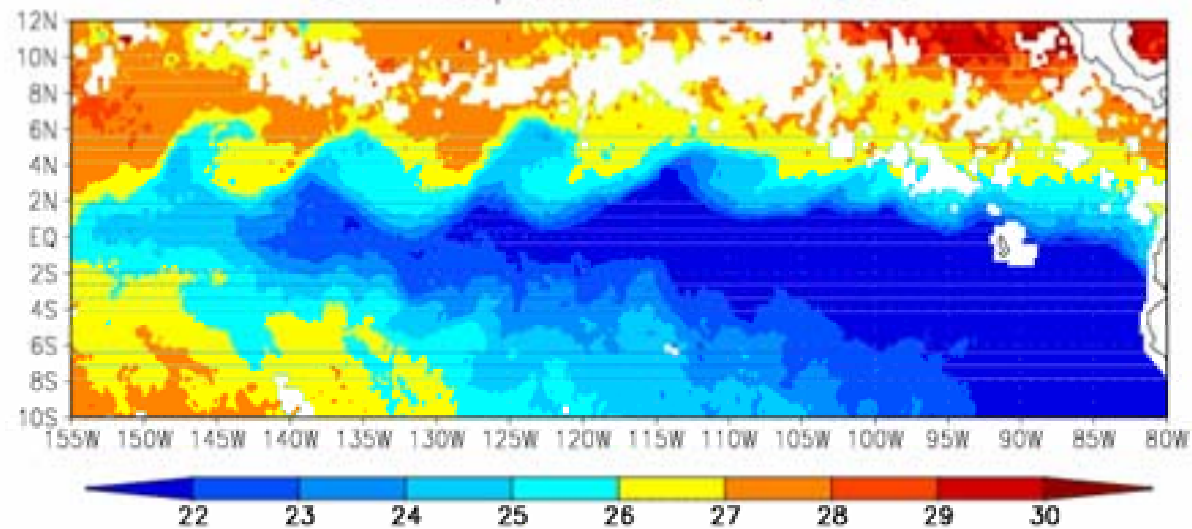# Tropical instability waves in HYCOM
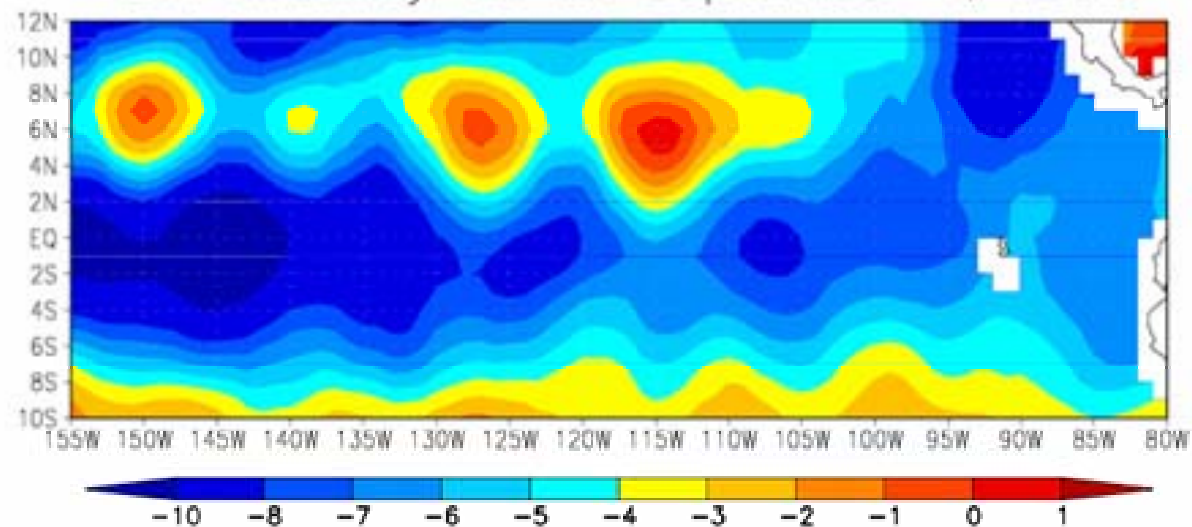
by

Toshi Shinoda

(NRL Stennis Space Center)

1. Introduction
2. Statistical description of TIWs
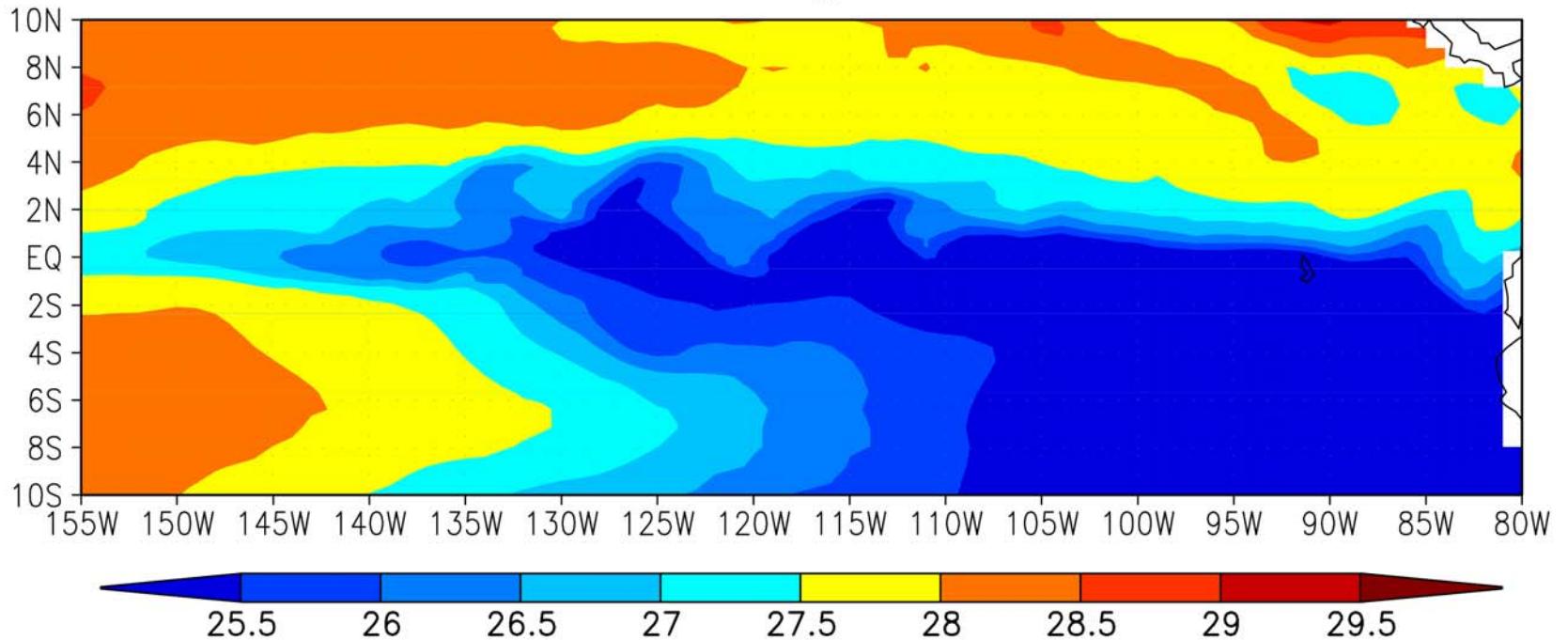3. Evaluation of HYCOM simulation
4. Conclusions

SST September 1, 1999

SSH Anomaly TOPEX September 1, 1999
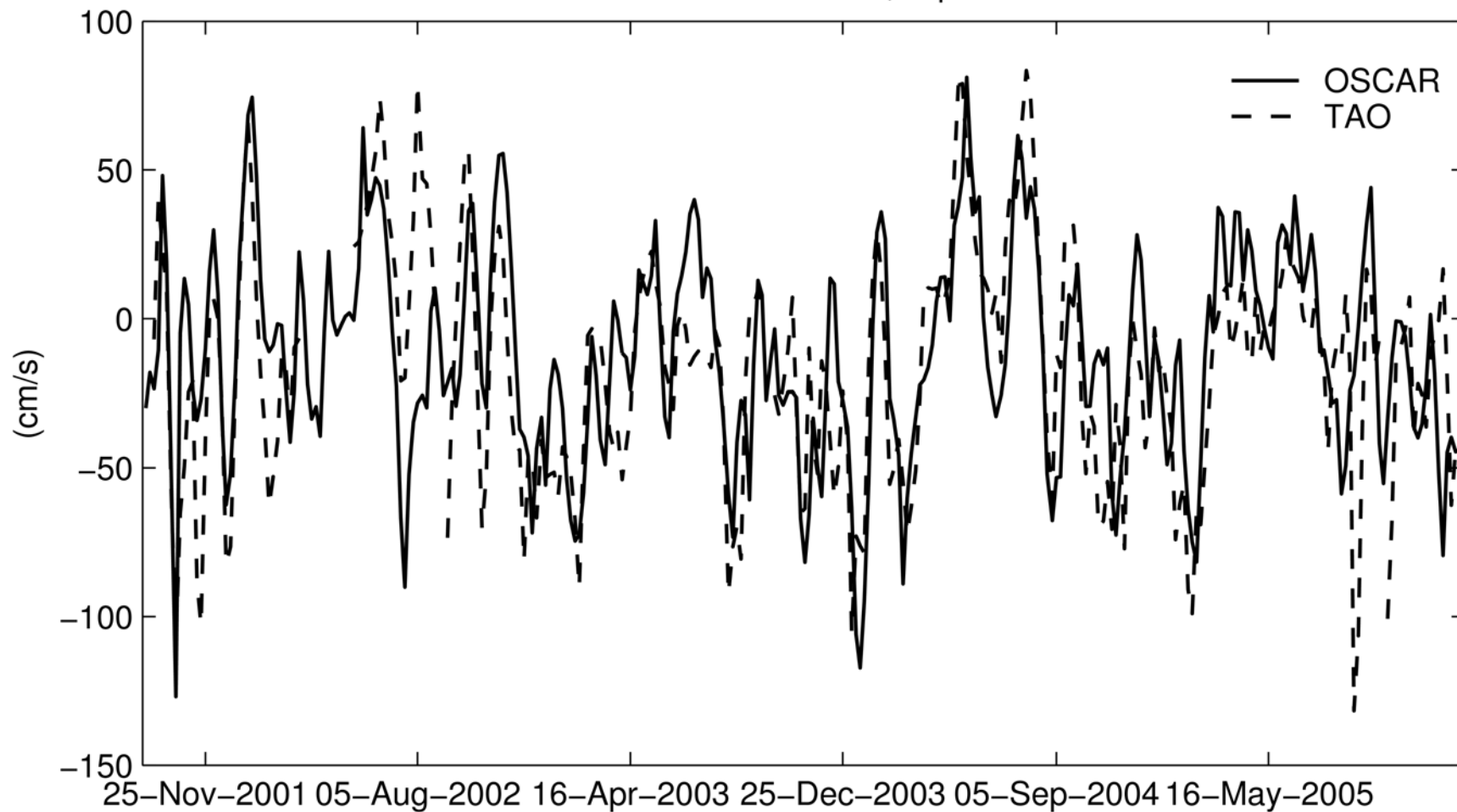
HYCOM SST August 31, 1989

Provide the statistical description of TIW using available satellite data.
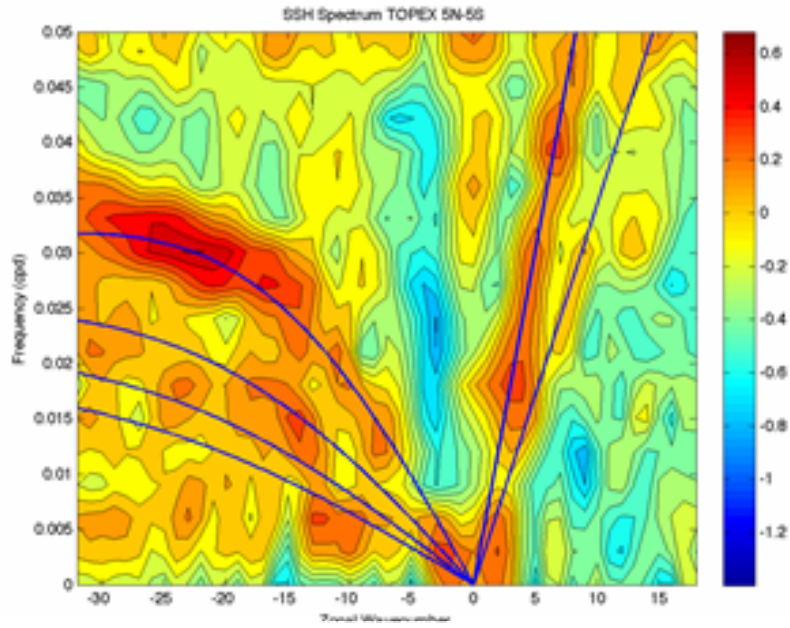
Data

Sea Surface Height ==> TOPEX (1993-2002)
SST   ==> TMI (1998-2006)
                        Reynolds (1981-2006)
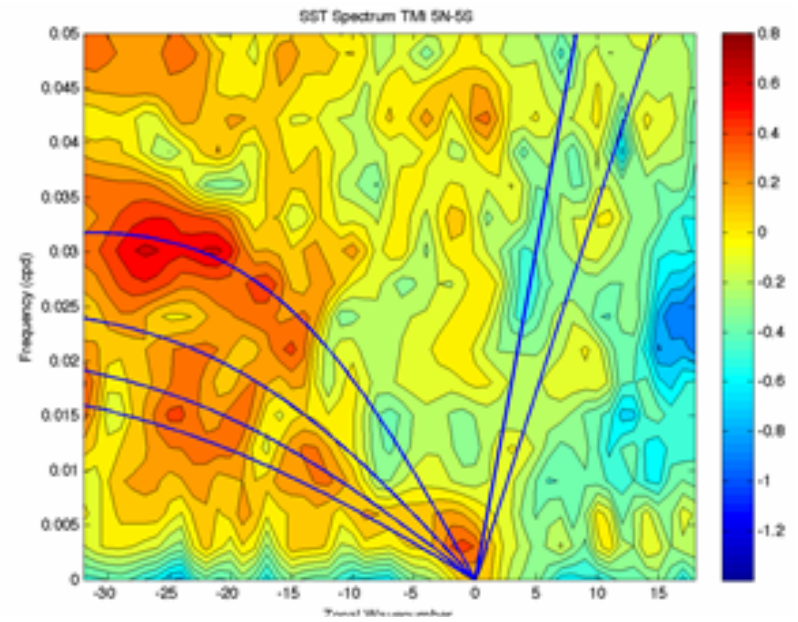Surface velocity   ==> OSCAR (1992-2006)
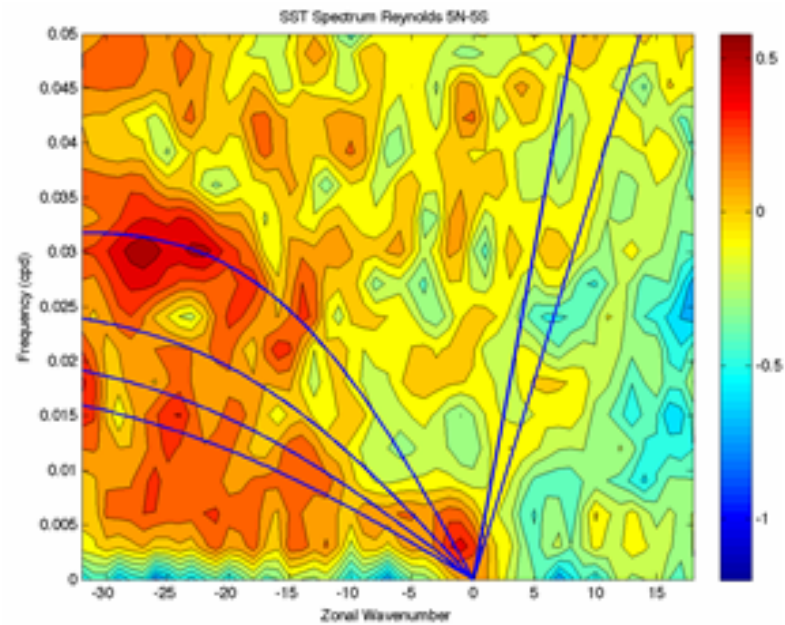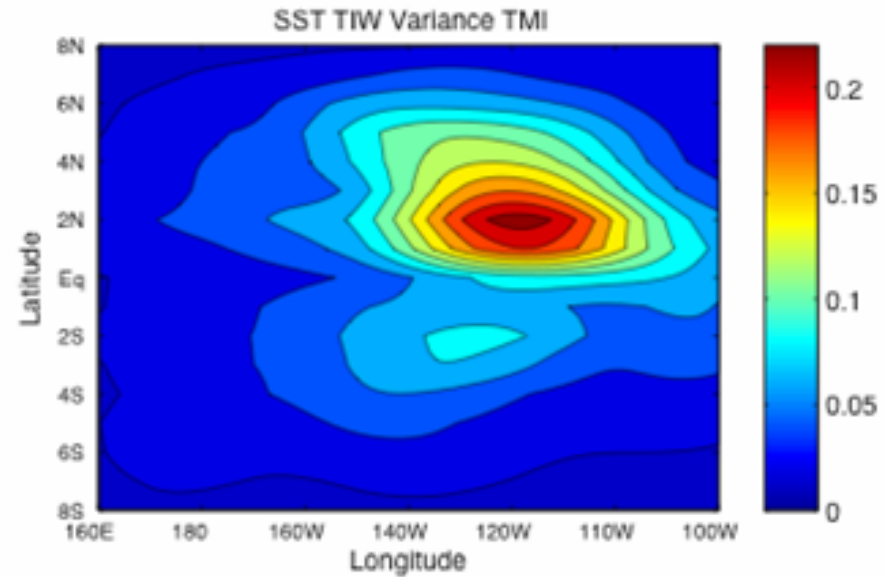
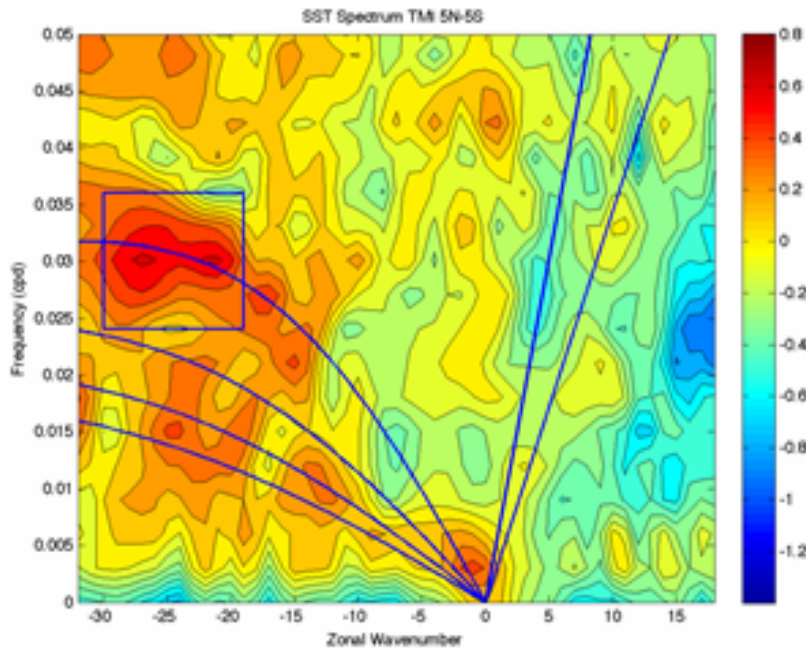Zonal Current 140W, Equator

TOPEX

SSH Spectrum TOPEX 5N-5S

TMI SST

SST Spectrum TMI 5N-5S

Reynolds SST

SST Spectrum Reynolds 5N-5S

SST Spectrum TMI 5N-5S

TMI SST

SST TIW Variance TMI

TOPEX

SSH TIW Variance TOPEX

Reynolds SST

SST TIW Variance Reynolds

TMI SST

Day −5
Day 0
Day +5

Reynolds SST

Day −5
Day 0
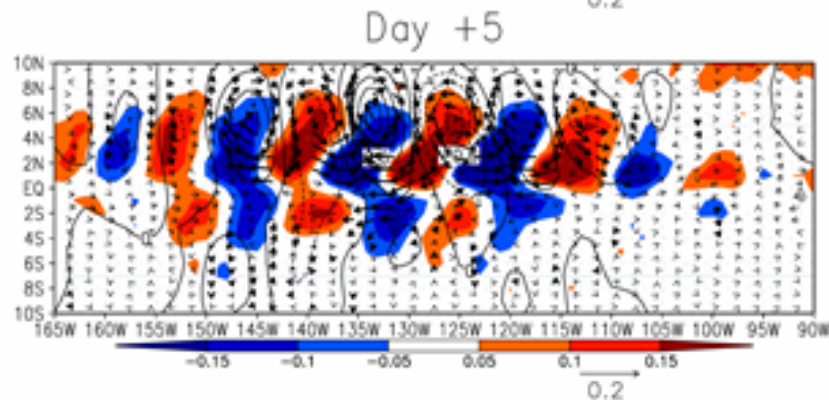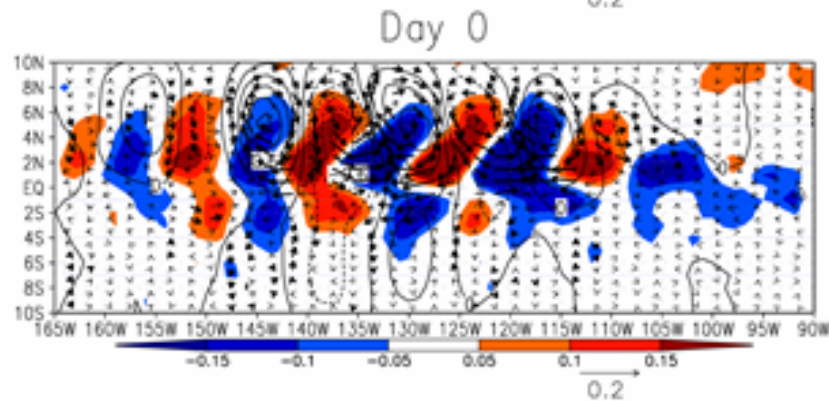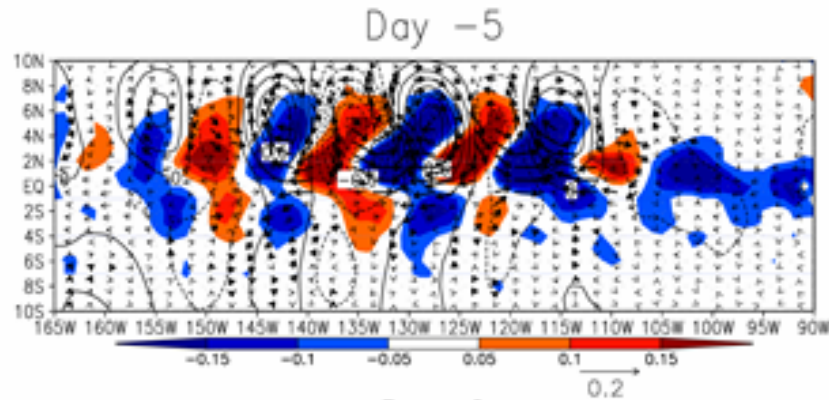### Day +5
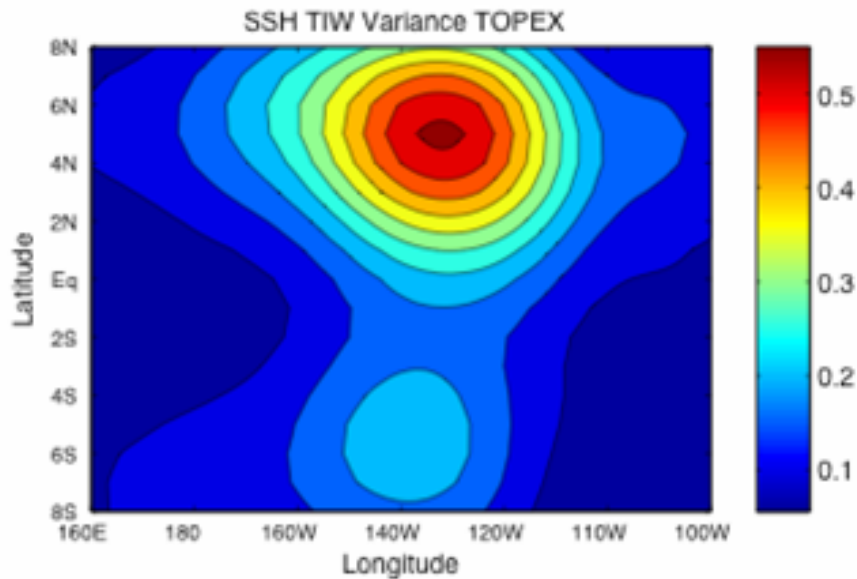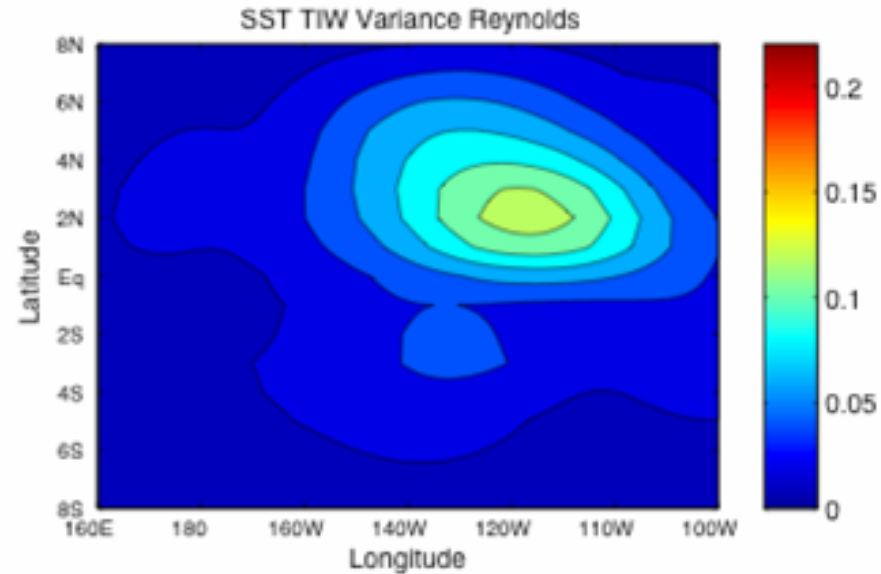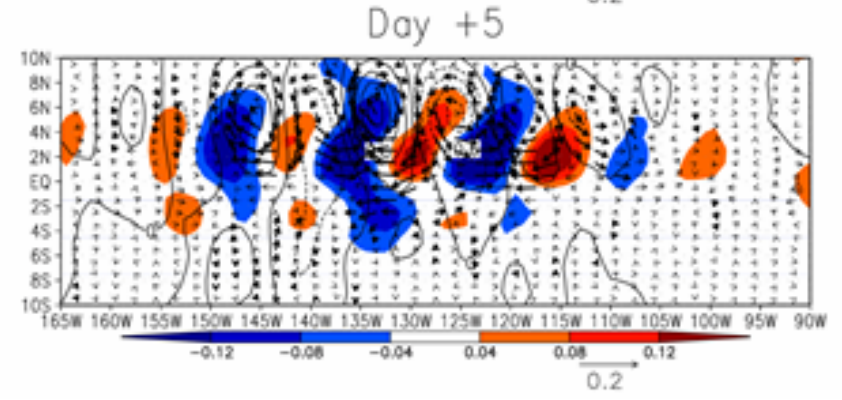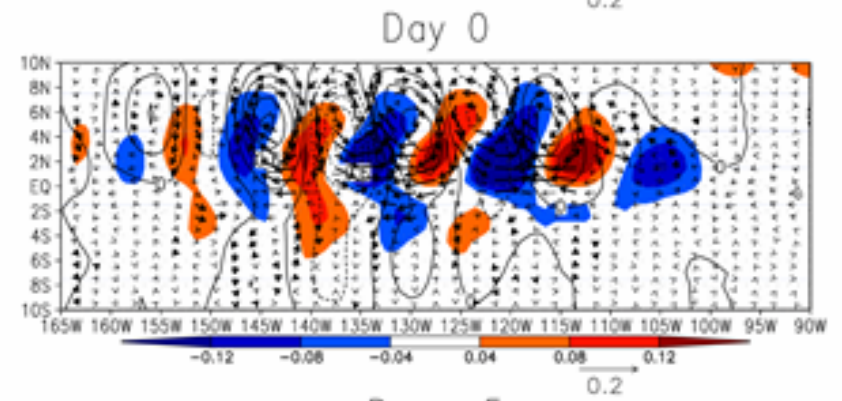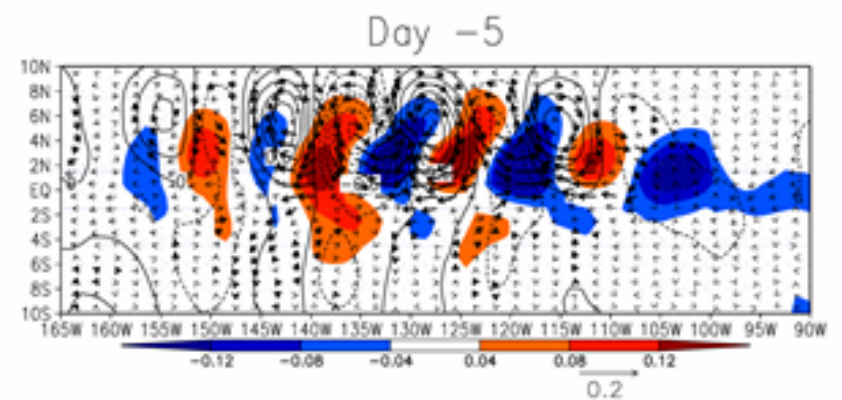
SST: Shading, SSH: Contours, Surface currents: Arrows

HYCOM experiment

Domain: Tropical Indo-Pacific basin (30N-40S)
Period: 1981-2005

Daily surface fluxes
Shortwave and longwave radiation:
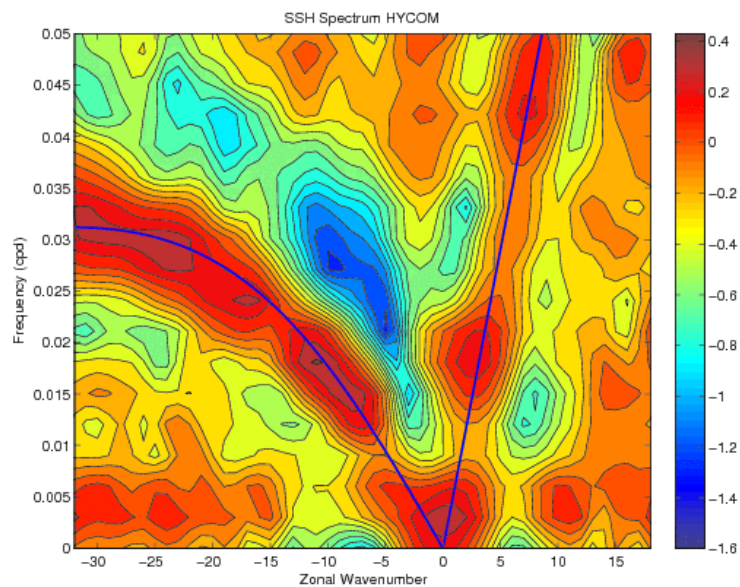*ISCCP-FD (Zhang et al. 2005)*
Latent and sensible heat fluxes
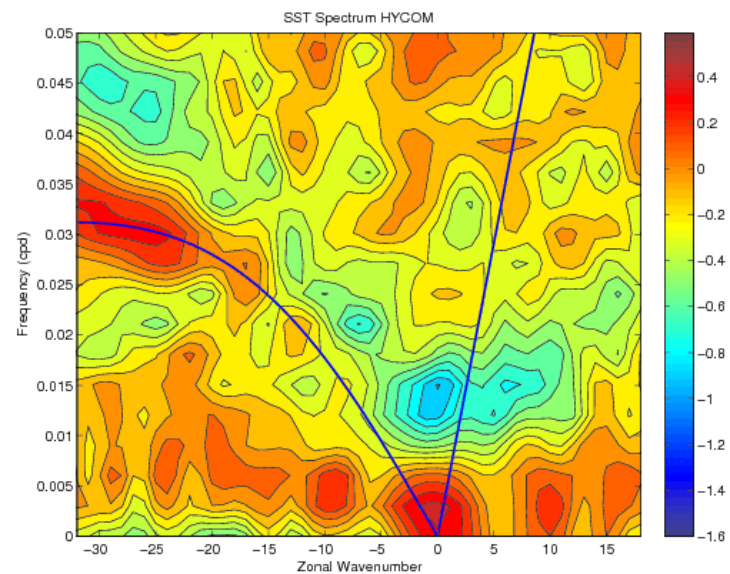*Winds, air temperature and humidity from*
the NCEP/NCAR reanalysis

Resolution: Zonal ==>1 deg.
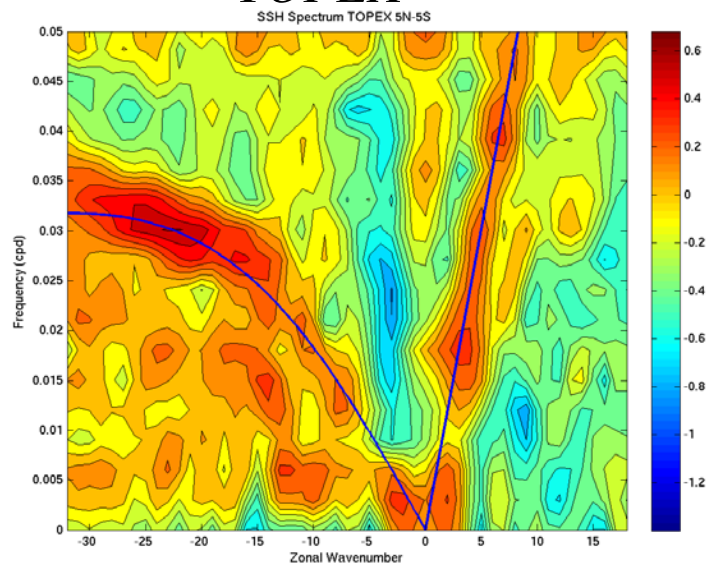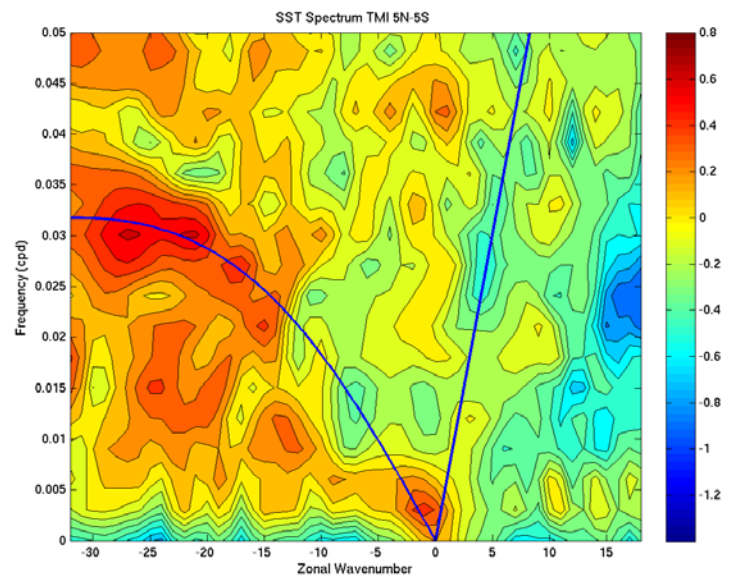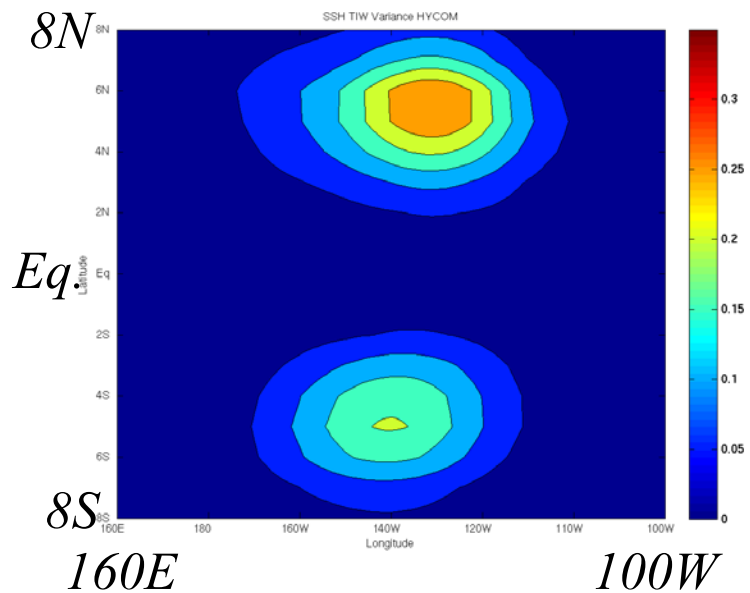*Meridional ==> Stretched coordinate (0.25 deg. on the equator)*
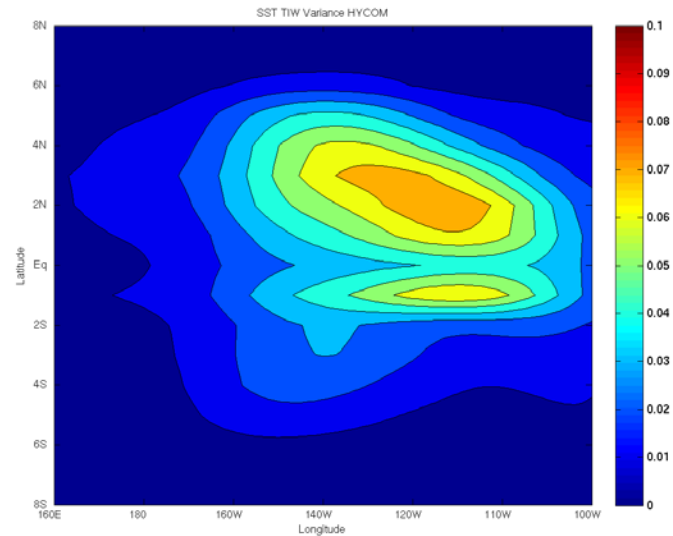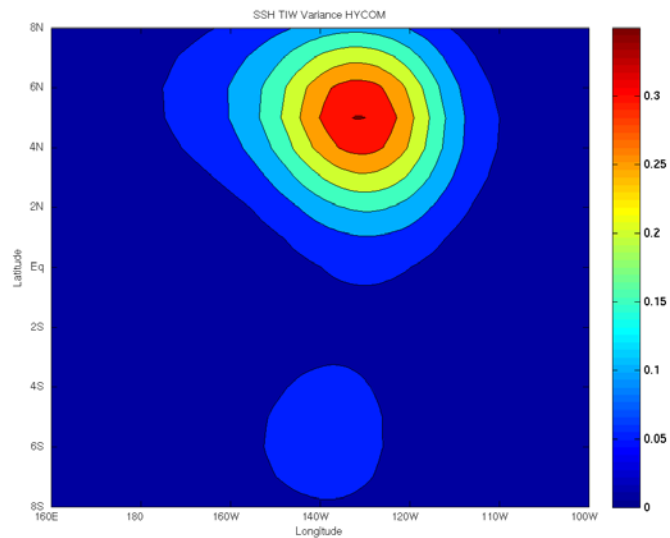
HYCOM SSH · *HYCOM SST* · *TOPEX* · *TMI SST*
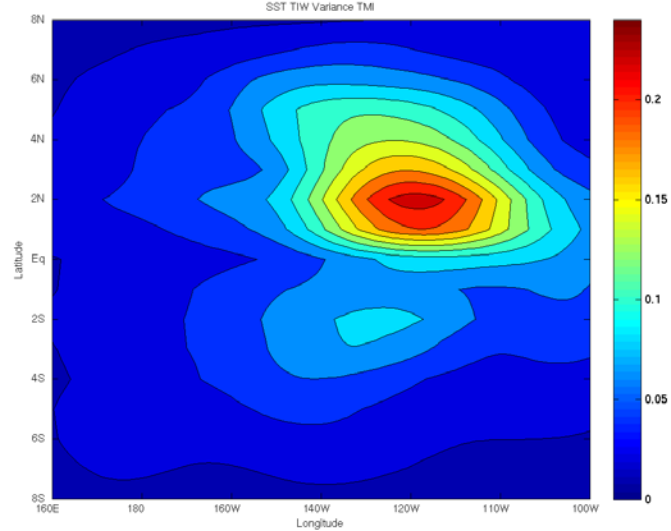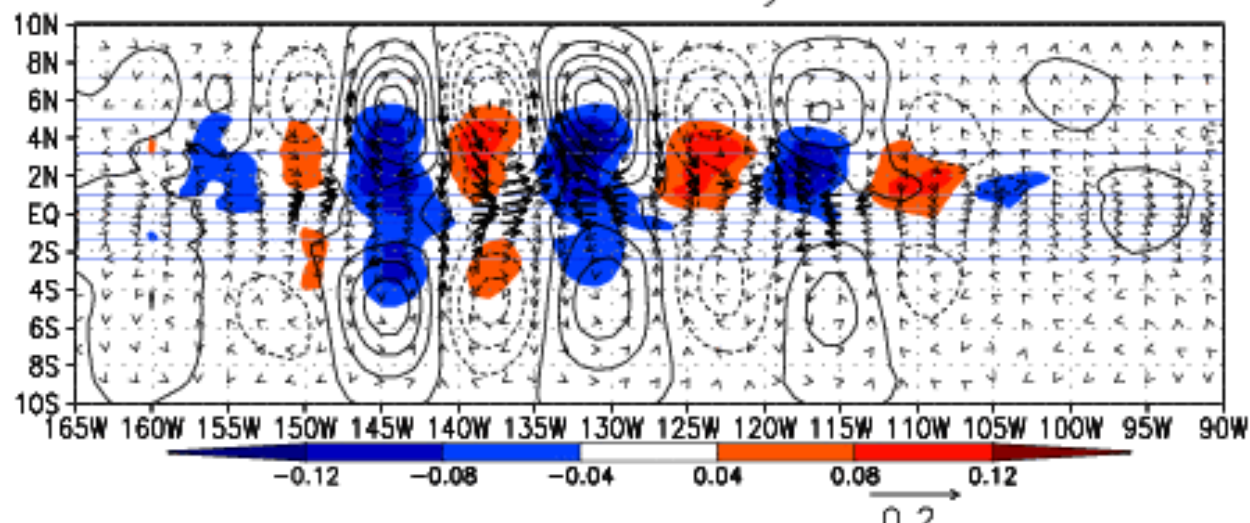
HYInCOM SSH   HYCOM SST
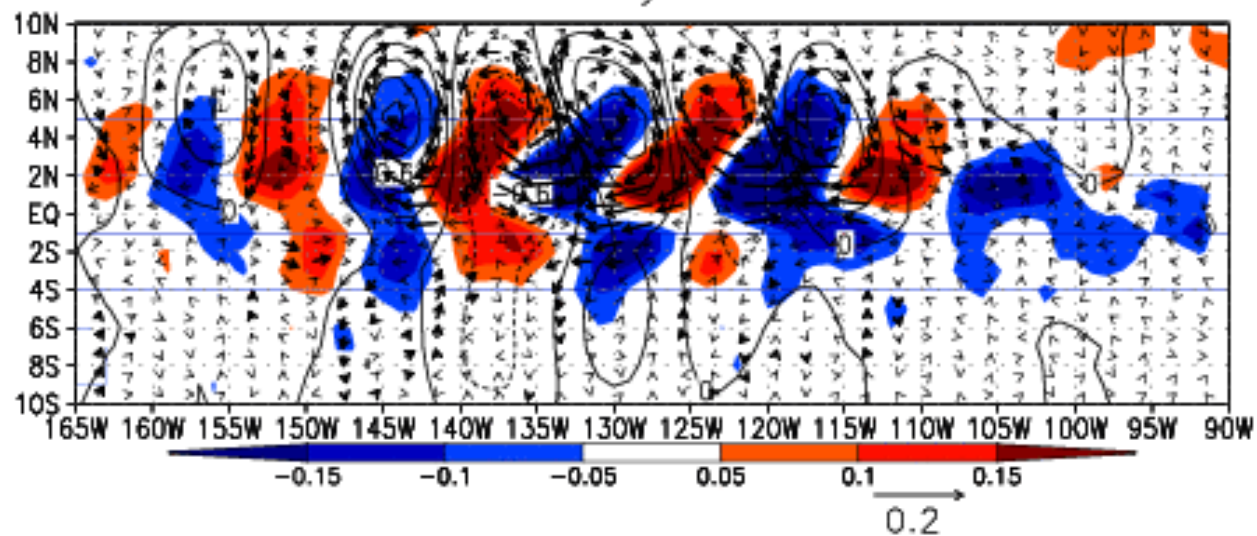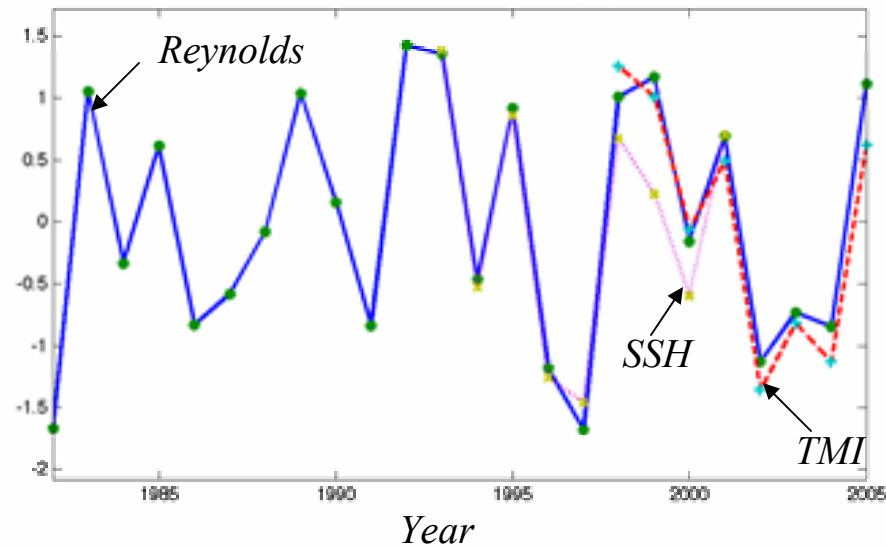
TOPEX   TMI SST

HYCOM   Day 0

TMI SST   Day 0

Interannual variation of TIW activity
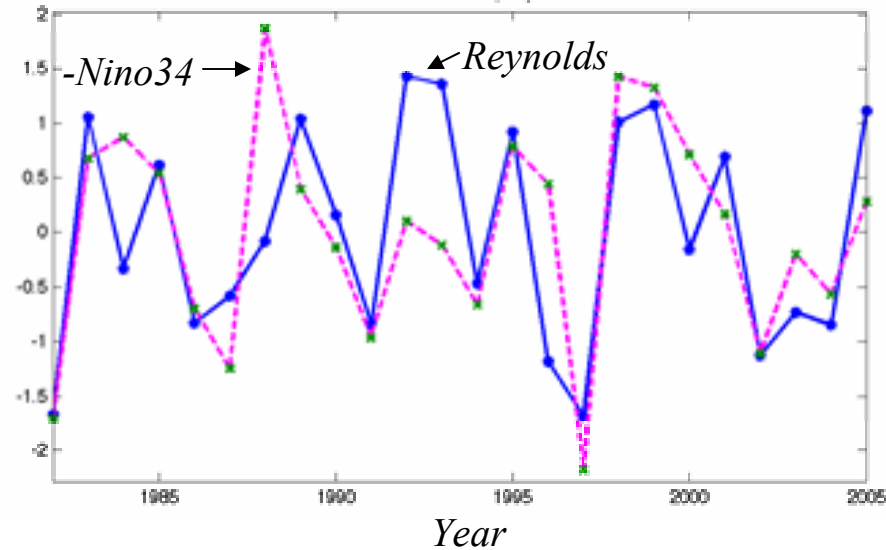
160W-100W, 5N-Eq., July-Jan

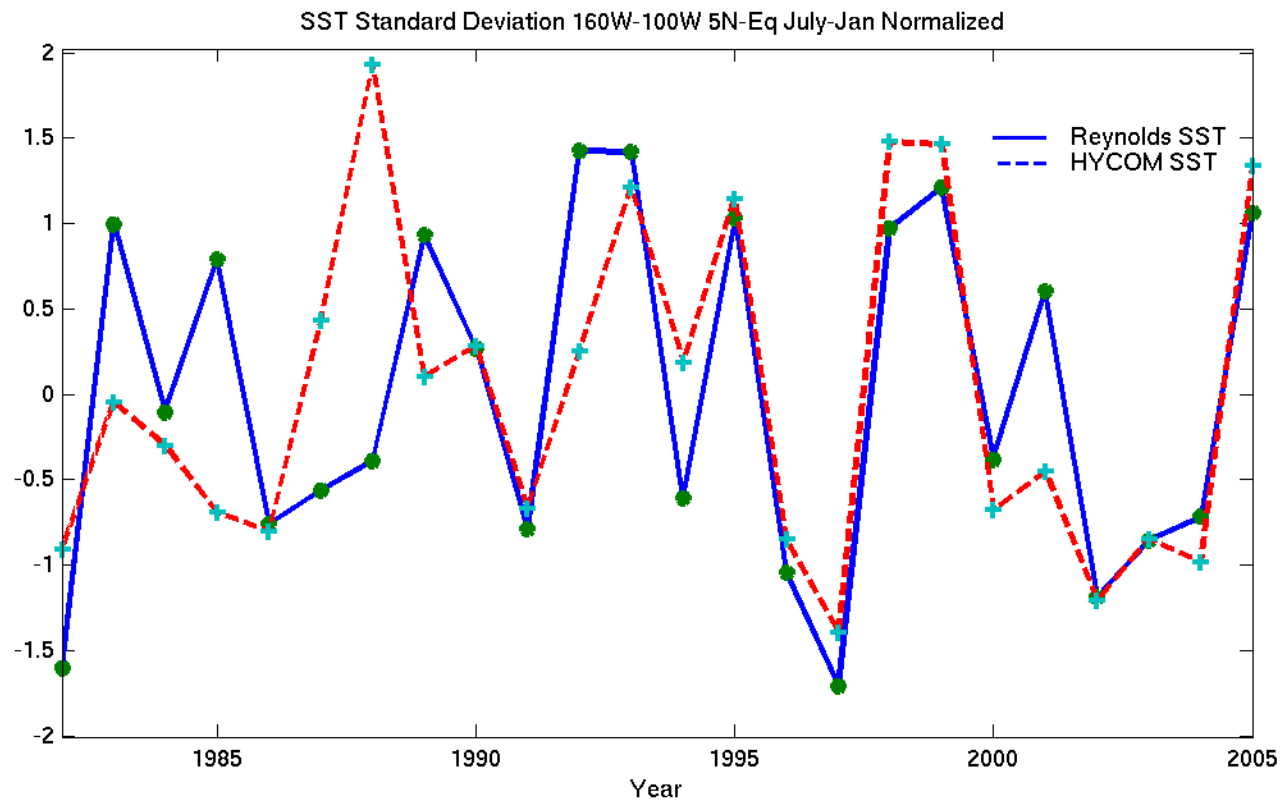SST and SSH Standard Deviation 160W-100W 5N-Eq July-Jan Normalized

Reynolds

SSH

TMI

Year

-Nino34 SST

-Nino34 SST160W-100W 5N-Eq July-Jan Normalized

-Nino34

Reynolds

Corr. Coef. =0.66

Year

SST Standard Deviation 160W-100W 5N-Eq July-Jan Normalized

Conclusions

Statistical analyses for the description of TIW are useful for the evaluation of the model performance

HYCOM is able to generate TIWs which have similar space and time scales to those in observations.

However, there are significant differences between HYCOM and observations that include amplitude, spatial pattern and phase relationship.

On going study

Can high resolution model generate better TIWs?
=> Necessary horizontal resolution to generate realistic TIWs?