# *Implementation of the NRL Coupled Ocean Data Assimilation (NCODA) system in HYCOM*


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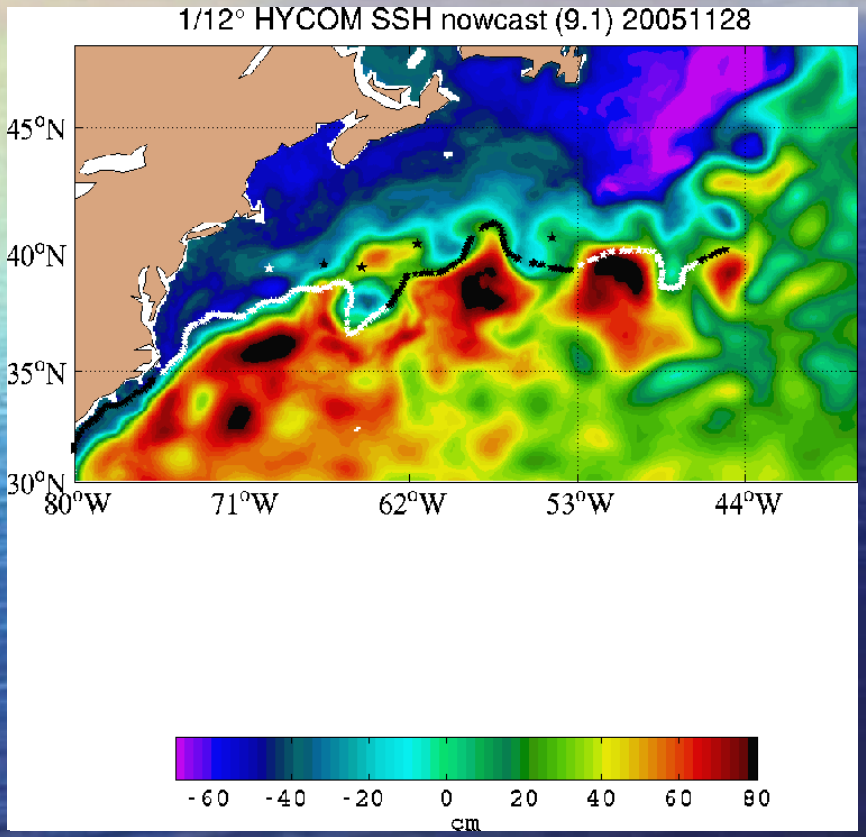
## *Present system*

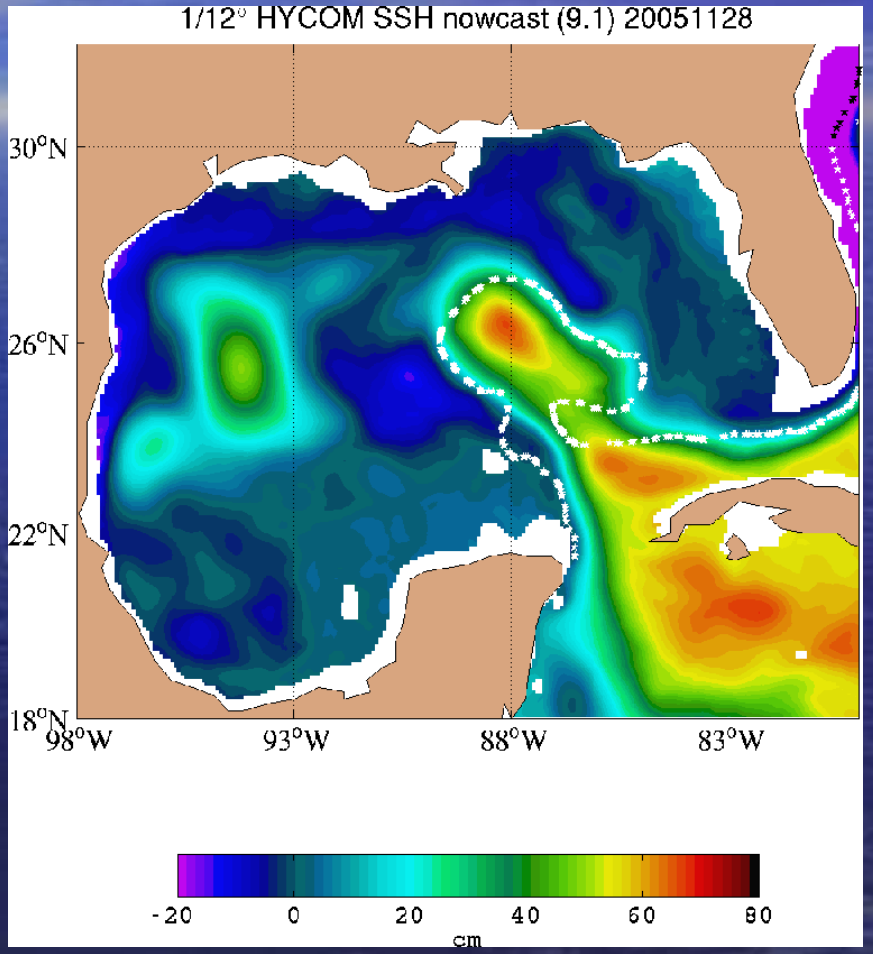
- 1/12º Atlantic (28ºS to 70ºN)
- Running in near real-time (on Wednesday)
  - . Assimilates the satellite altimeter analysis from the MODAS operational system at the Naval Oceanography Office (NAVOCEANO)
  - . Mean SSH from the 1/12° MICOM (ECMWF)
  - . Vertical projection via the Cooper and Haines technique (1996, JGR)
  - . FNMOC/NOGAPS atmospheric forcing
  - . Relaxation to the MODAS SST analysis
- 10 day hindcast, 14 day forecast
- Automated scripts run the system from the preprocessing of the forcing fields to the post processing of the results
- Participating in the MERSEA model inter-comparison

**http://hycom.rsmas.miami.edu**

# *1/12° Atlantic HYCOM*

## *SSH in Gulf Stream region, 23 November, 2005*

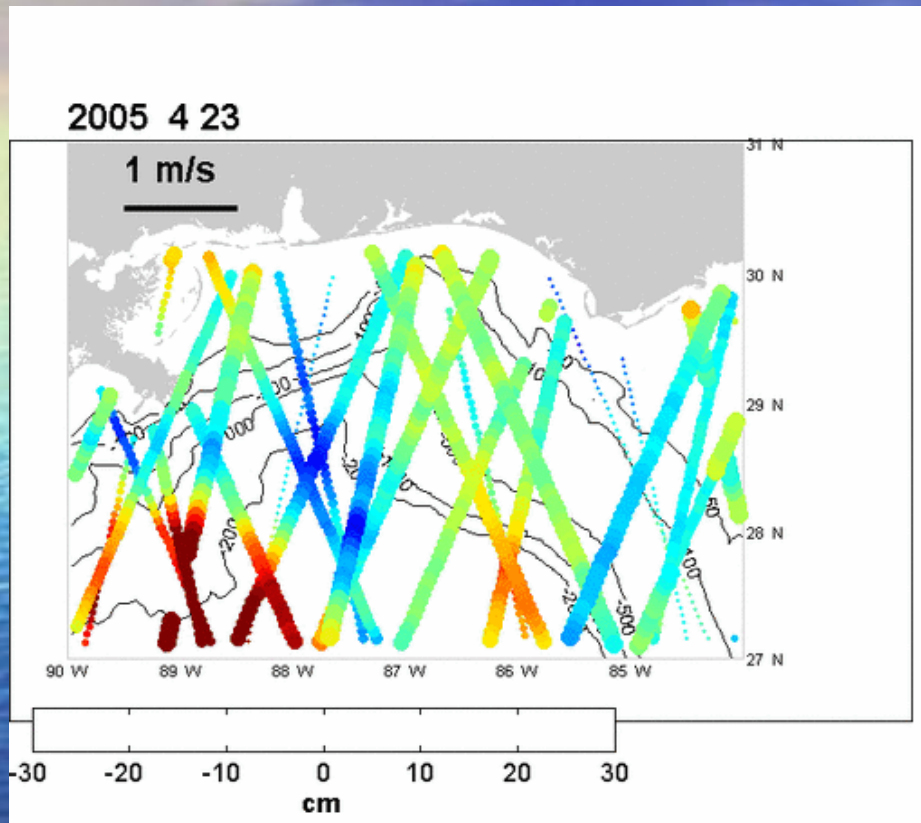


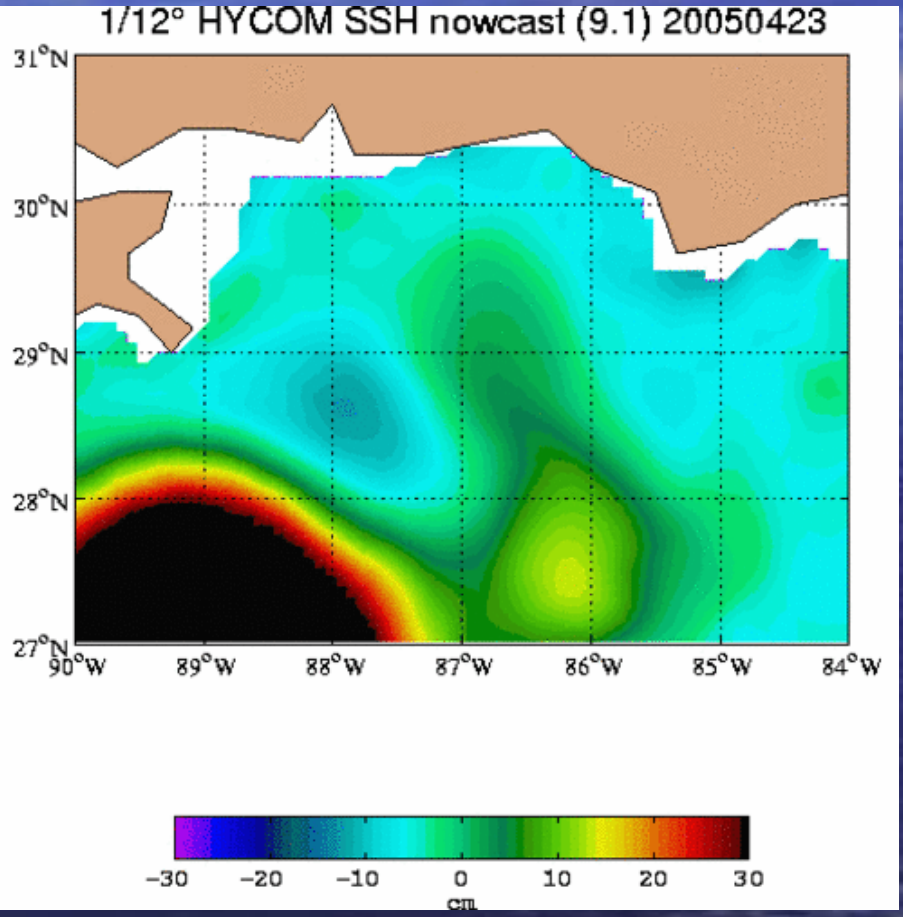




**White/black line is the frontal analysis of MCSST observations performed at NAVOCEANO. Black line represents data more than four days old.**

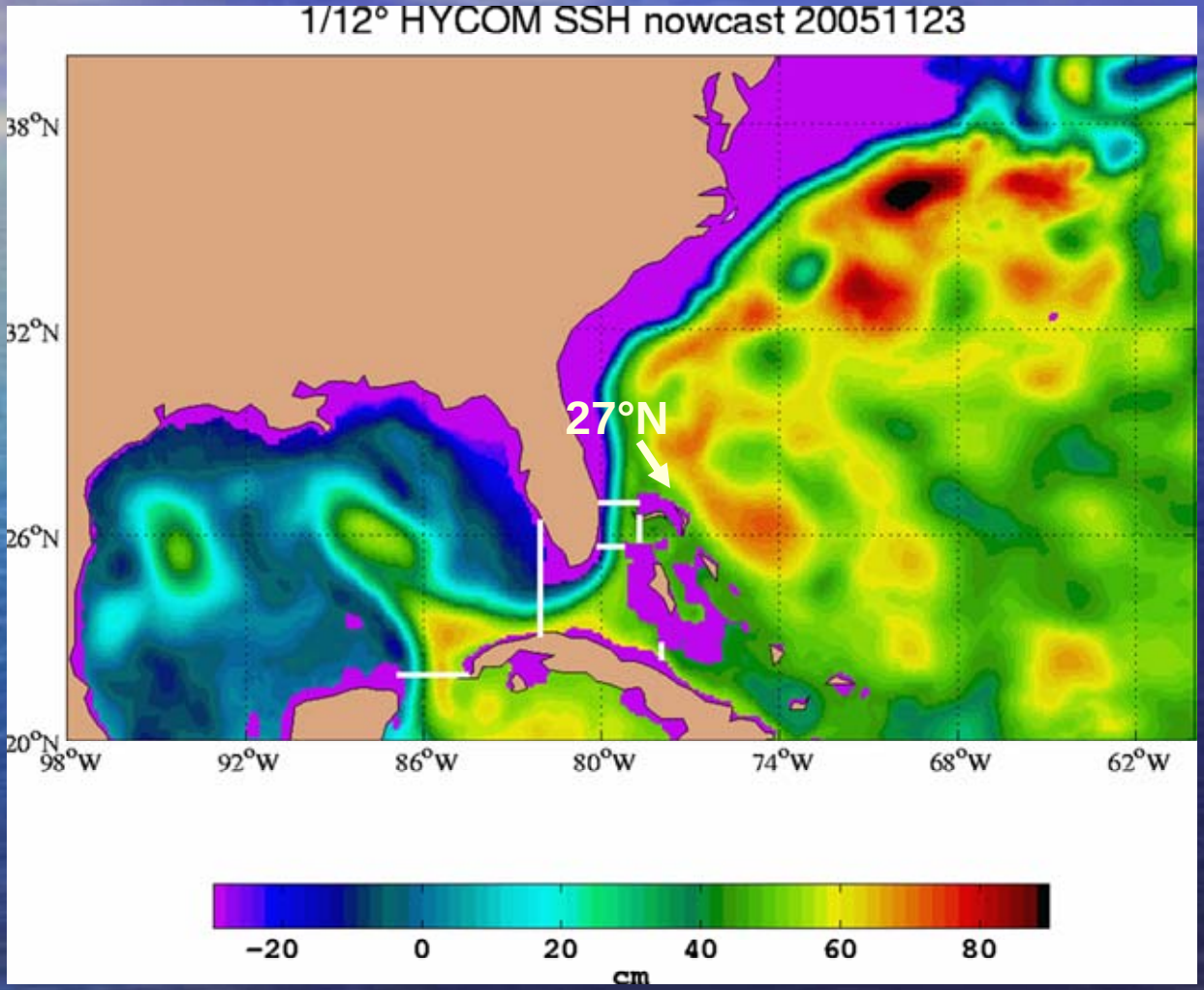
# 1/12° Atlantic HYCOM

## SSH in Gulf of Mexico region (SEED)

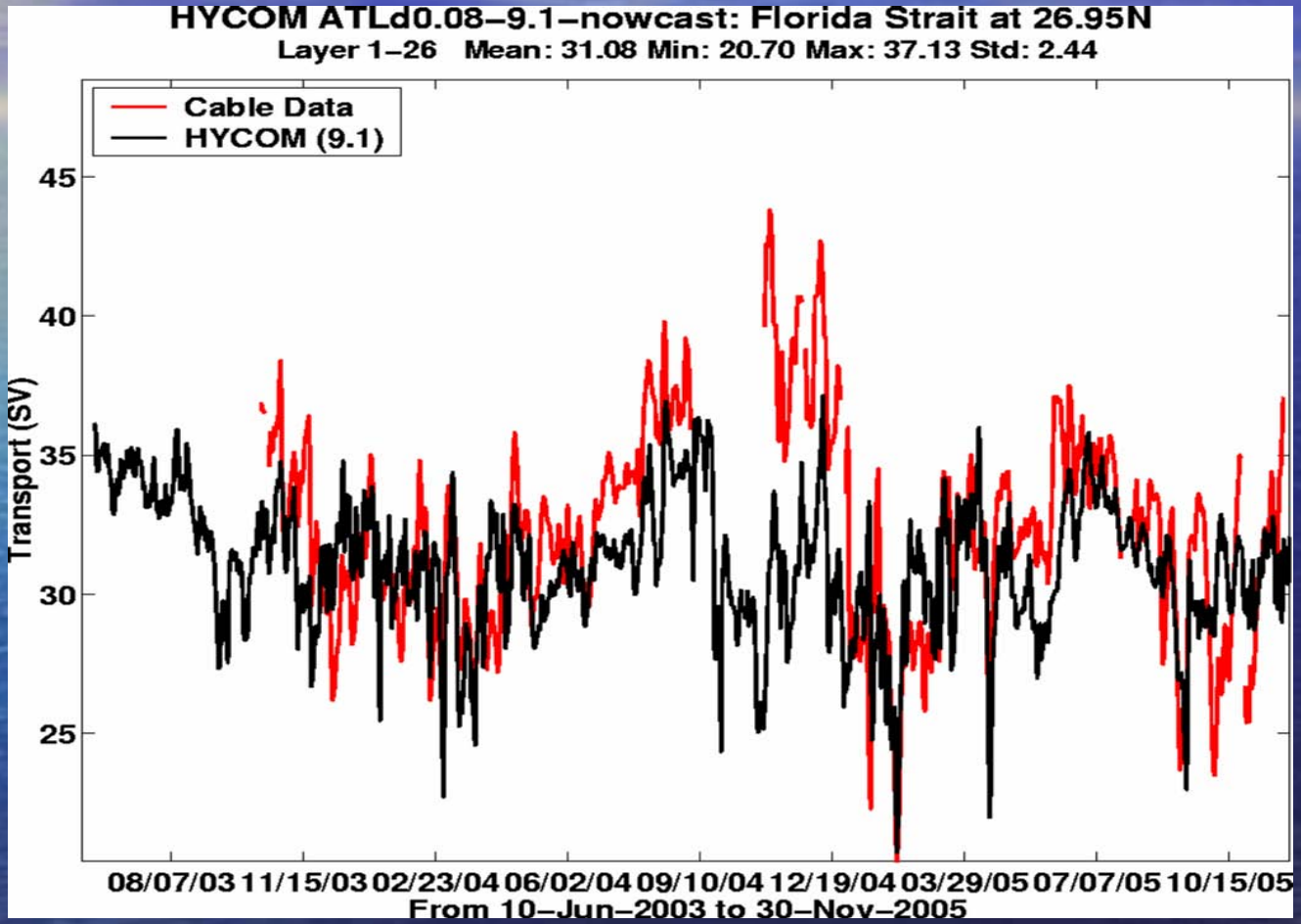


# *Transport sections*



# *Florida Current transport at 27°N*




**Cable data: http://www.aoml.noaa.gov/phod/floridacurrent/**

# *GULF OF MEXICO MODEL CONFIGURATION*

- Horizontal grid: 1/12° (258 x 175 grid points, 6.5 km spacing on average)
- 18°N to 31°N
- 20 vertical coordinates
- Bathymetry: 5m coastline
- Surface forcing from FNMOC/NOGAPS
- Monthly river runoff
- Nested Boundary:

  relaxation to the 1/12° Atlantic HYCOM T, S, U and V along open boundary, (no assimilation in these experiments)

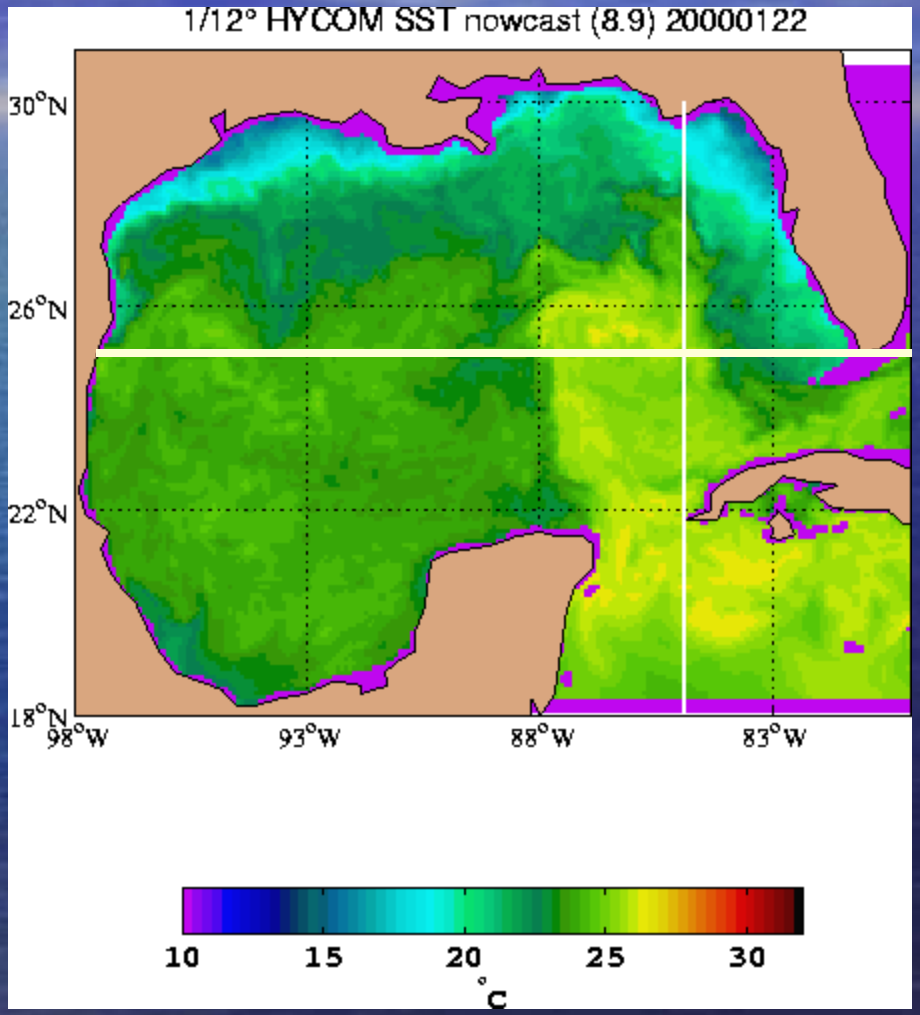
# *HYCOM/NCODA coupling*

- **HYCOM to 3D z-grid**
- **NCODA analysis**
- **Use the NCODA analysis of T, S to create a new restart file. Let hybgen move the interfaces**

**or**

- **Use the NCODA analysis of T, S and layer pressure to create a new restart file.**
- **A new analysis every day in these experiments**

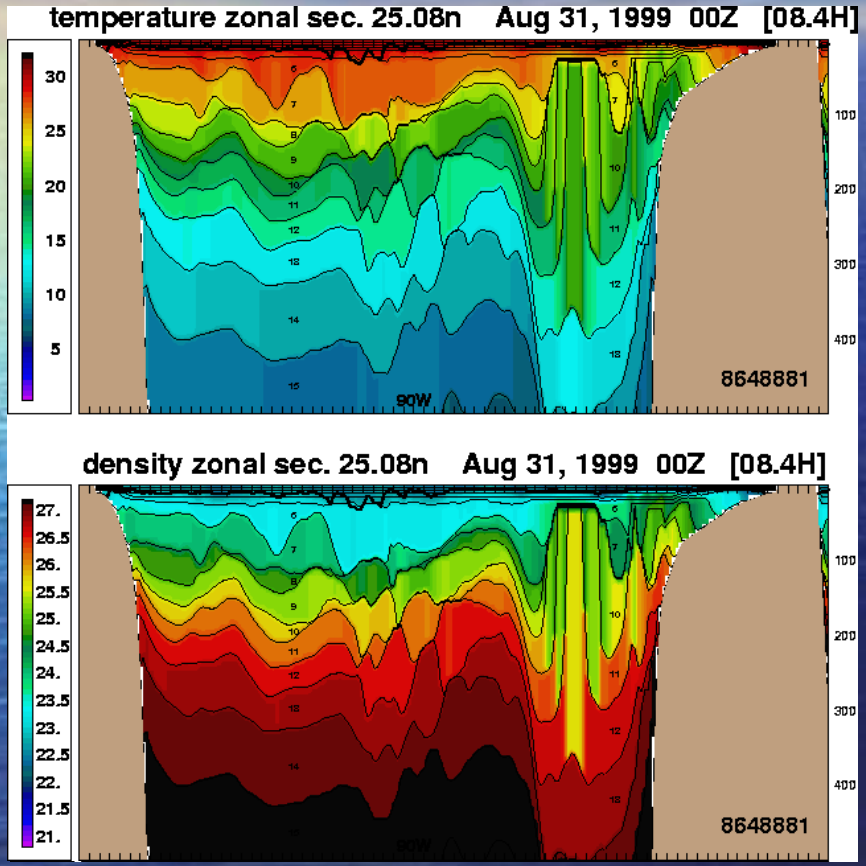
# Sections in the Gulf of Mexico



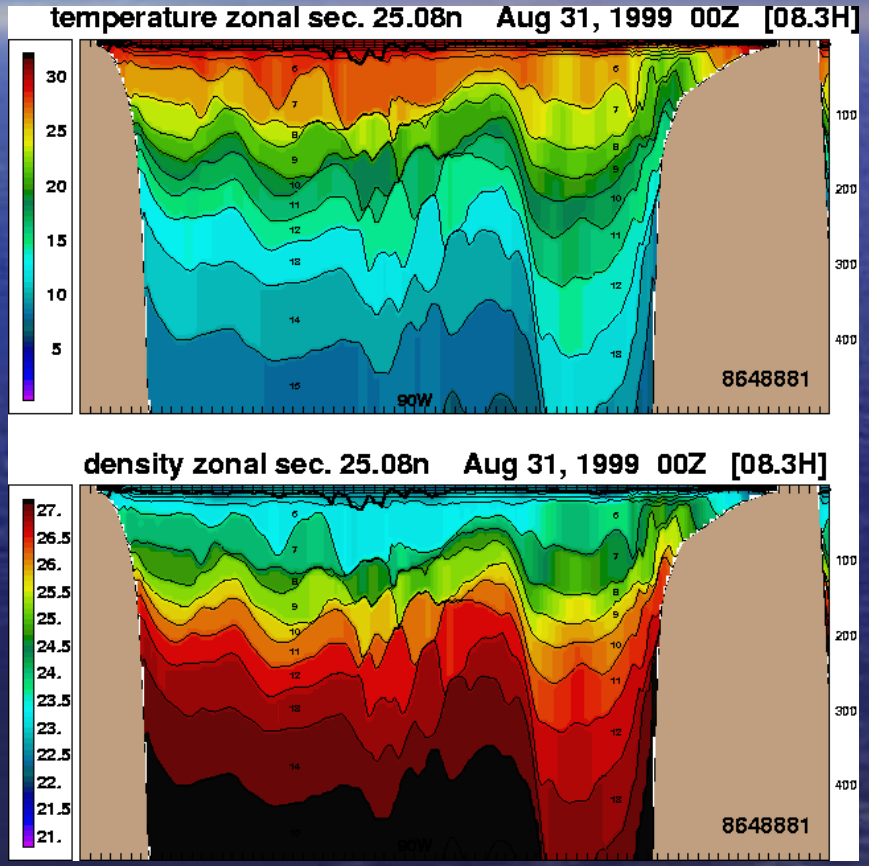

25.08°N

# T and ρ section along 25.08°N, 31 August 1999

## T and S updating




## T and S updating, new hybgen



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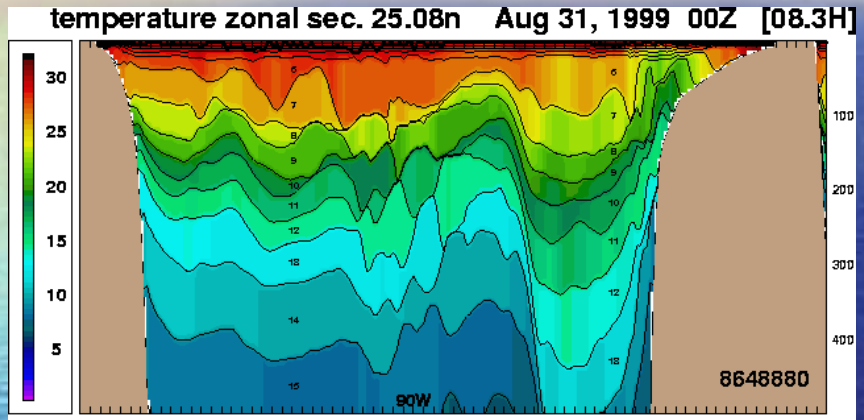
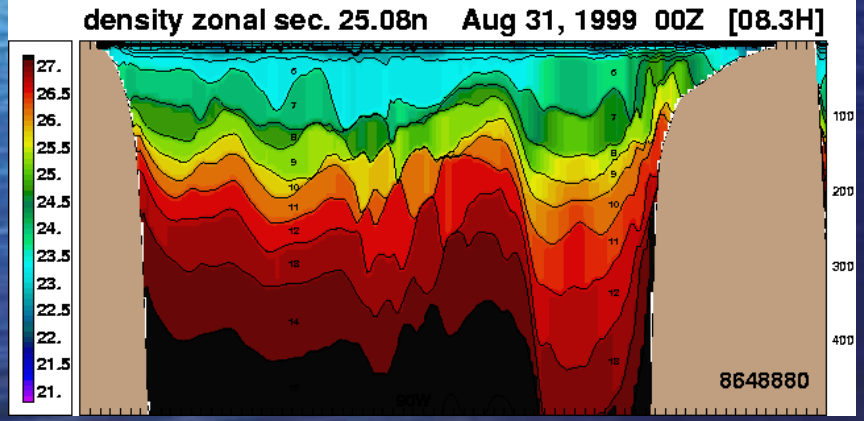
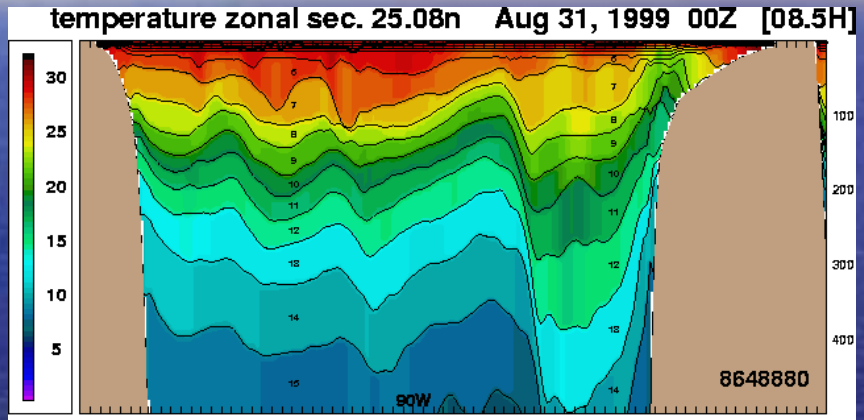
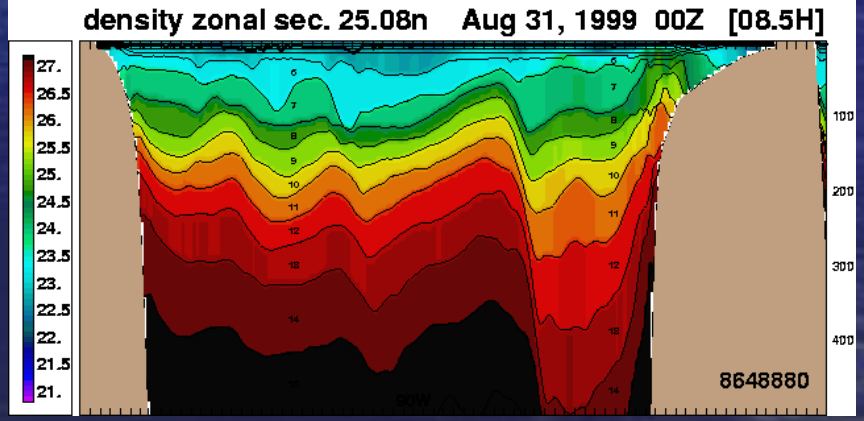


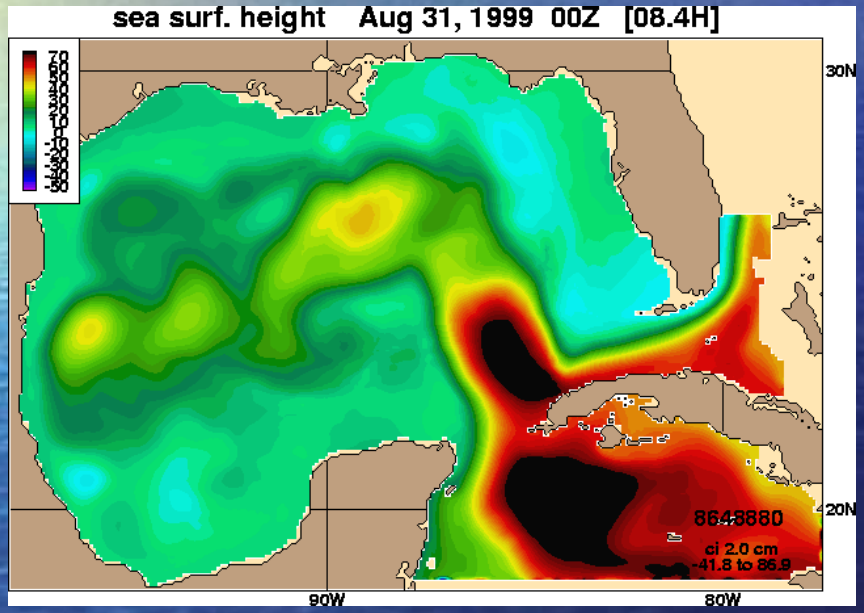

## T, S and dp updating



# SSH, 31 August 1999

## T and S updating

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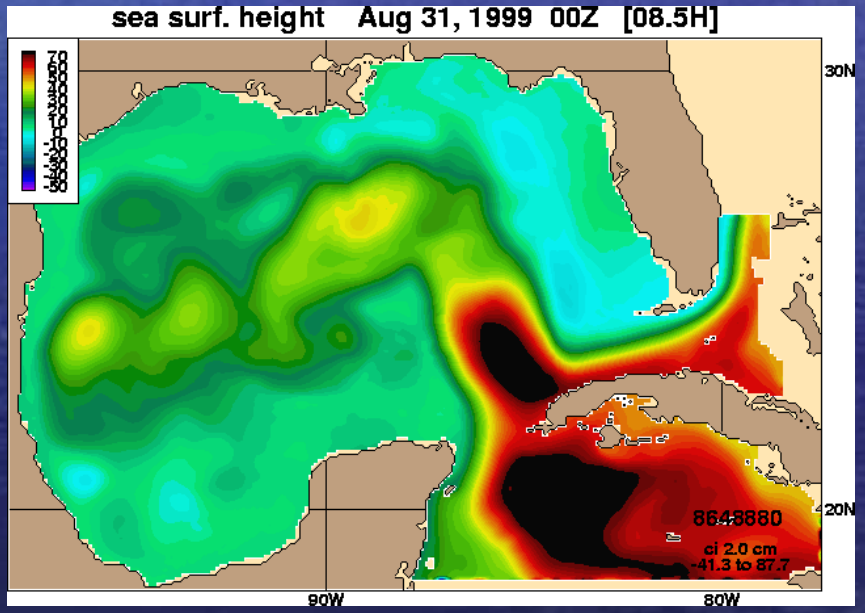

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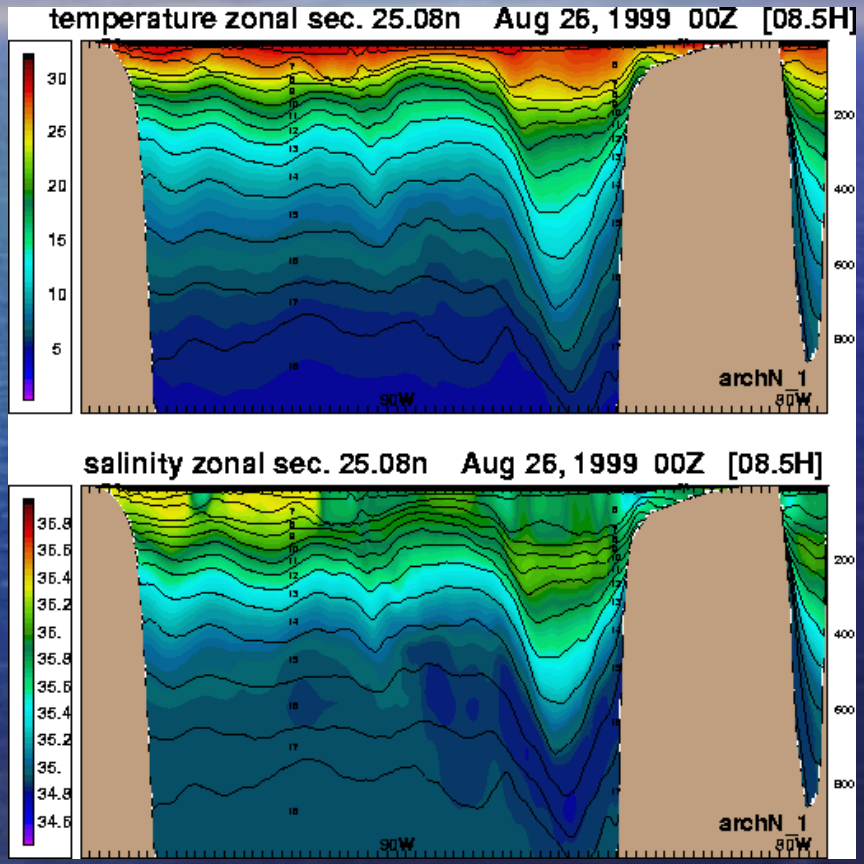
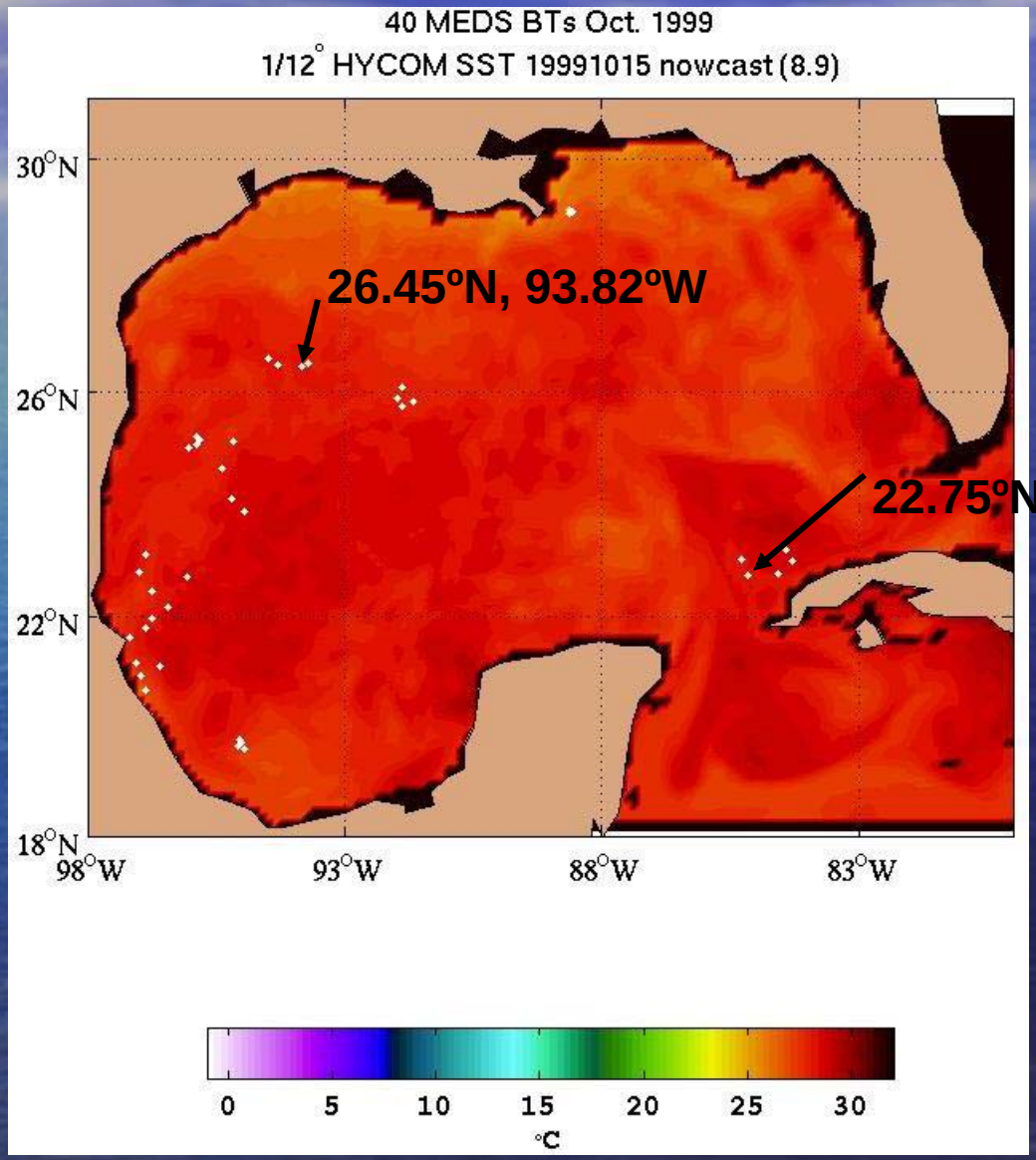


# BT positions October 1999



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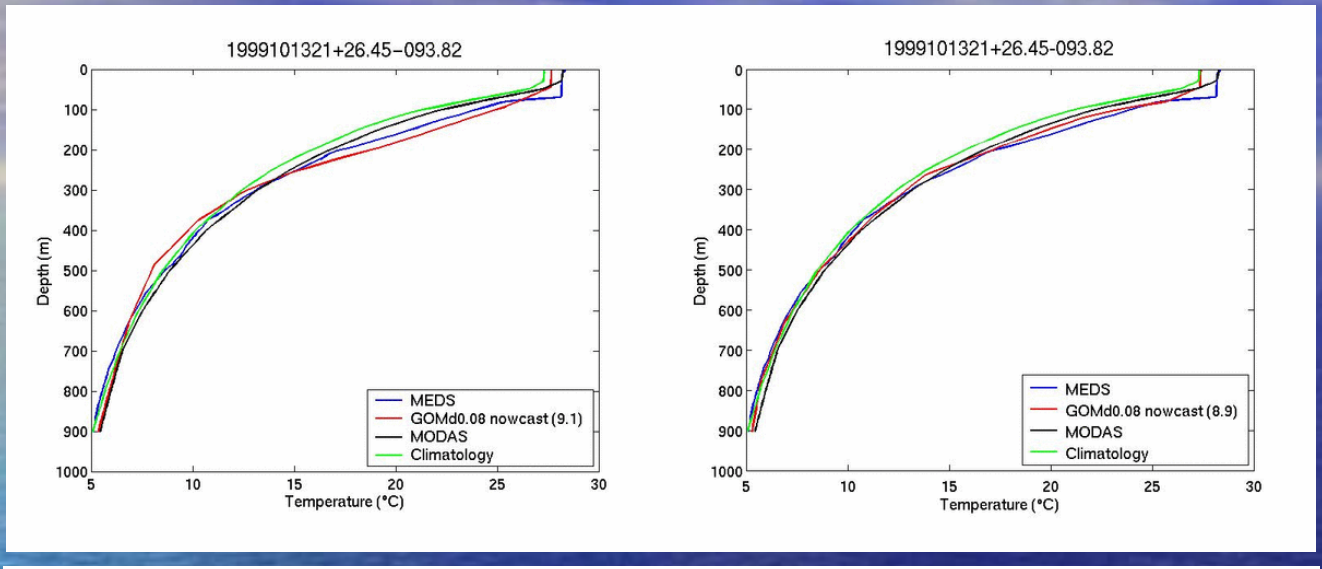


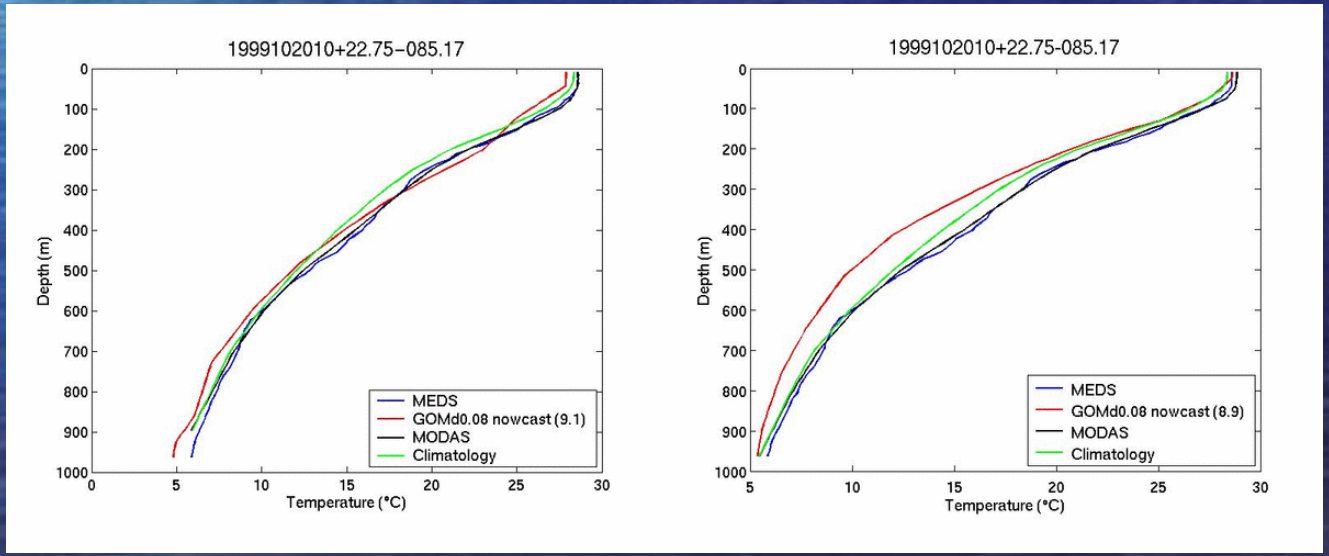

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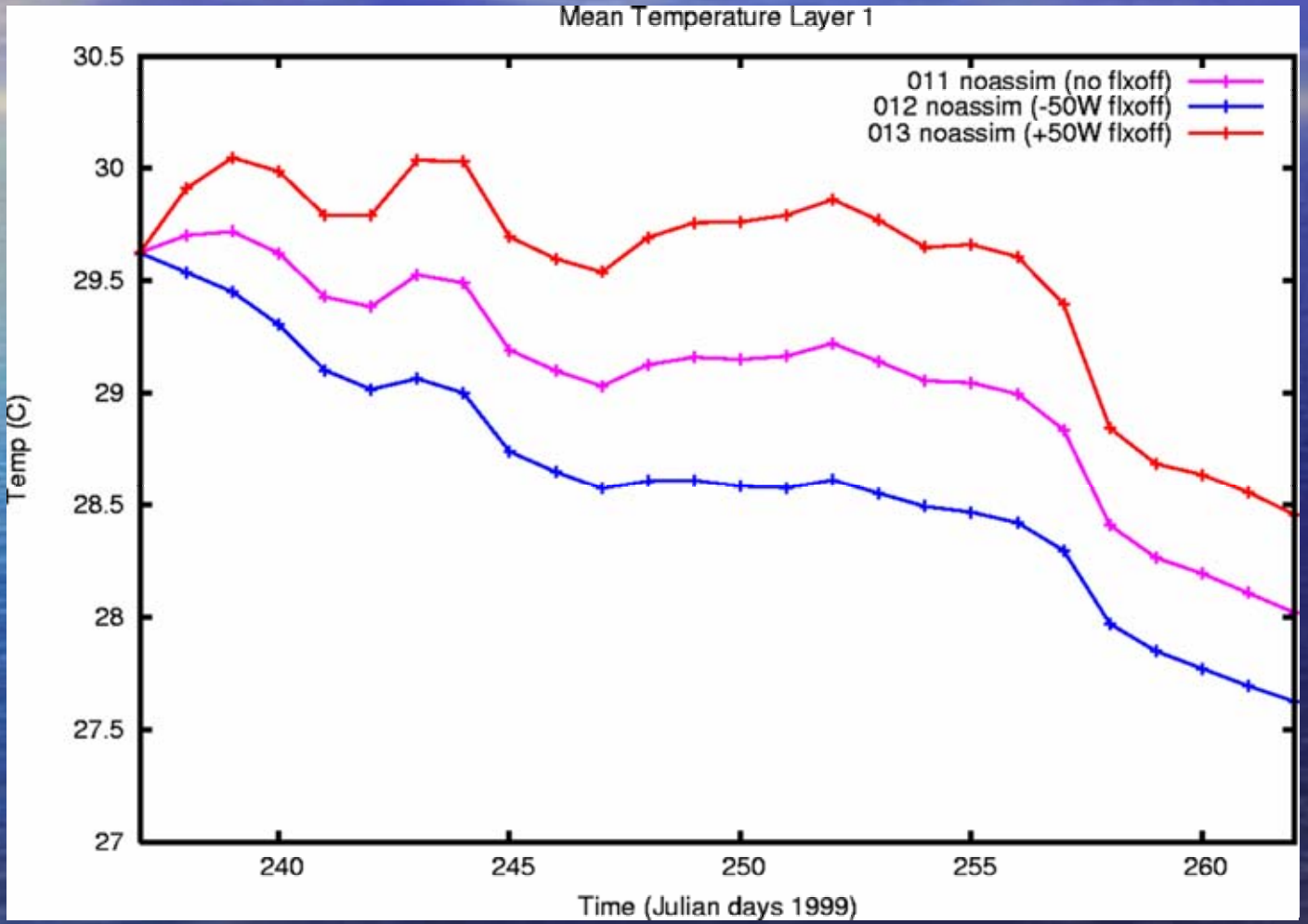

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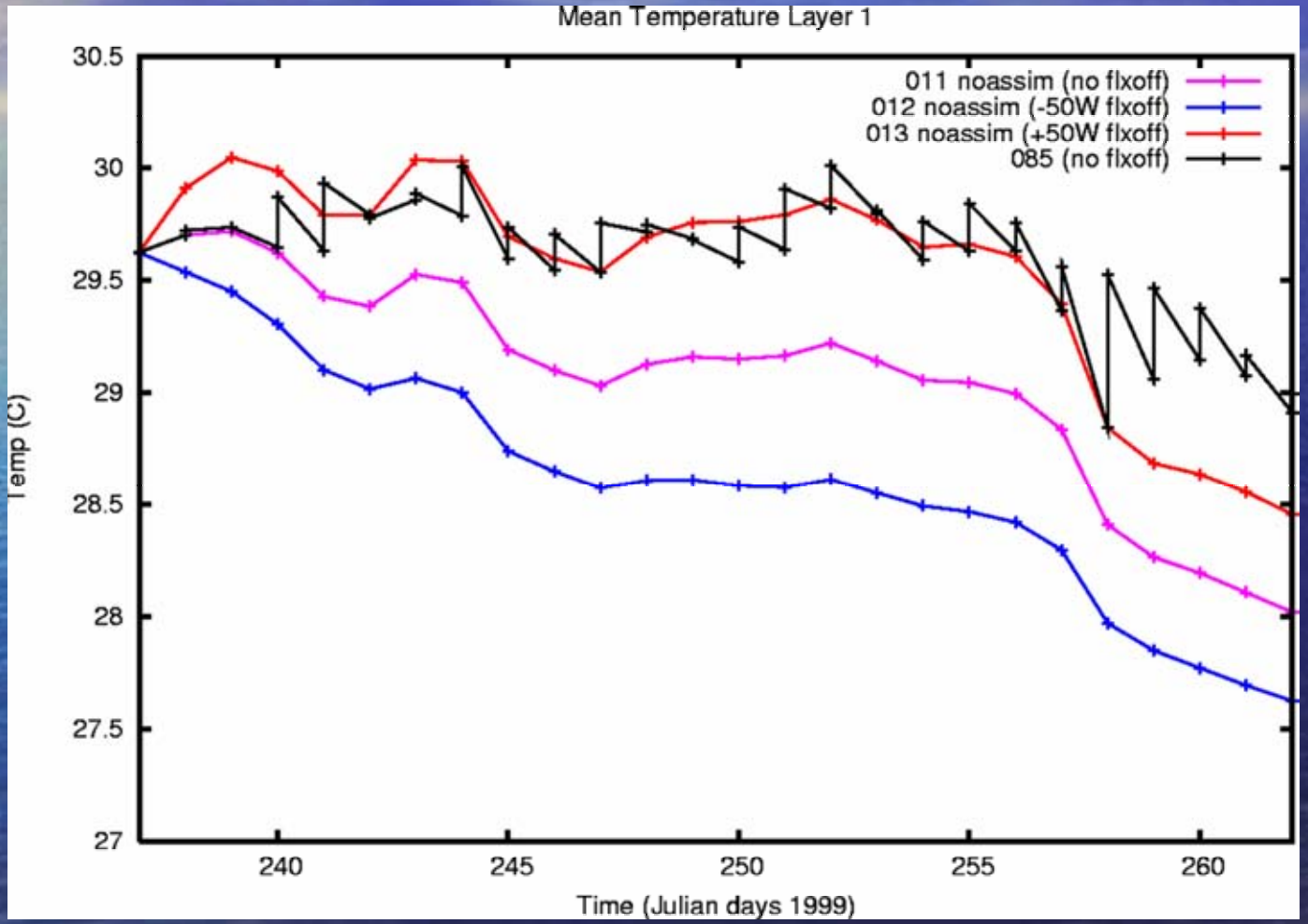
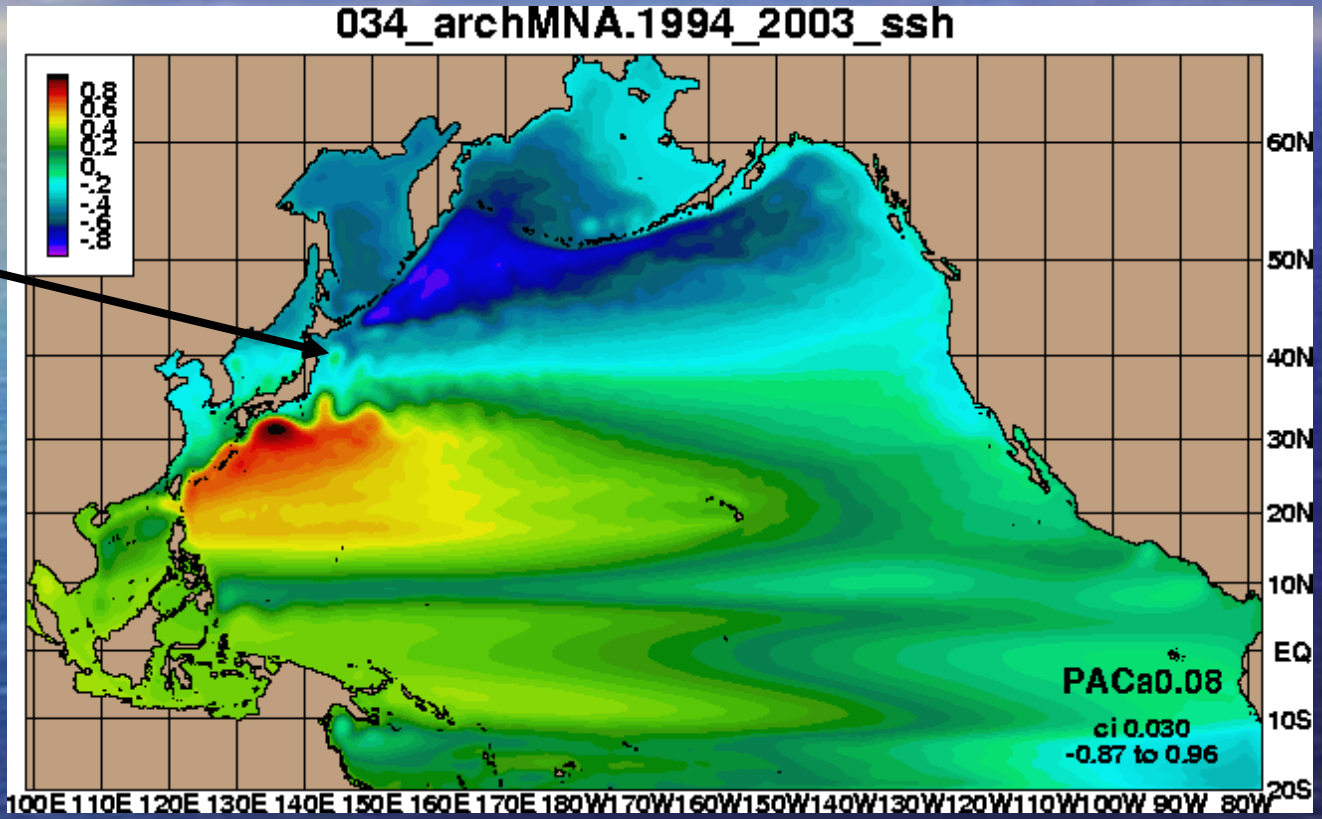


# *1/12° PACIFIC HYCOM*

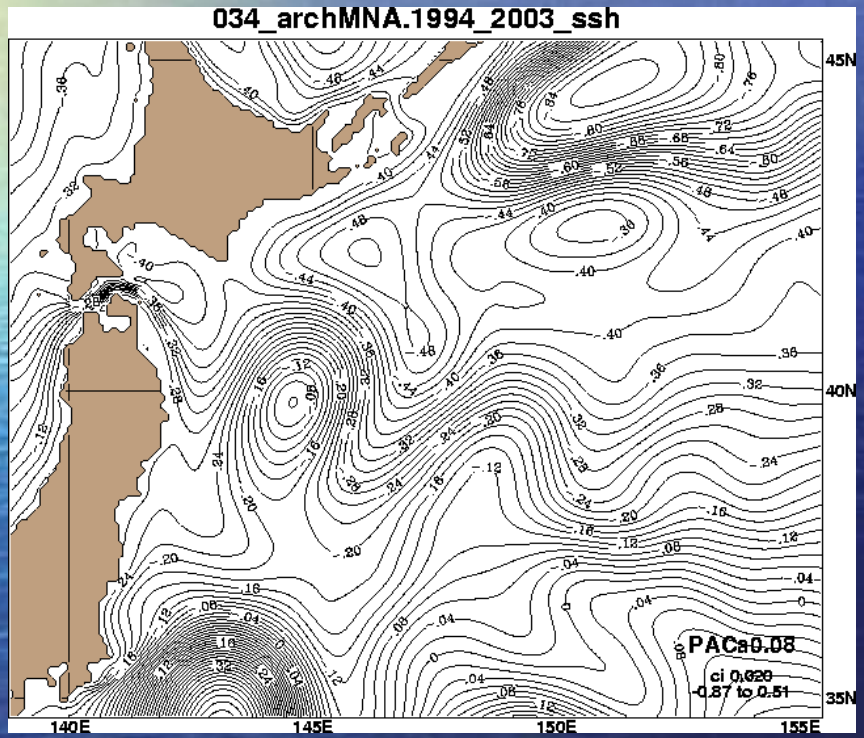
## Mean SSH 1994 – 2003



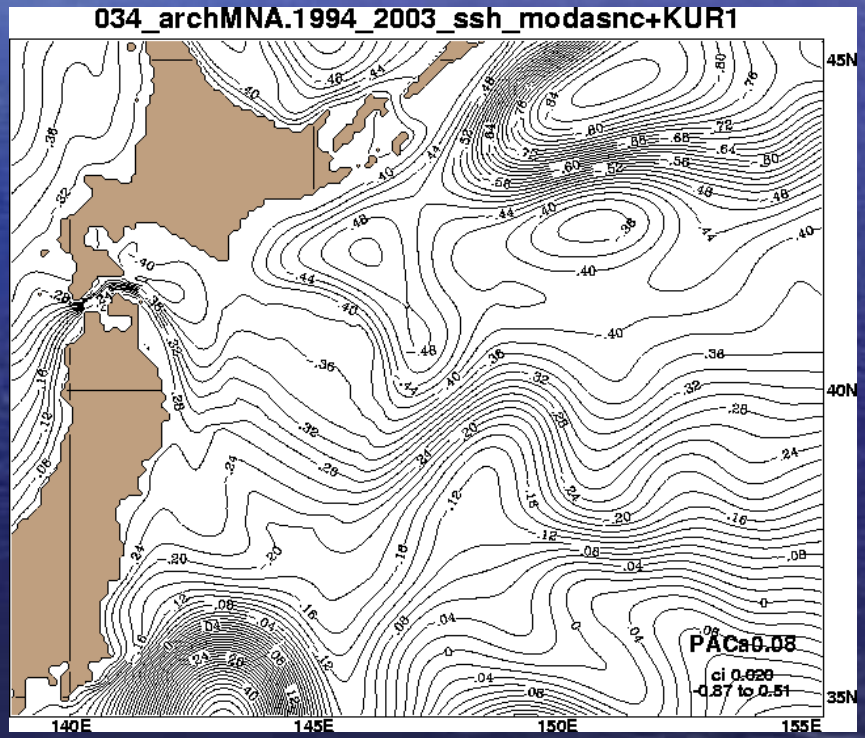
# *1/12° PACIFIC HYCOM*

## Mean SSH 1994 – 2003

**ORIGINAL**




**RUBBER SHEETED**



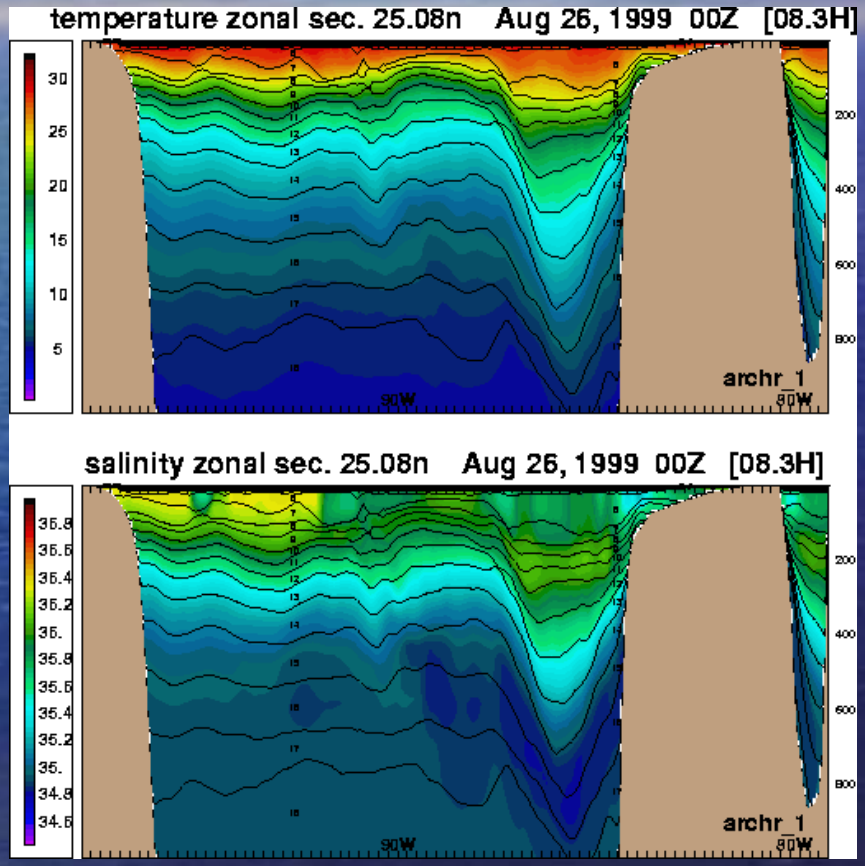
# *Future*

- **NCODA in 1/12° Pacific HYCOM**
- **NCODA in 1/12° Atlantic HYCOM**
- **1/12° Global HYCOM assimilation**

**http://hycom.rsmas.miami.edu**

# T and S section along 25.08°N, 31 August 1999

## T and S updating



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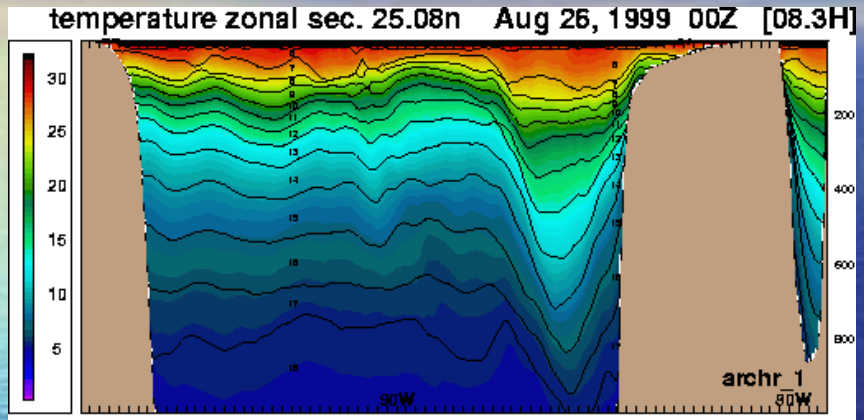


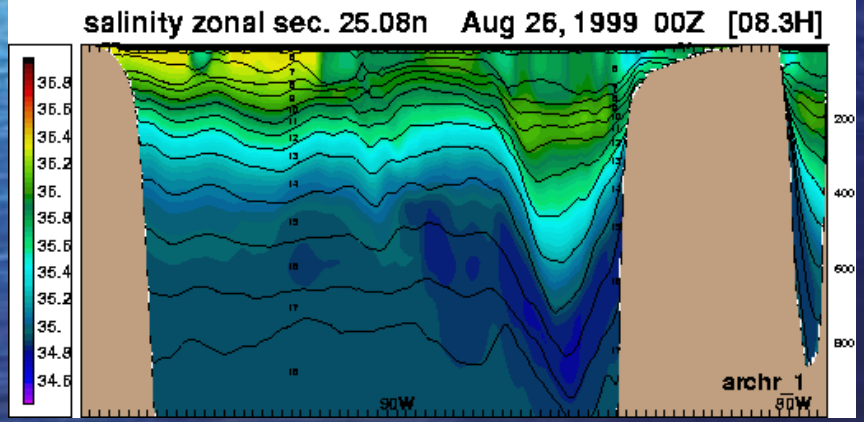


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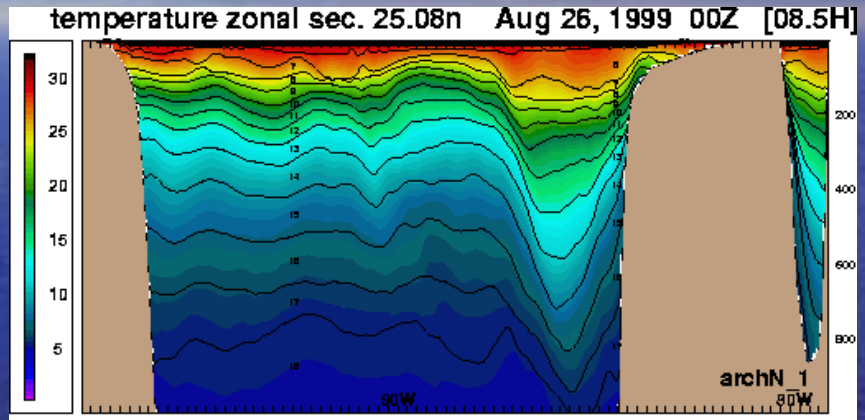
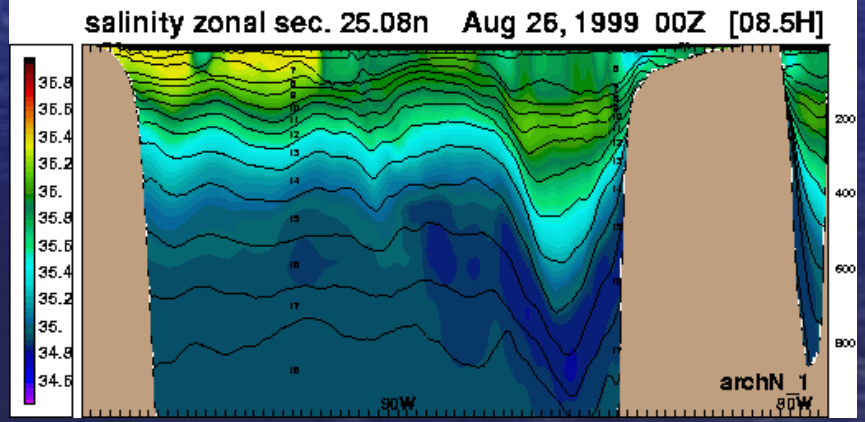
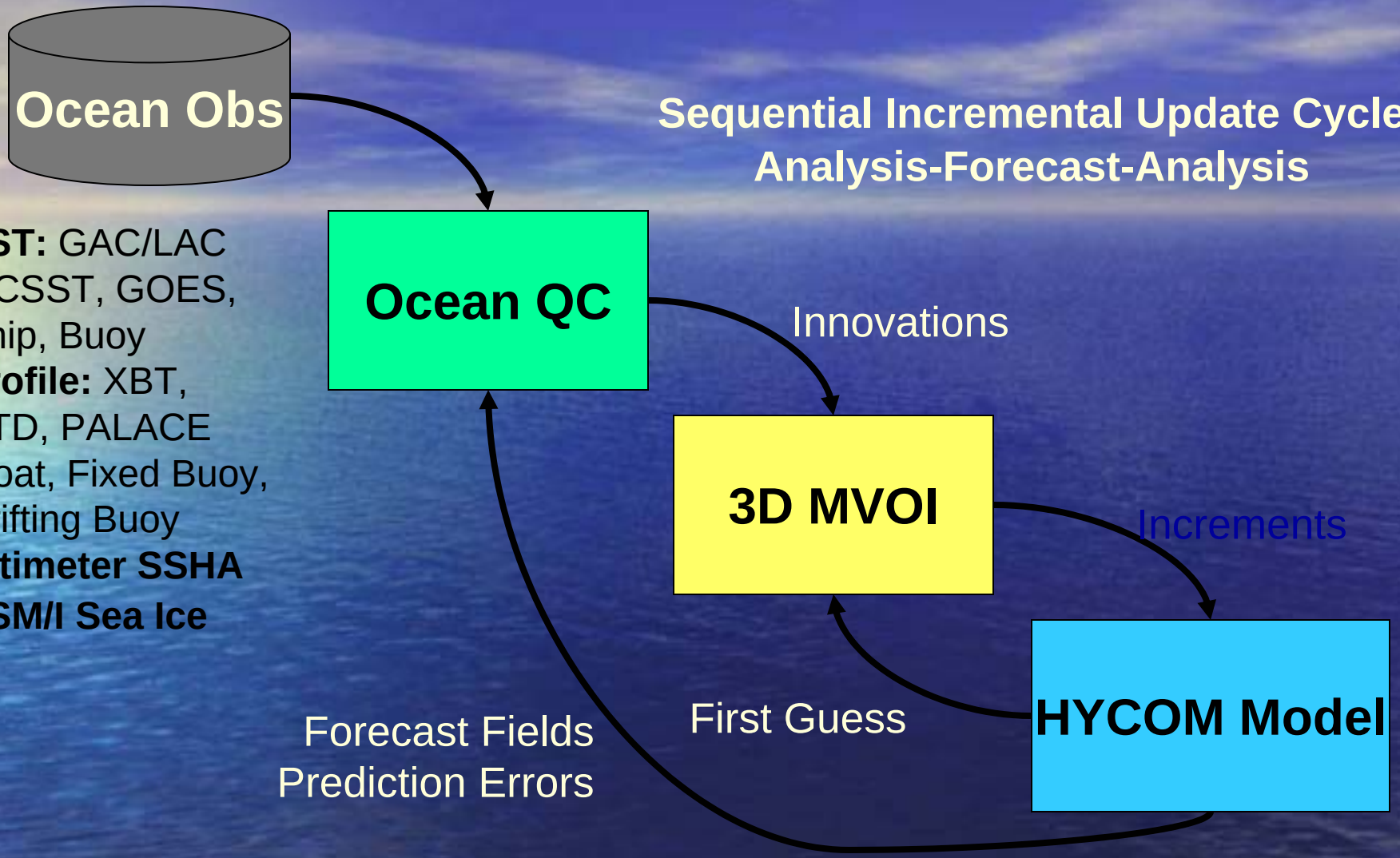


# *NRL Coupled Ocean Data Assimilation (NCODA)*




**MVOI - simultaneous analysis 5 ocean variables**
**temperature, salinity, geopotential, velocity (u,v)**

# T and ρ section along 25.08°N, 31 August 1999

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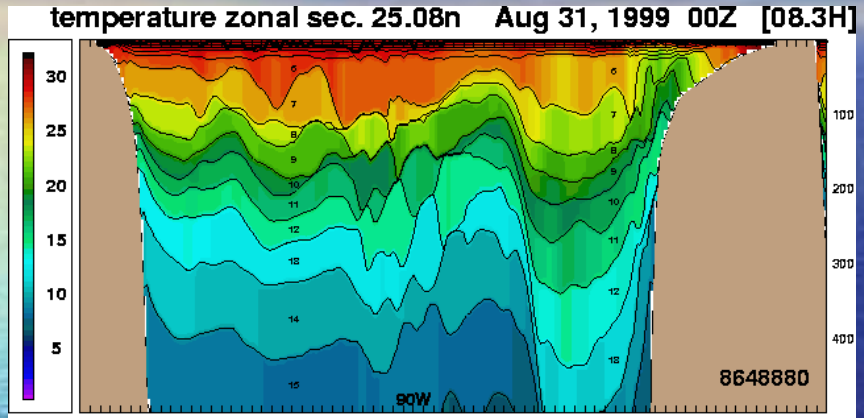


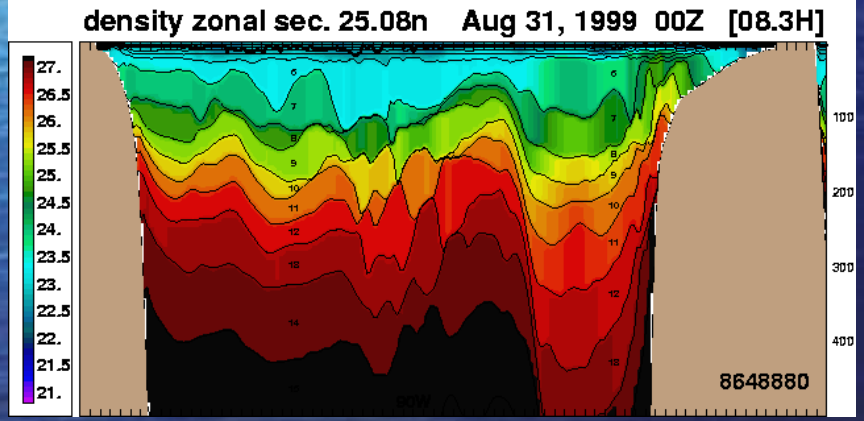


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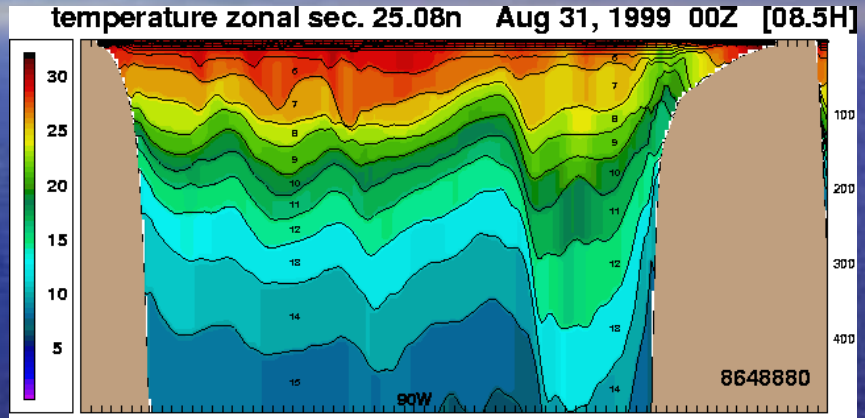


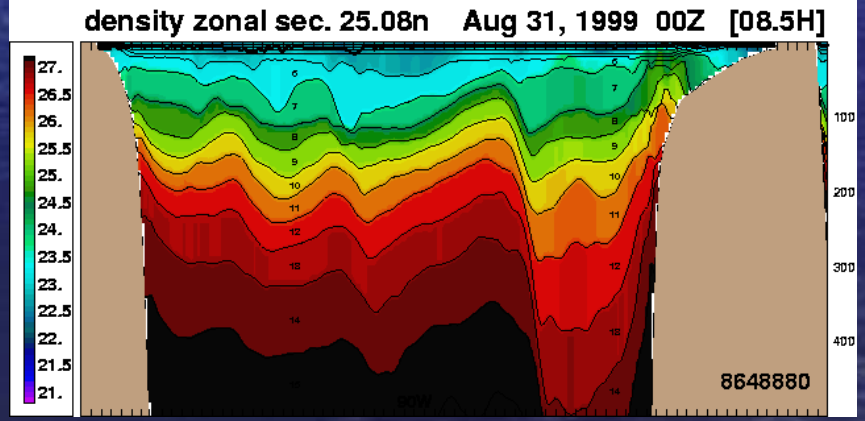

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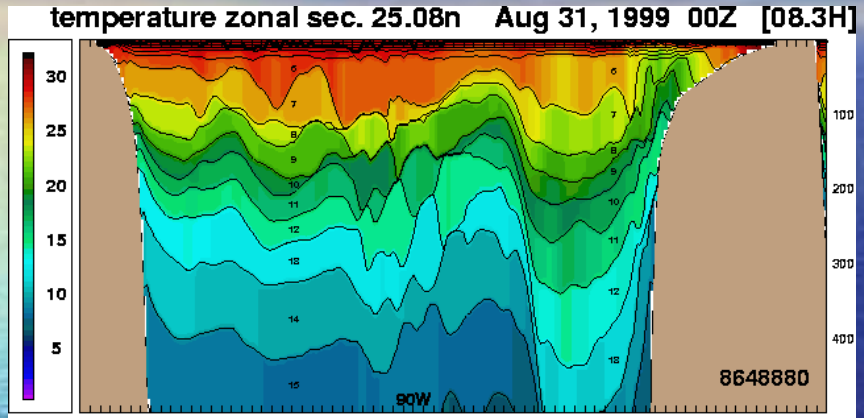


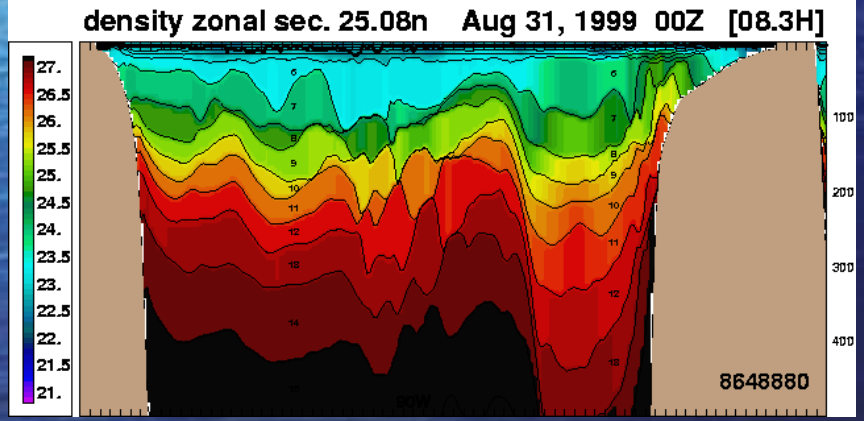


## T and S updating, new hybgen