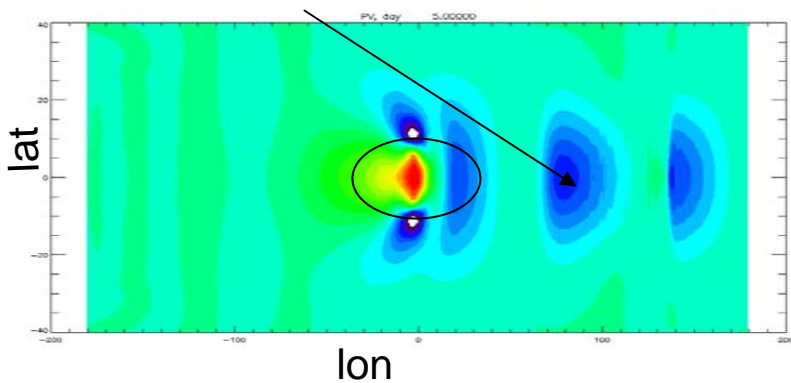
# The effect of diurnal SST change on equatorial Kelvin waves

## Shallow water NSEAM

One long wave

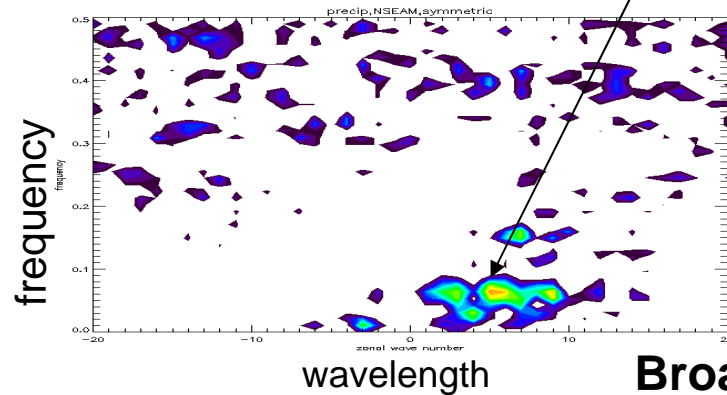


Series of intense short waves

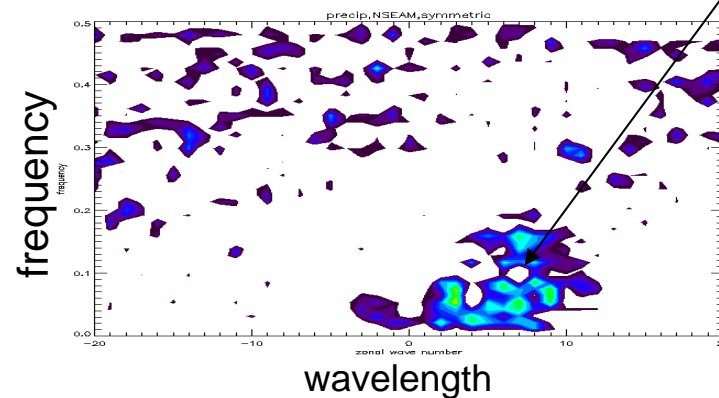


## Aqua planet NSEAM

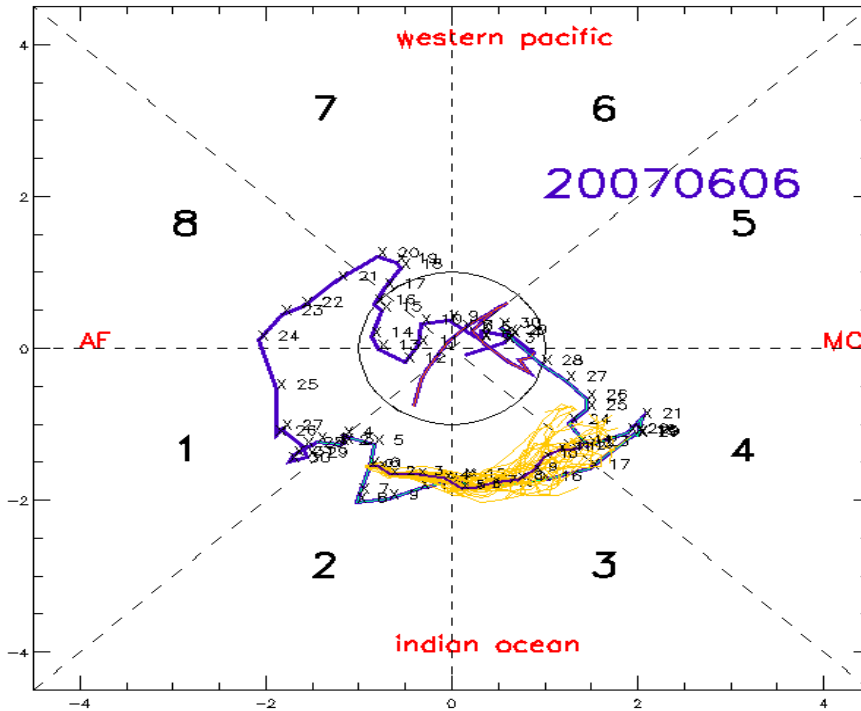
Strong peak for one frequency



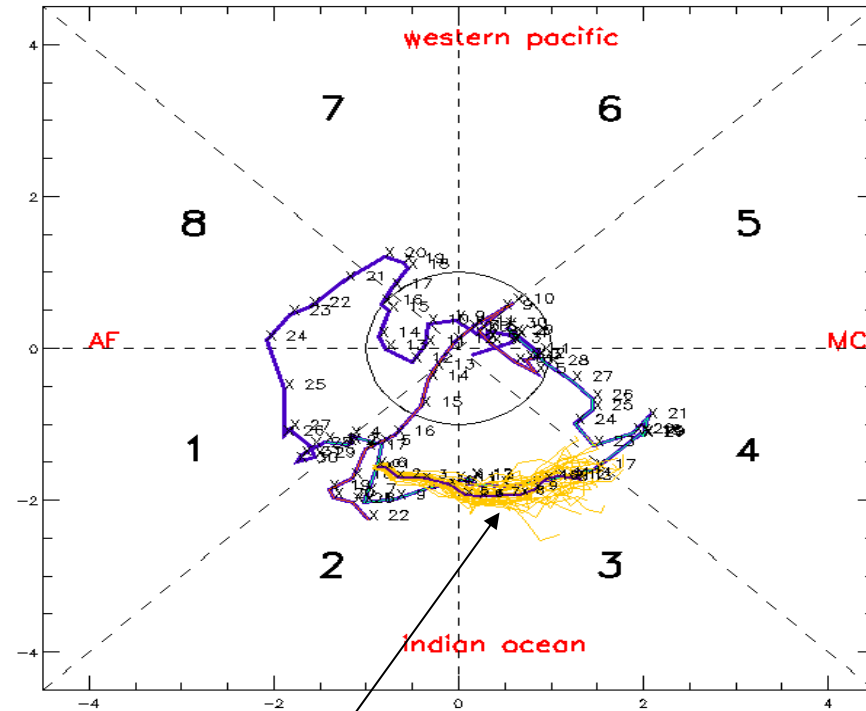
Broad spectrum



# The impact of diurnal SST variations on MJO ensemble forecast (May-June 2007)



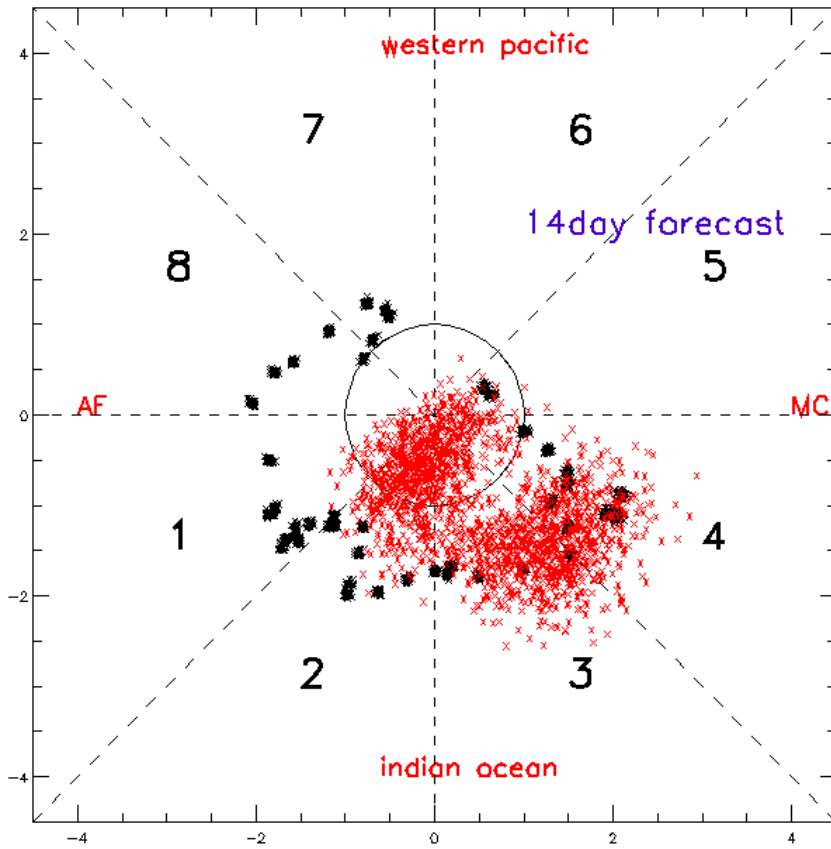
control



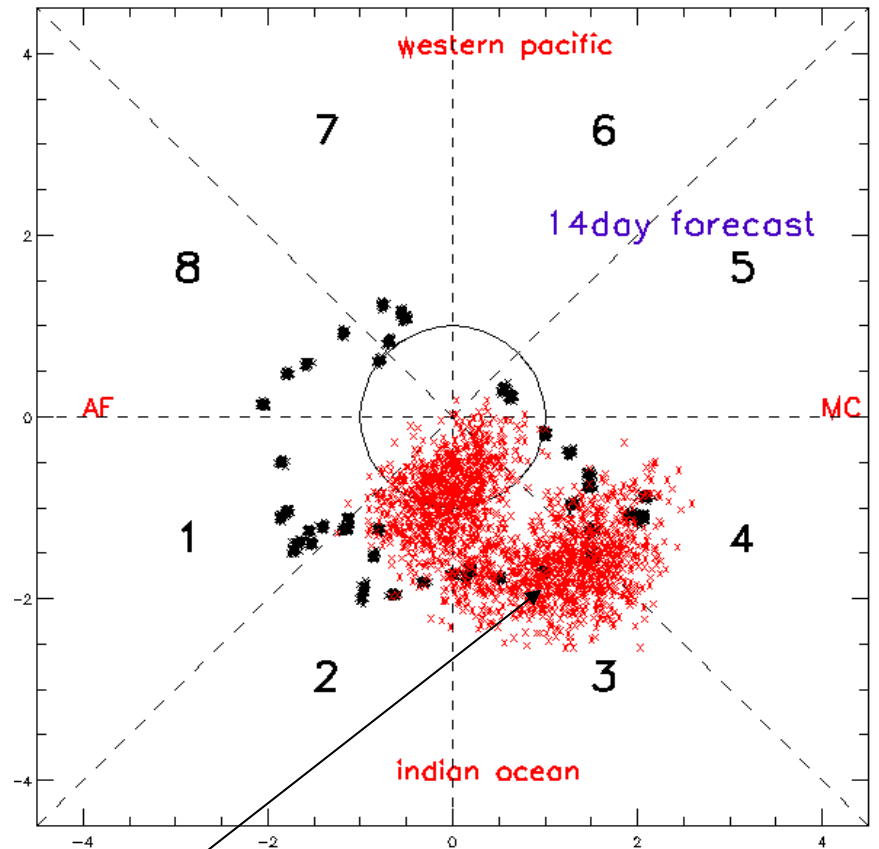
Diurnal change of skin sst

Stronger signal in the Indian ocean

# All forecasts for May-June 2007



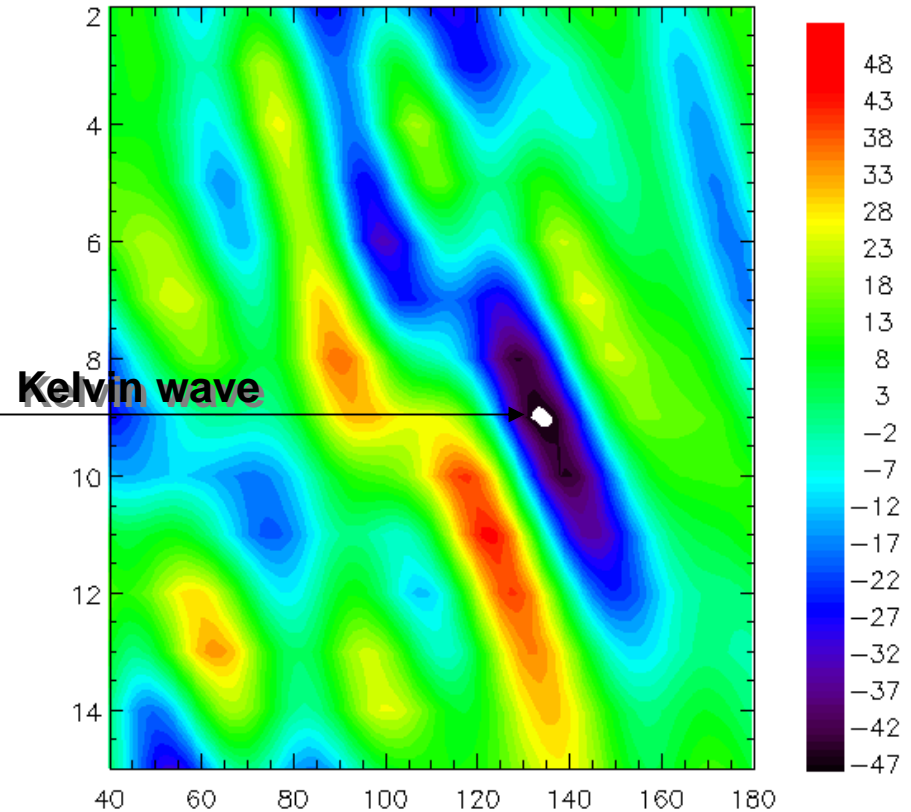
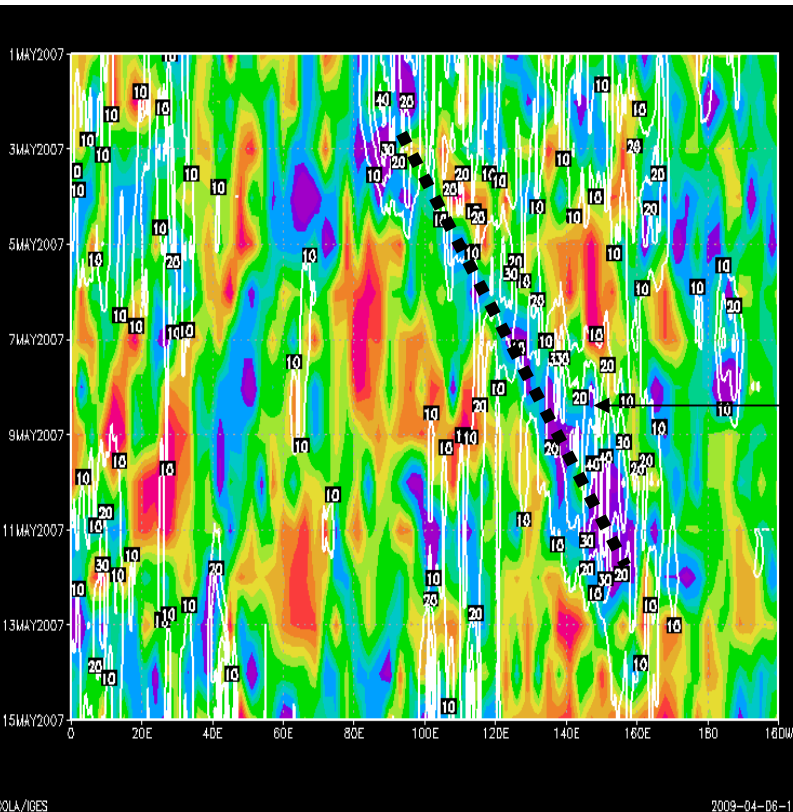
**control**



**Diurnal change skin sst**

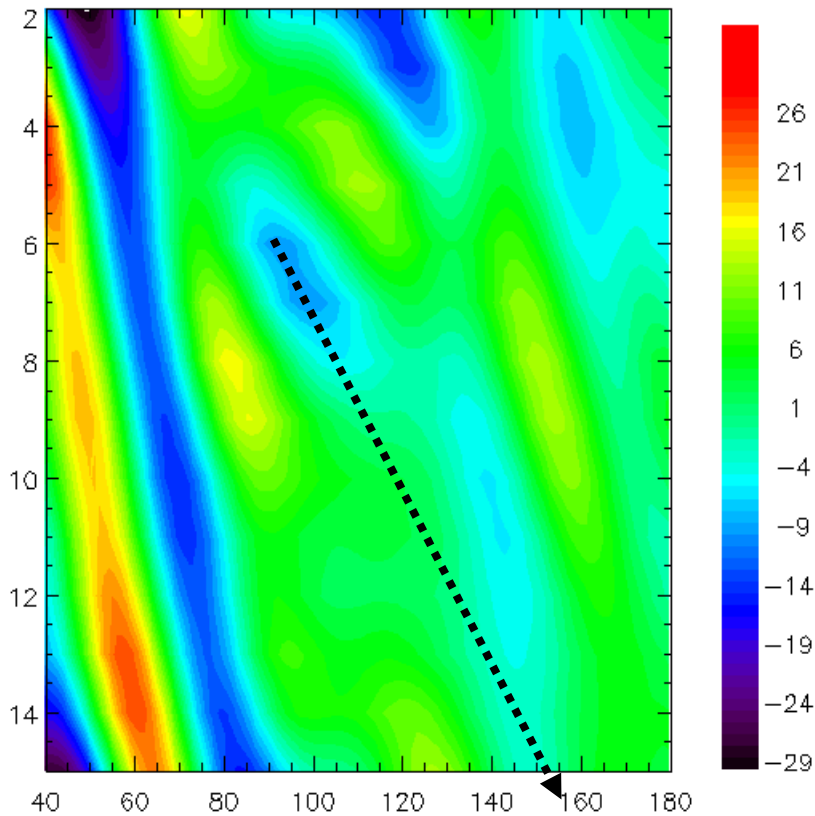
**Stronger MJO in Indian Ocean**

# The effect on skin skin SST change on Kelvin wave in the ensemble forecast

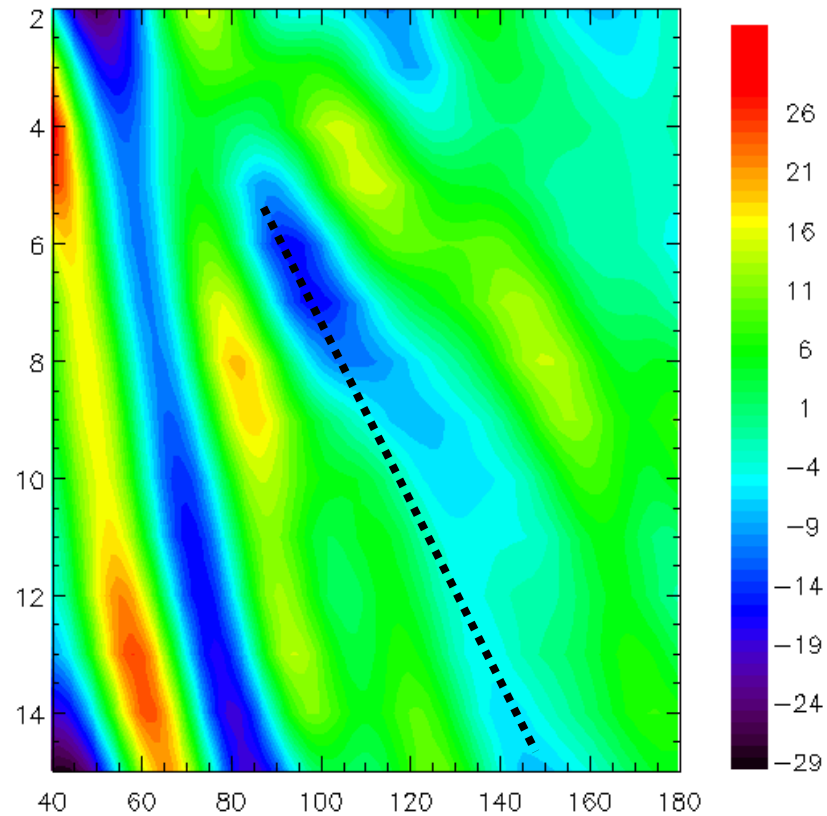


OLR anomaly from NOAGPS analysis, (shading) and precipitation from TRMM data (white contours) averaged 5S-5N for 2-15May 2007

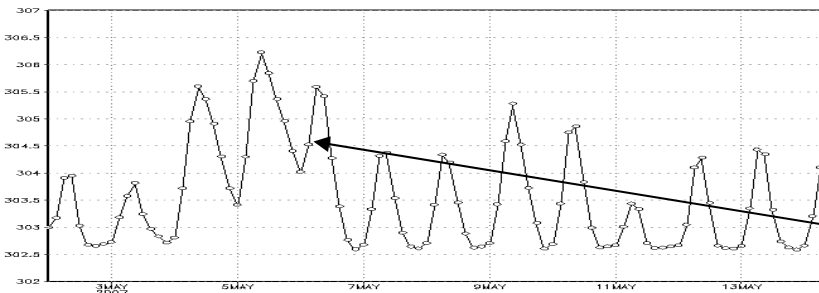
OLR from NOGAPS analysis filtered for Kelvin waves



**OLR filtered for Kelvin waves  
14 days ensemble mean  
control**



**OLR filtered for Kelvin waves  
14 days ensemble mean  
Skin SST**

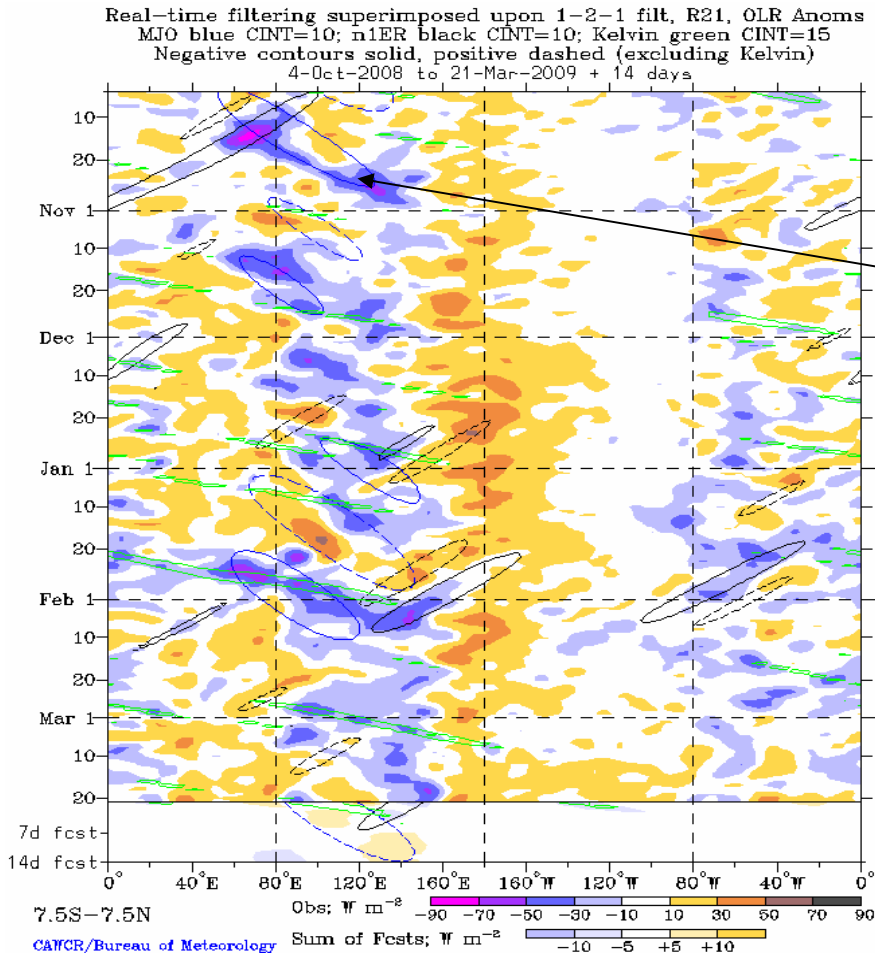


**Skin SST May1-May 15 2007  
ON 105E**

**SST increase May5-May7**

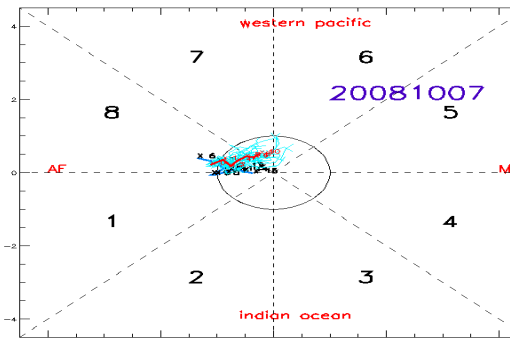
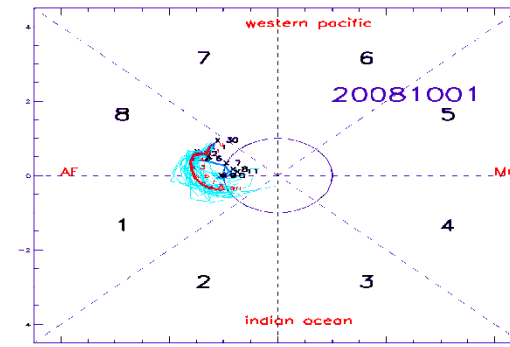


# October 2008 MJO



Interaction between the MJO and Rossby wave.

Difficult to predict in NOGAPS  
 Associated with large equatorial westerlies (possible influence on termination on IOD episode)



Sue Chen will show preliminary COAMPS results

# Summary

- NOGAPS MJO forecasts have characteristics similar to other models:
  - a. relatively good forecast of Indian Ocean
  - b. difficulties over Maritime continent
  - c. difficulties when strong Rossby wave is present
- Including diurnal SST variability causes:
  - a. Change of the Kelvin wave spectrum on aqua planet
  - b. Increase of MJO strength in NOGAPS
  - c. Increase in intensity of Kelvin wave