

HYCOM/Quoddy Nested Baroclinic Nowcast/Forecast System for the South Atlantic Bight (and other things)

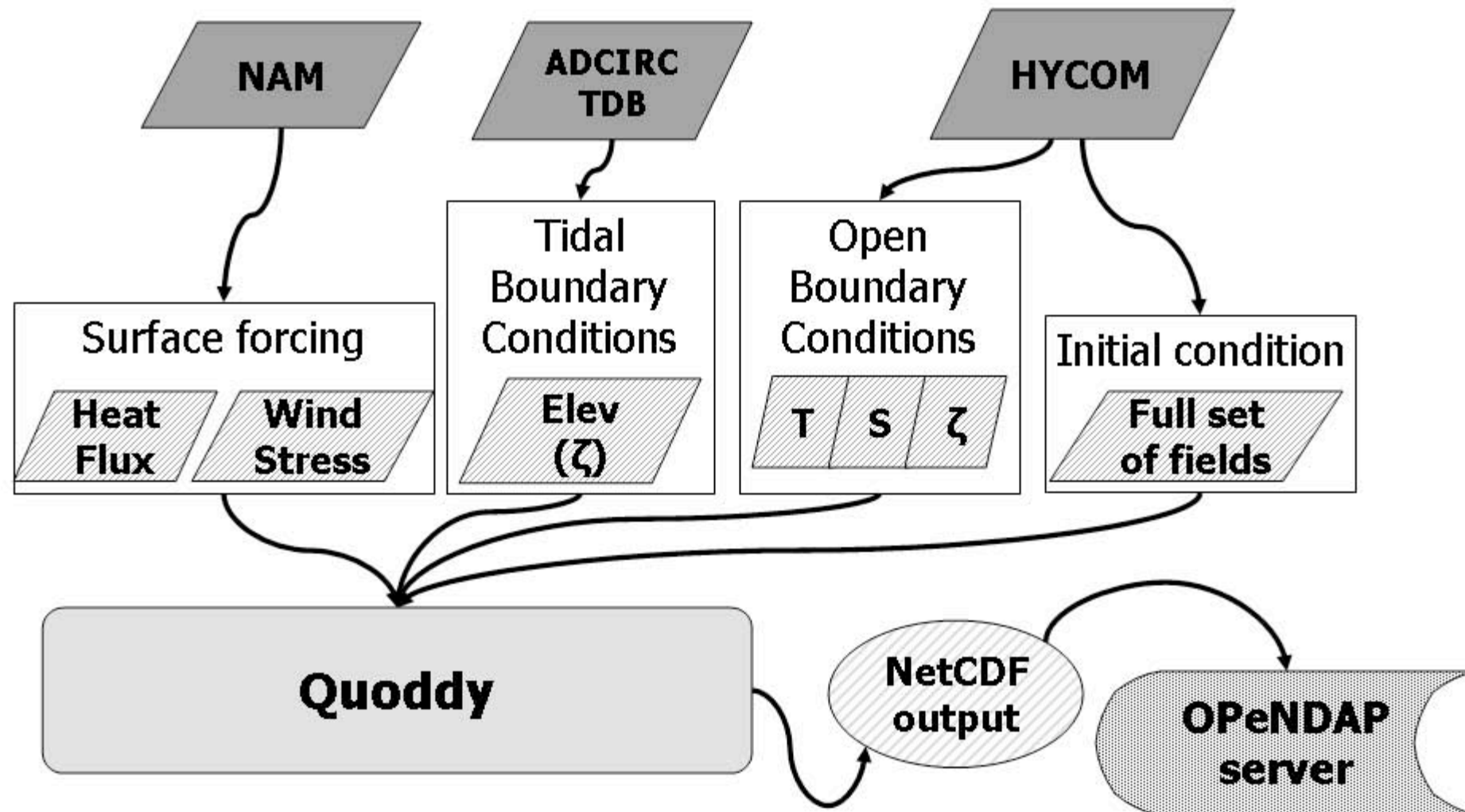
**Thomas Shay, Francisco Werner, Alfredo
Aretxabaleta, Brian Blanton**

**Department of Marine Sciences
The University of North Carolina at Chapel Hill**

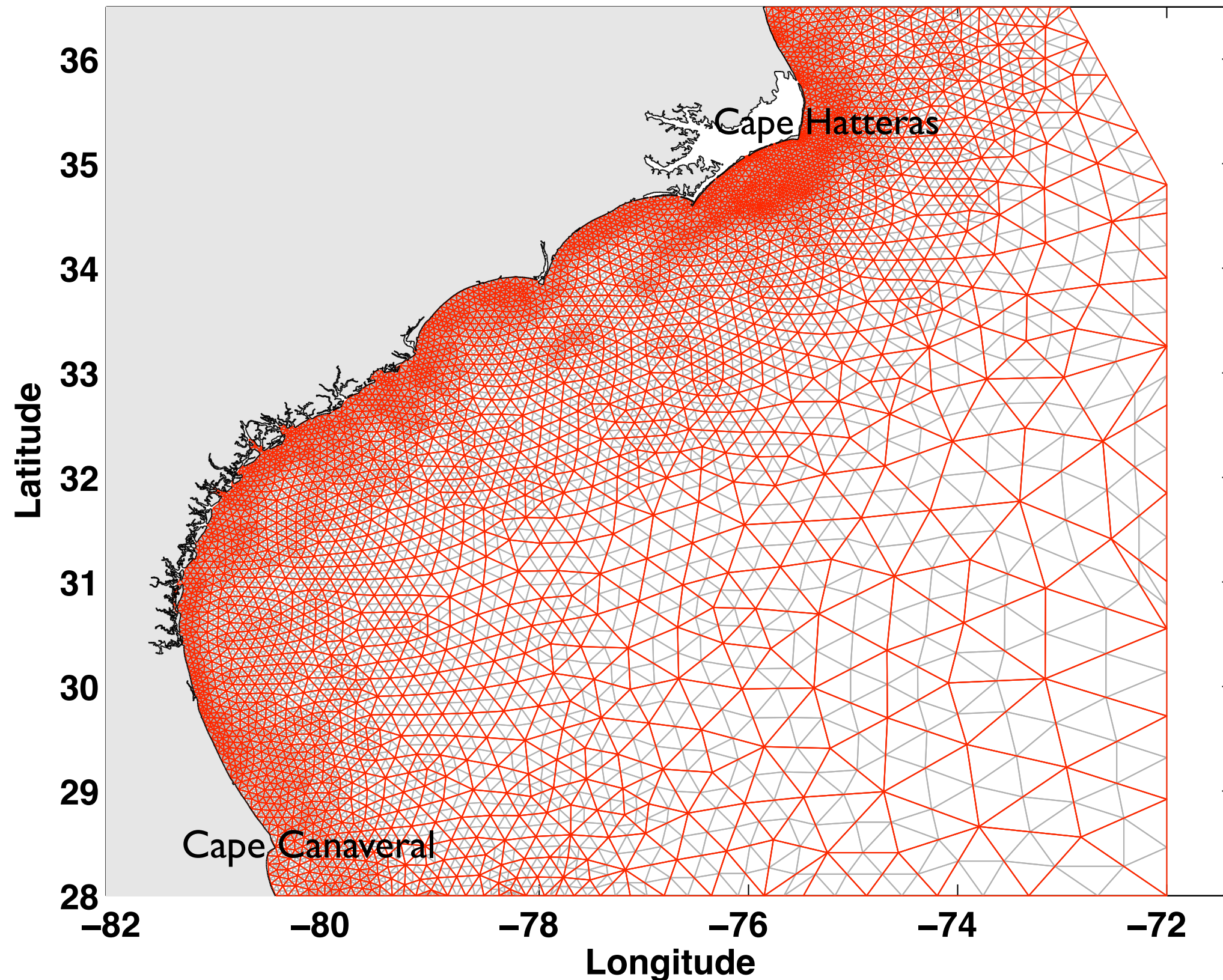
SAB NC/FC System

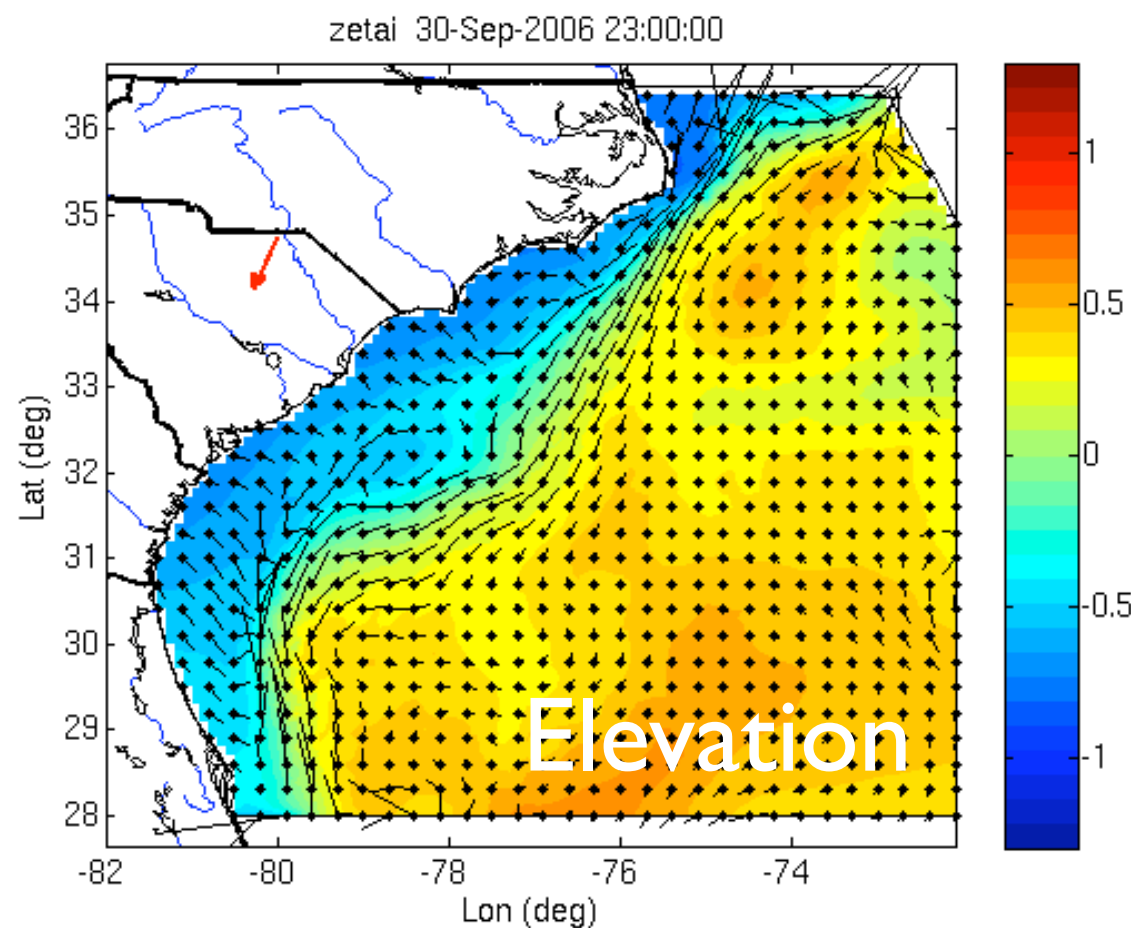
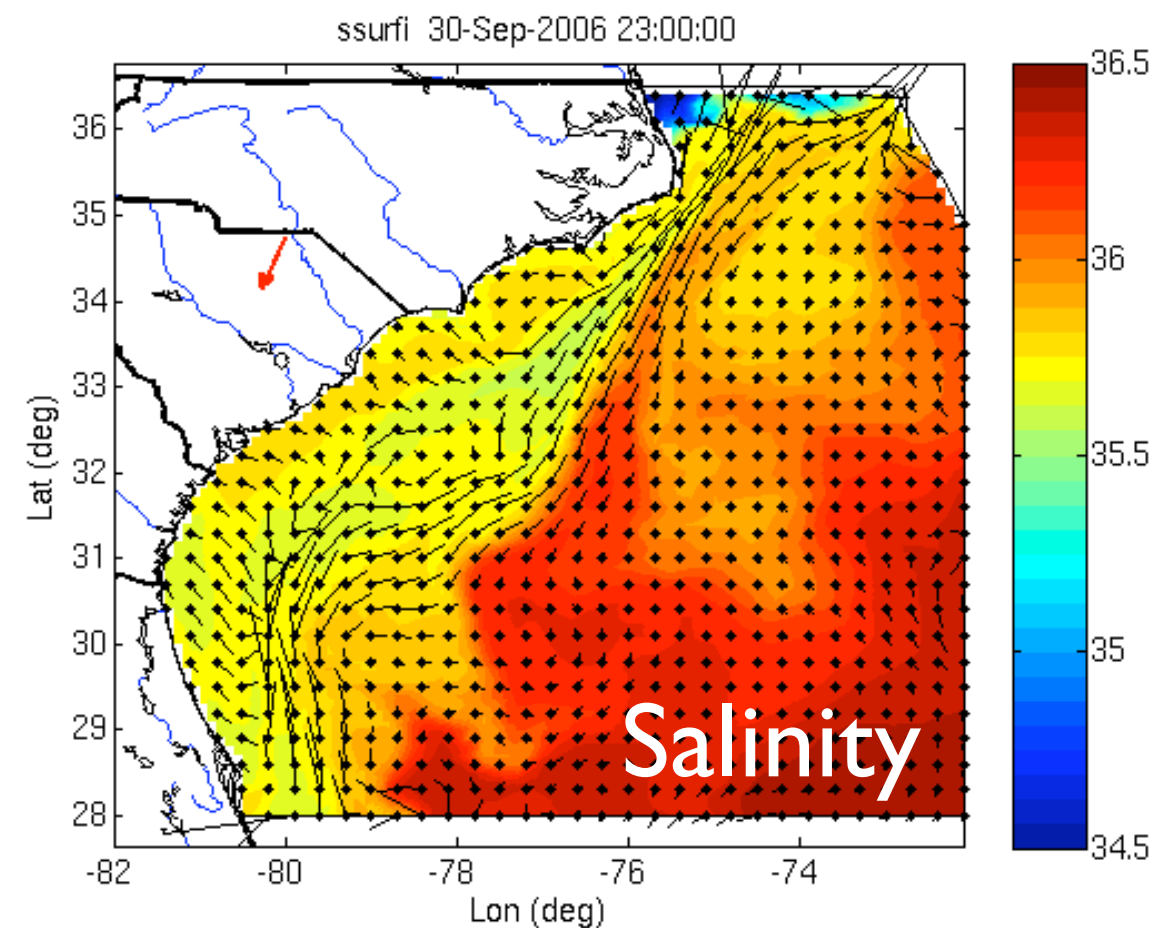
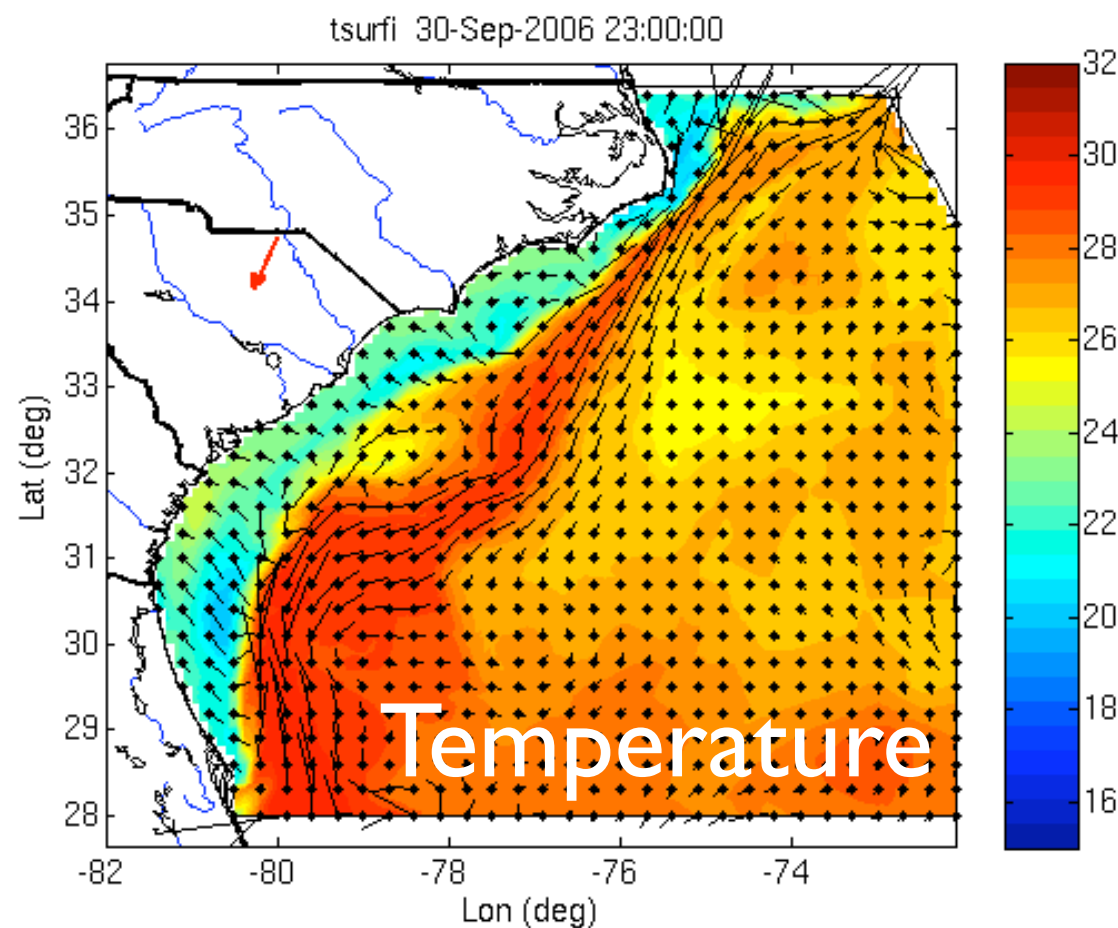
- SAB regional baroclinic model is Quoddy
- HYCOM provides IC and open BC
- Tidal open BC from ADCIRC TDB
- NCEP ETA (now WRF/NMM) for surface forcing (AWIP12)
- 4-day diagnostic run (spin up tides + mixing), up to 21-day prognostic run

HYCOM/Quoddy NC/FC System



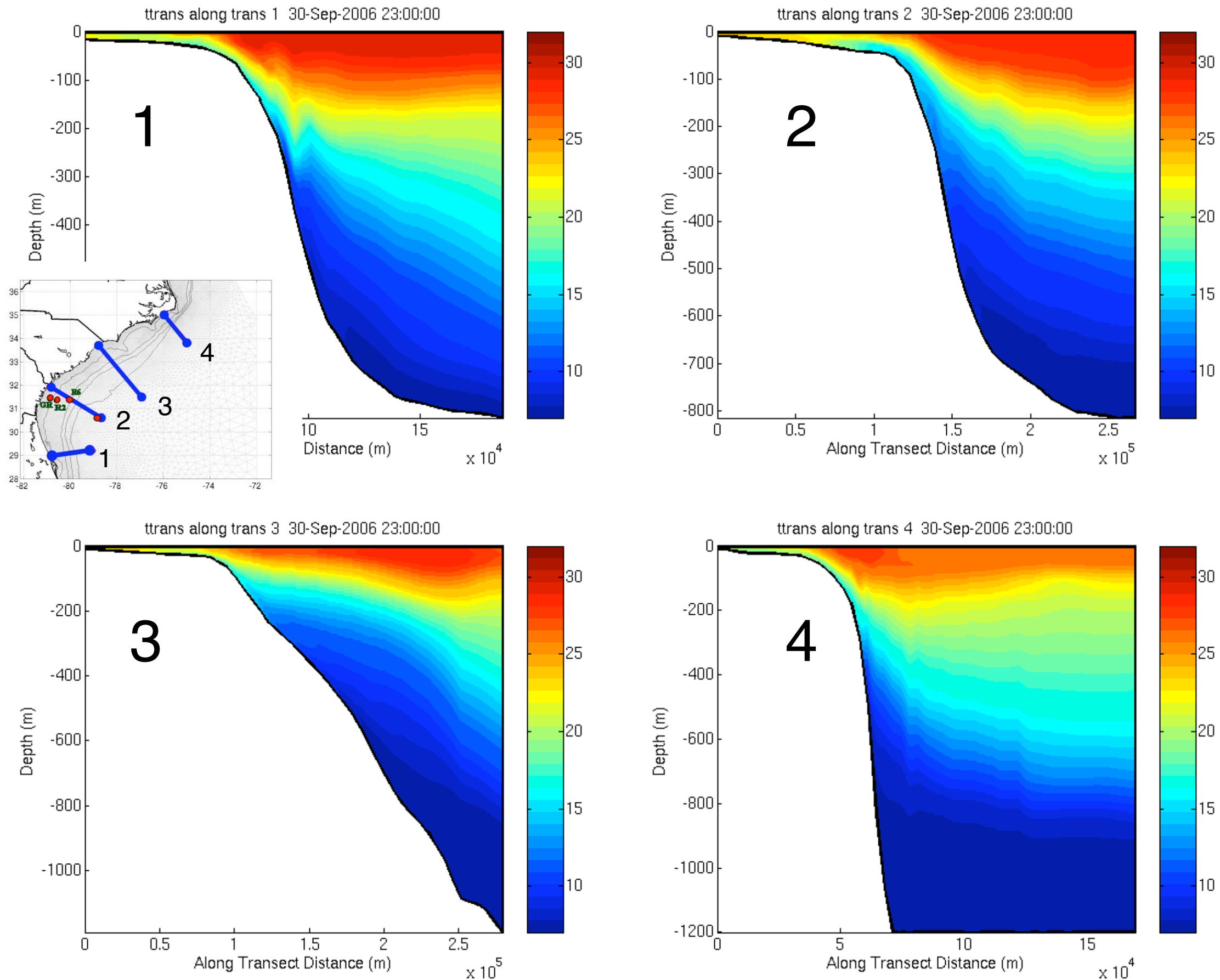
Quoddy SAB Domain



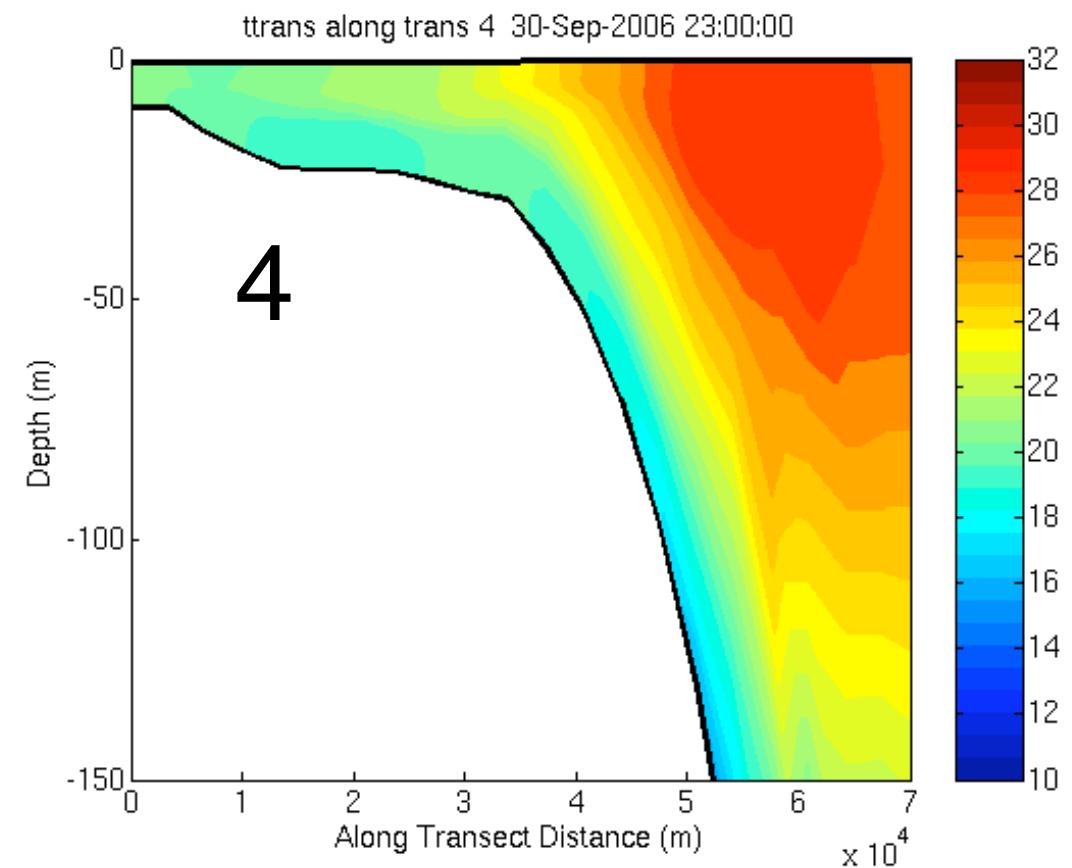
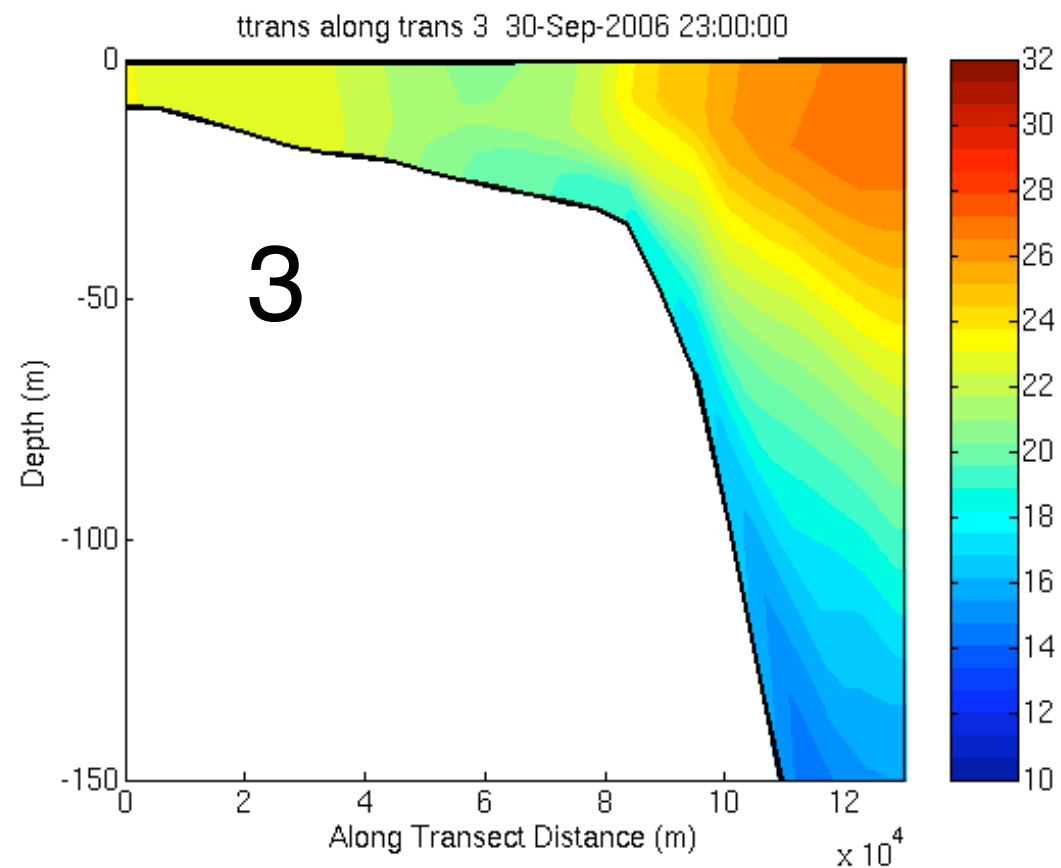
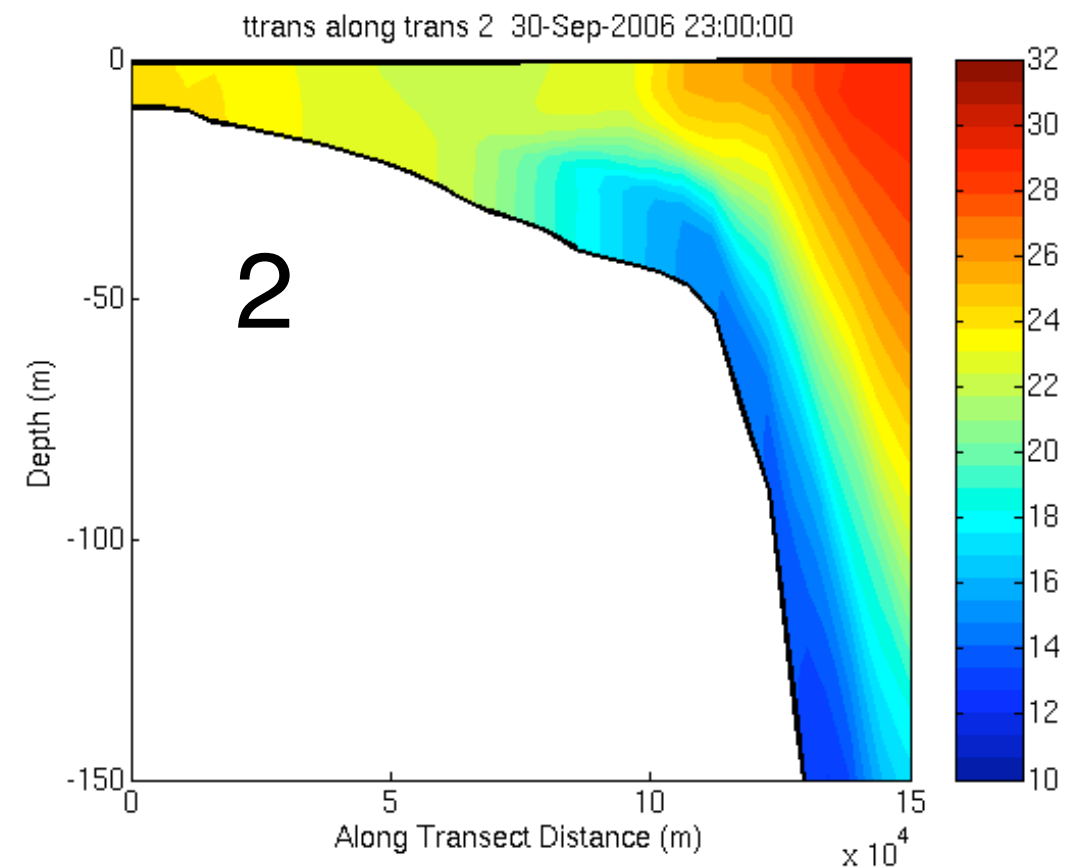
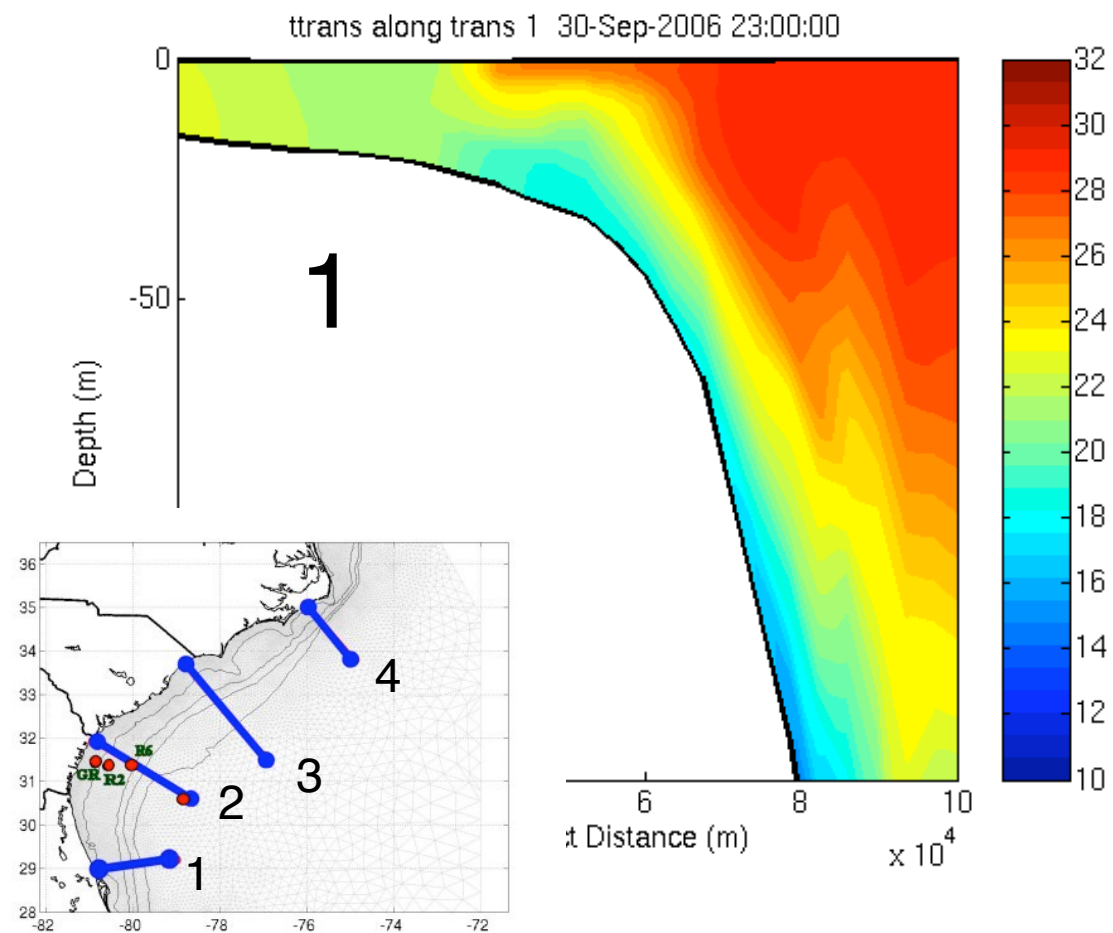


Quoddy output surface
temperature, salinity,
elevation, and velocity.
Interpolated onto regular grid.

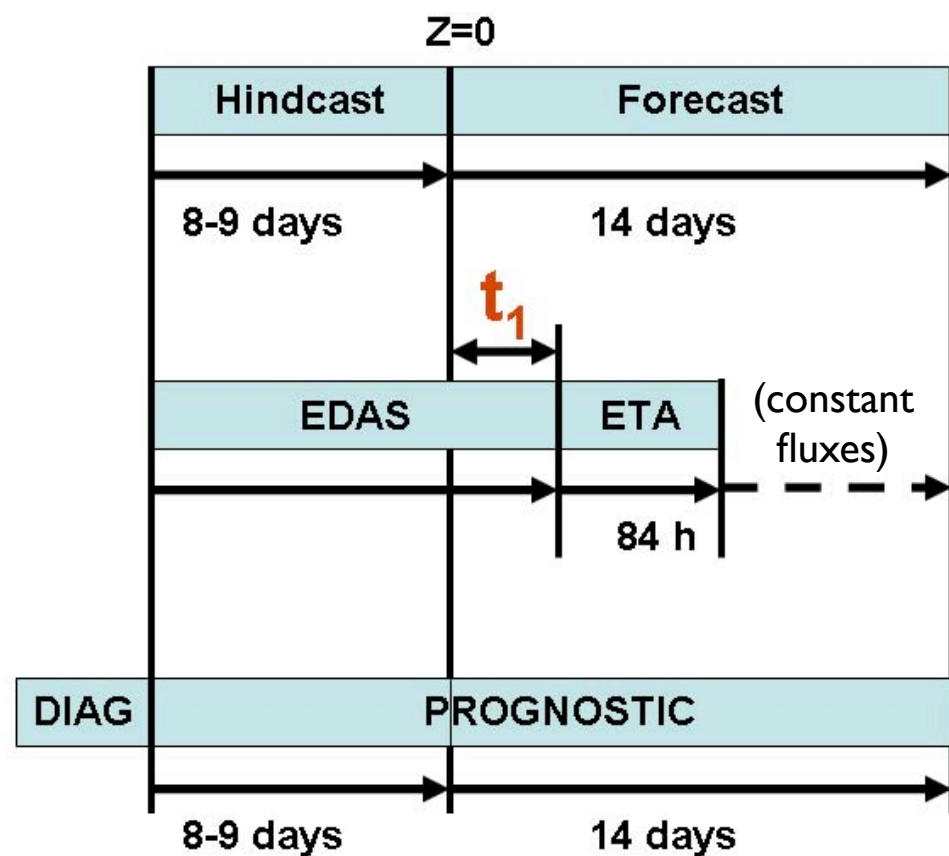
Temperature Sections



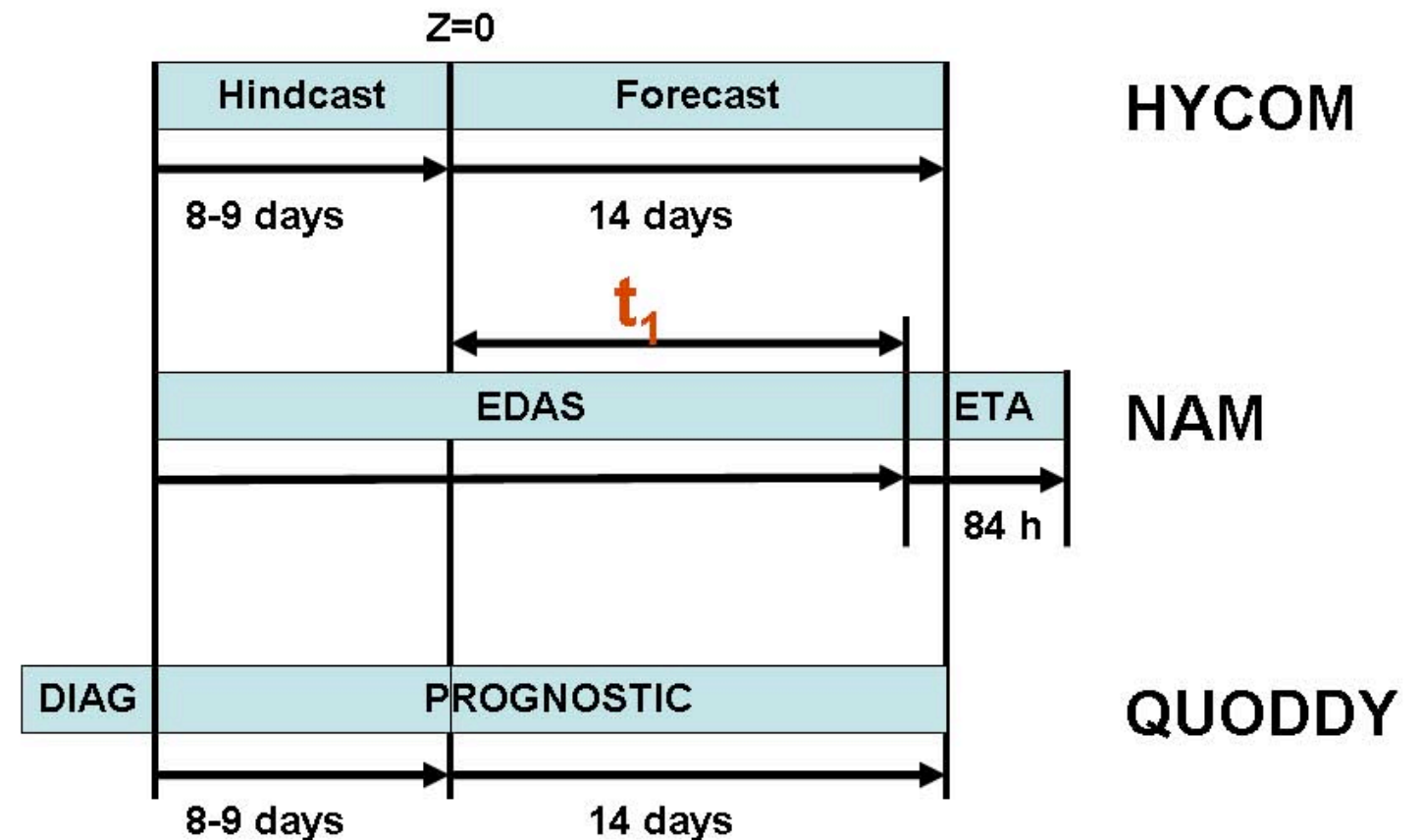
Shelf Temperature Sections



NC/FC System Timing



Ideal t_1 is <1 day

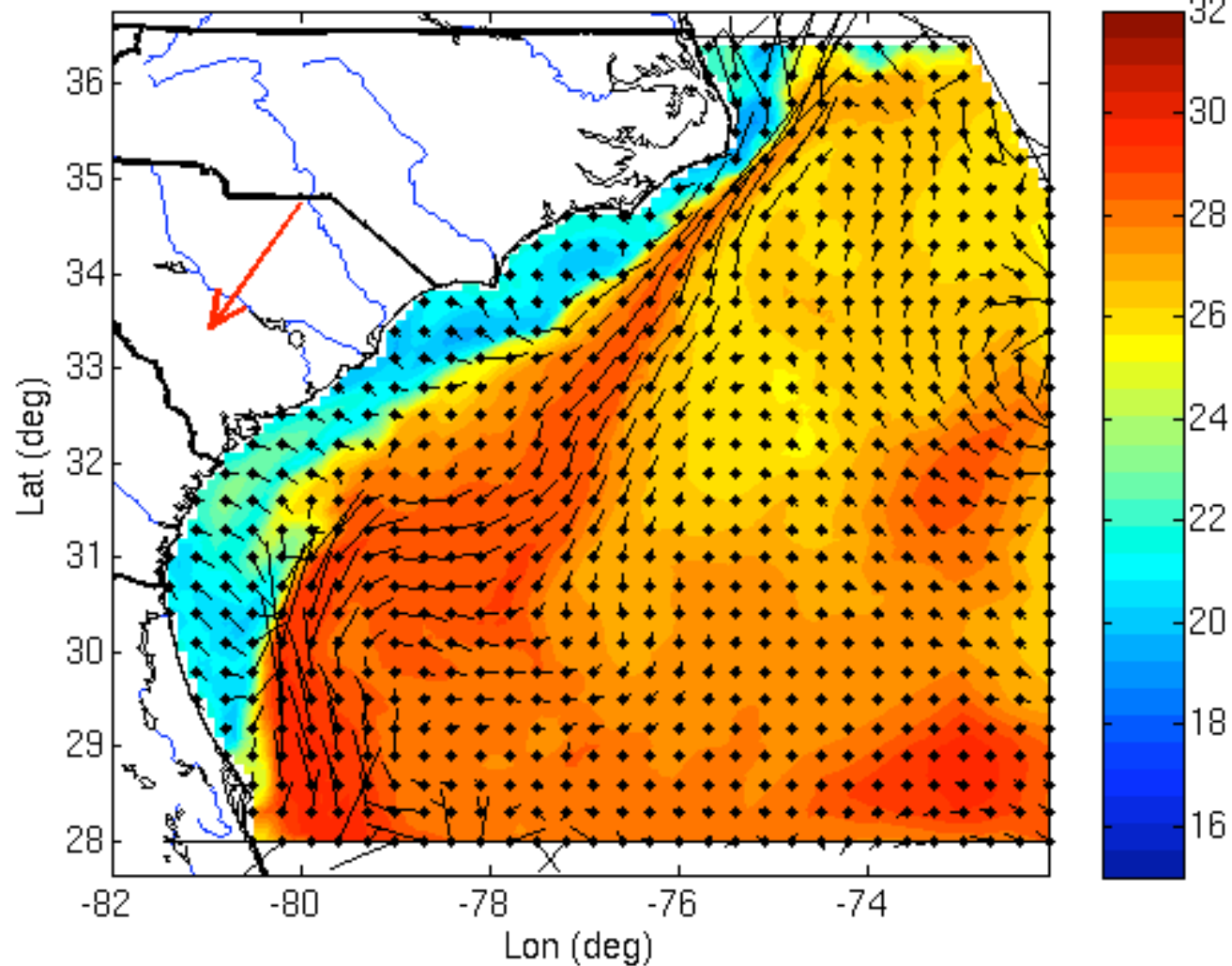


Typical t_1 is 8-12 days owing to HYCOM posting delay

Effect of HYCOM Posting Delay

Typical

tsurfi 30-Sep-2006 23:00:00



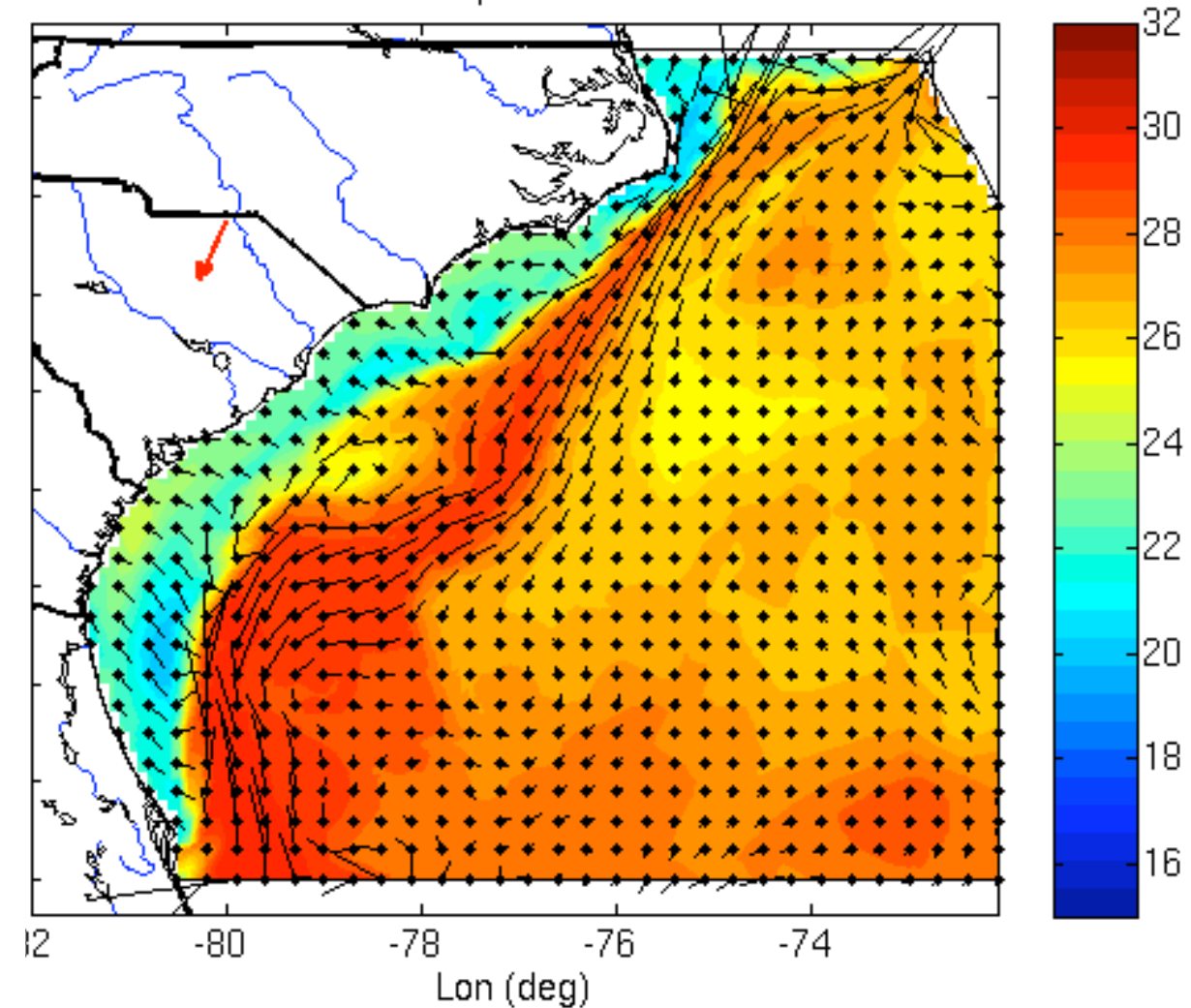
$t_1 = 8$ days

20 Sep HYCOM nowcast

72 hour Quoddy forecast

Ideal

tsurfi 30-Sep-2006 23:00:00



$t_1 < 1$ day

27 Sep HYCOM nowcast

72 hour Quoddy forecast

NCCOOS Model Output Web Page

Model Output — North Carolina Coastal Ocean Observing System

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Model Output

by Luke Stearns — last modified 2006-04-29 21:20

Parameter	NAM	ADCIRC	HYCOM	QUODDY
Wind				
Sea Surface Temperature				
Water Level				
Surface Currents				

news

- ADCIRC now with medium grid resolution 2006-05-01
- Quoddy Model Surface Maps Added 2006-04-20
- NCCOOS Site Has New Face 2005-12-02
- EDU Content Moved to Marsigli 2005-09-27
- New Site Installed 2005-09-08

More news...

November 2006

Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

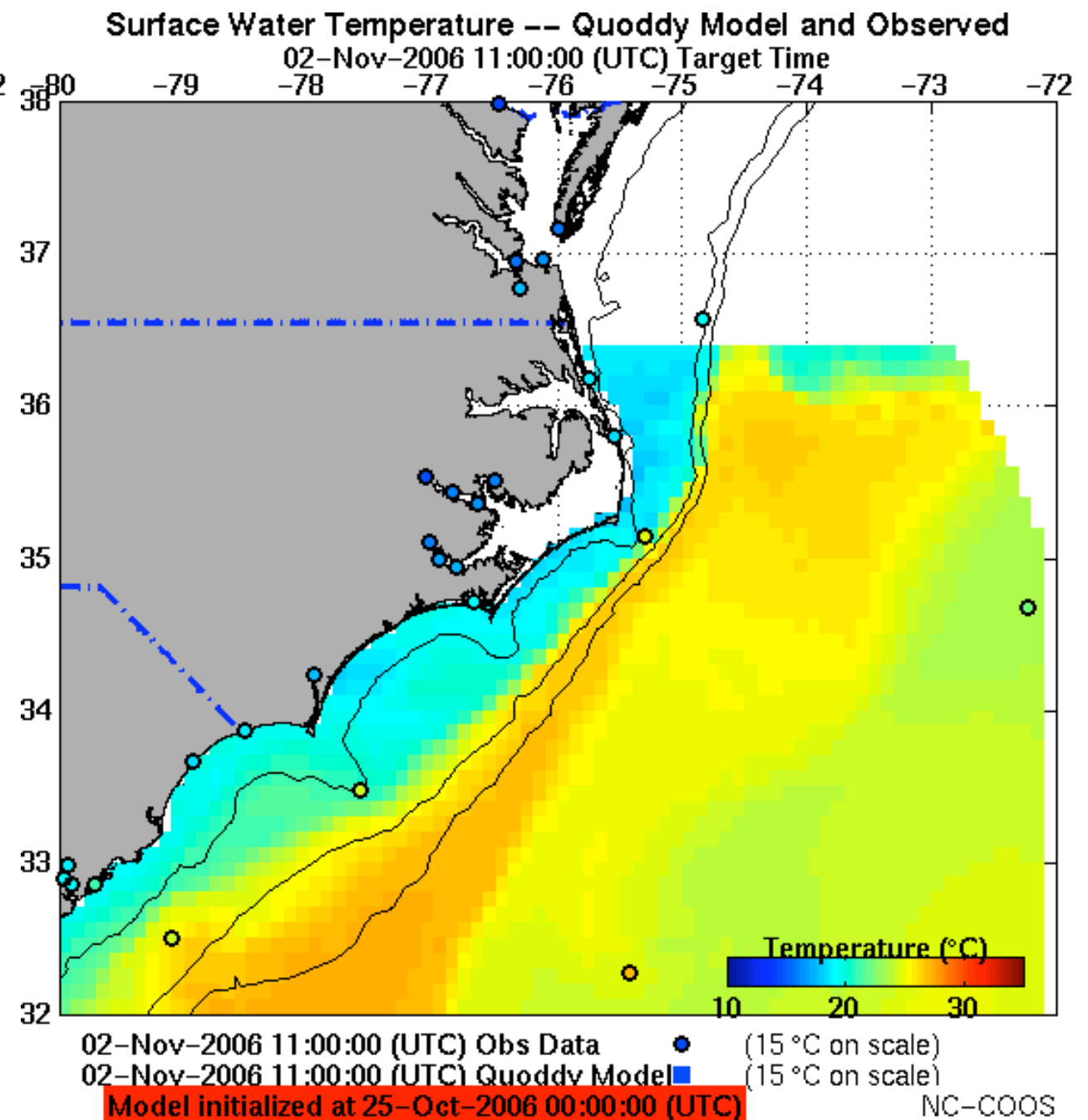
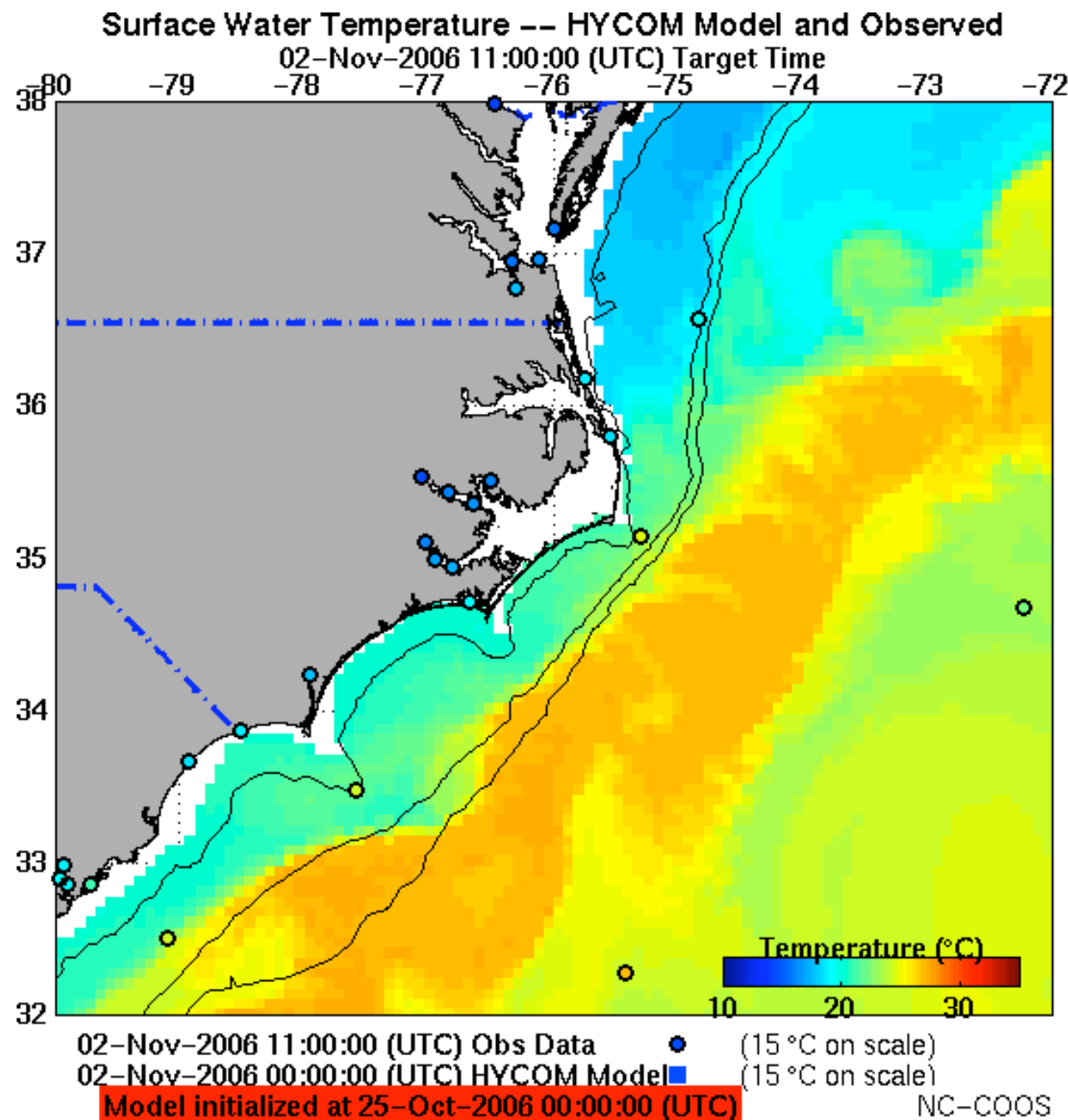
<http://nccoos.org/models>

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PLONE POWERED

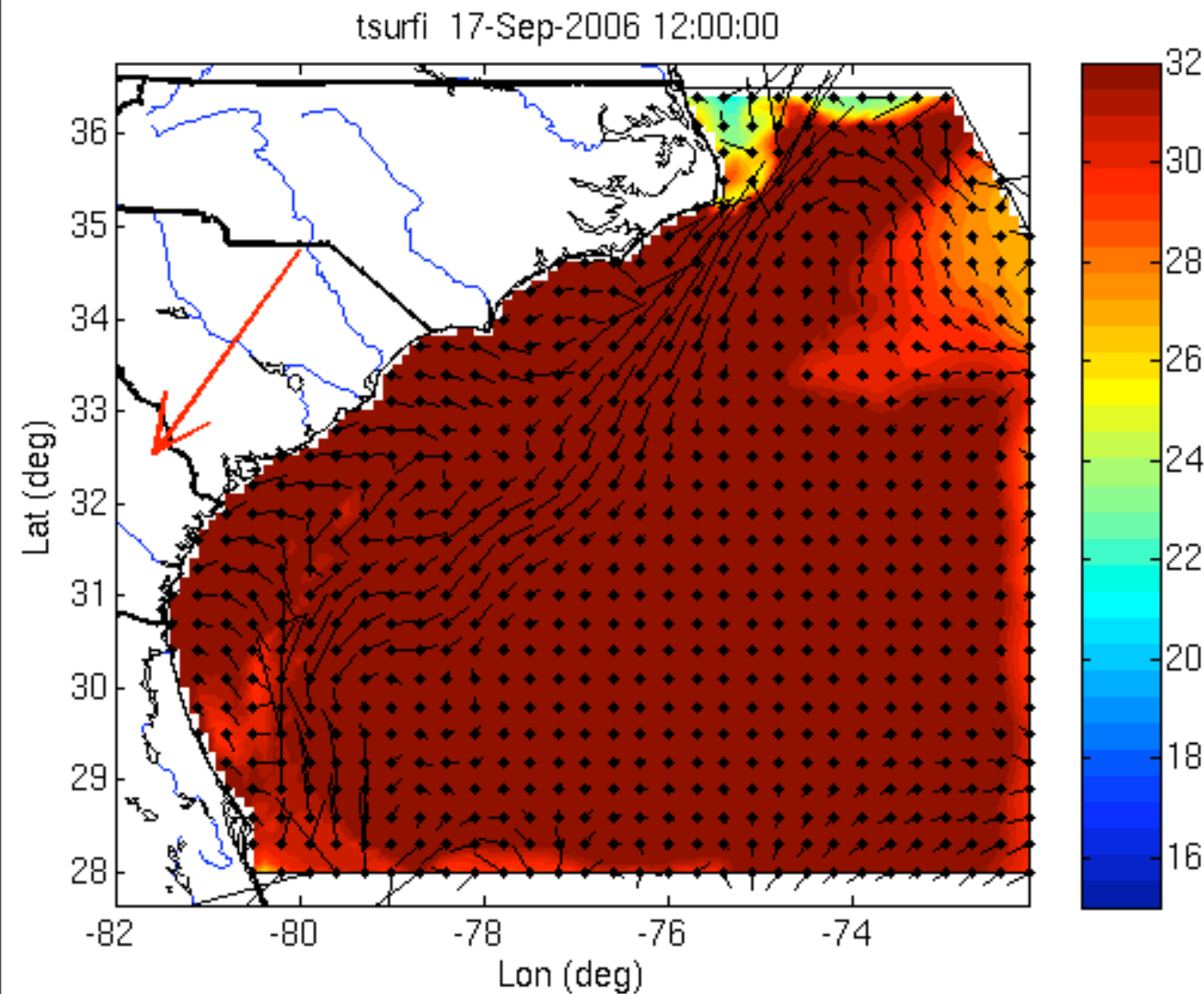
HYCOM and Quoddy SST

2 Nov 2006 1100UTC

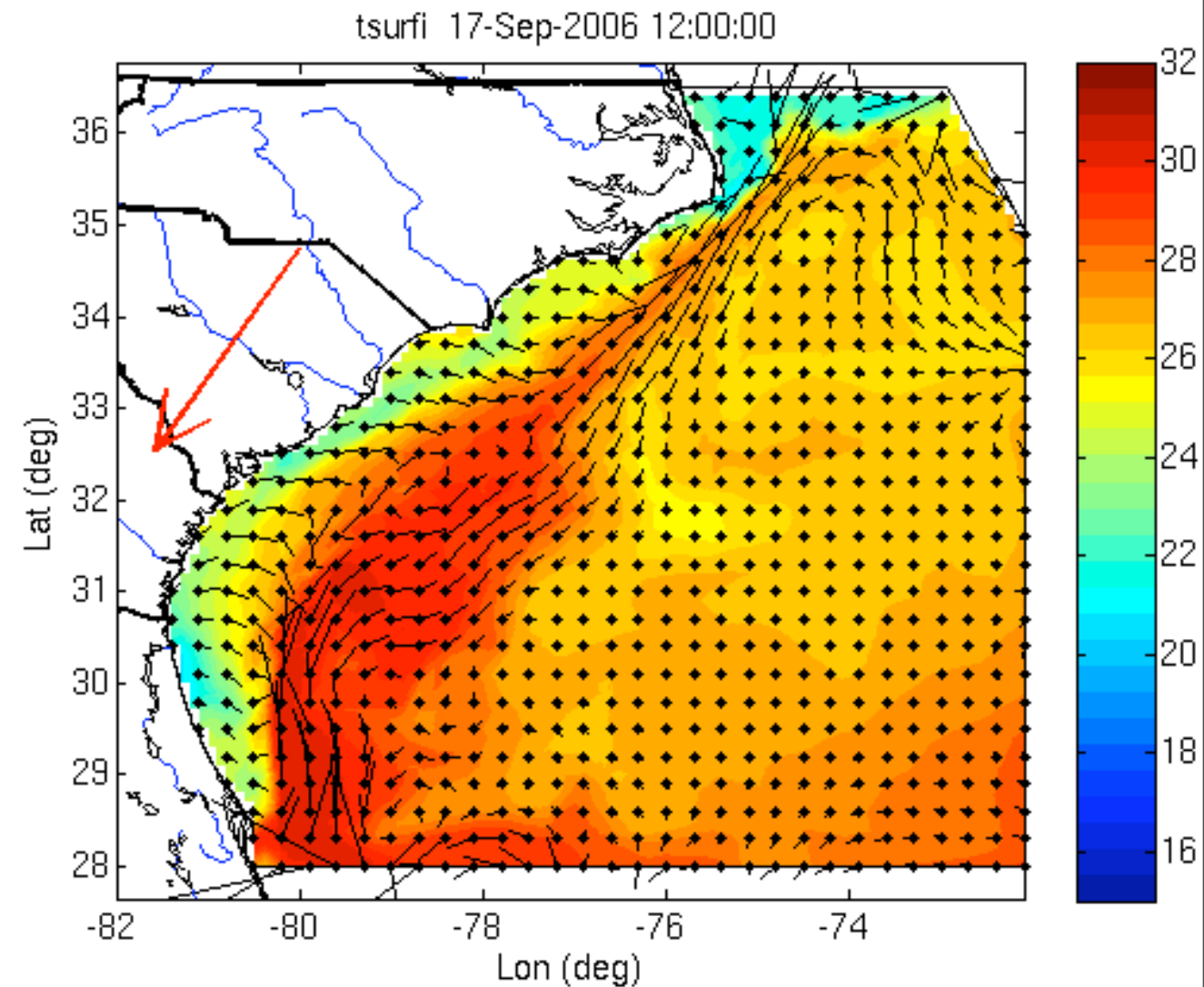


My Rookie Mistake

(NCEP Changed Sign of Heat Fluxes)



Using old sign convention after
“stealth” change by NCEP

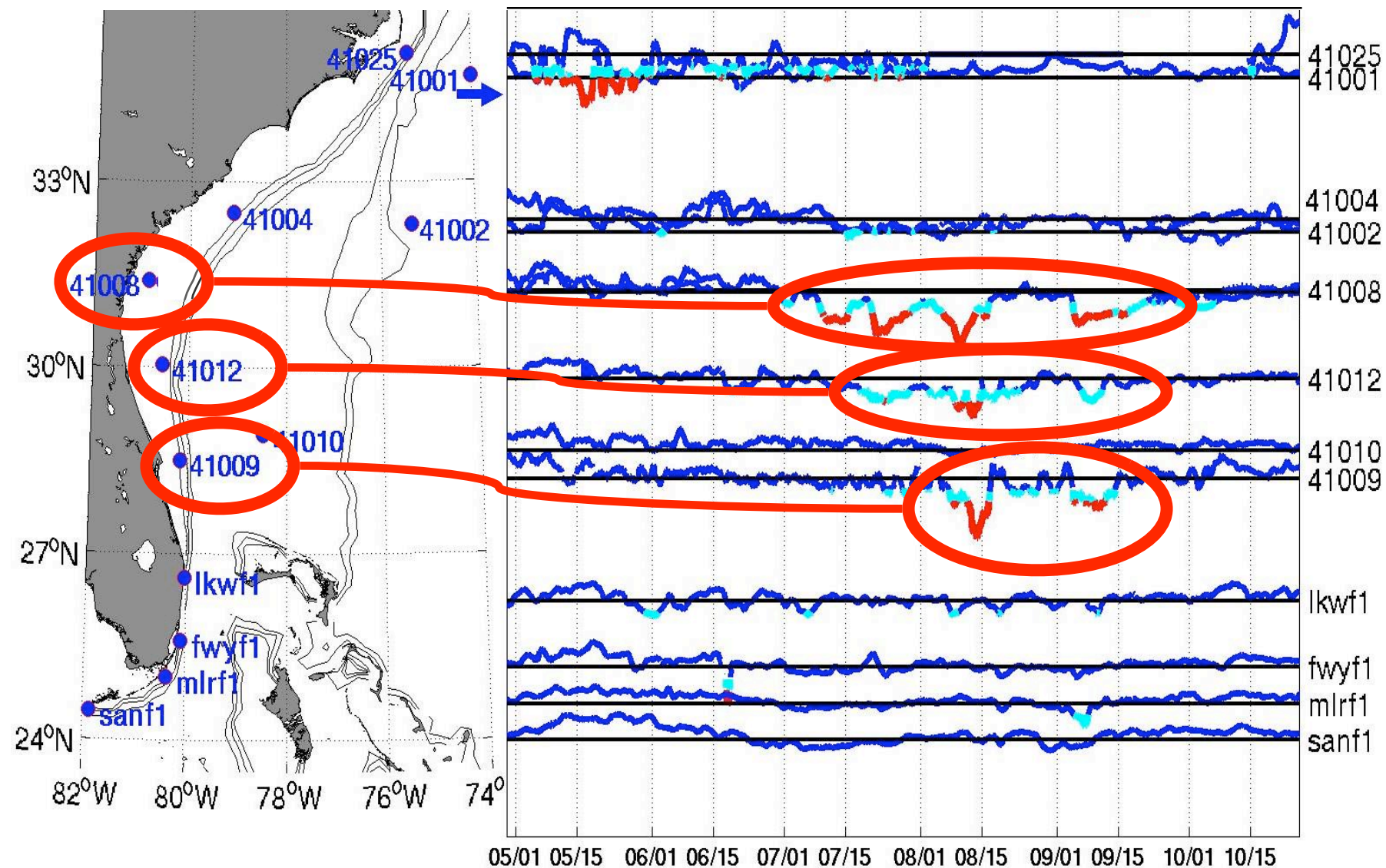


Using new sign convention

Summer 2003 Cold Event in SAB

- Observations: Fixed moorings, ship transects
- Quoddy with climatological IC and BC or nested HYCOM/Quoddy
- ADCIRC TDB tidal elevation
- NCEP EDAS (AWIP12) surface forcing
- USGS river input at 5 nodes (20psu)

Summer 2003 Cold Event



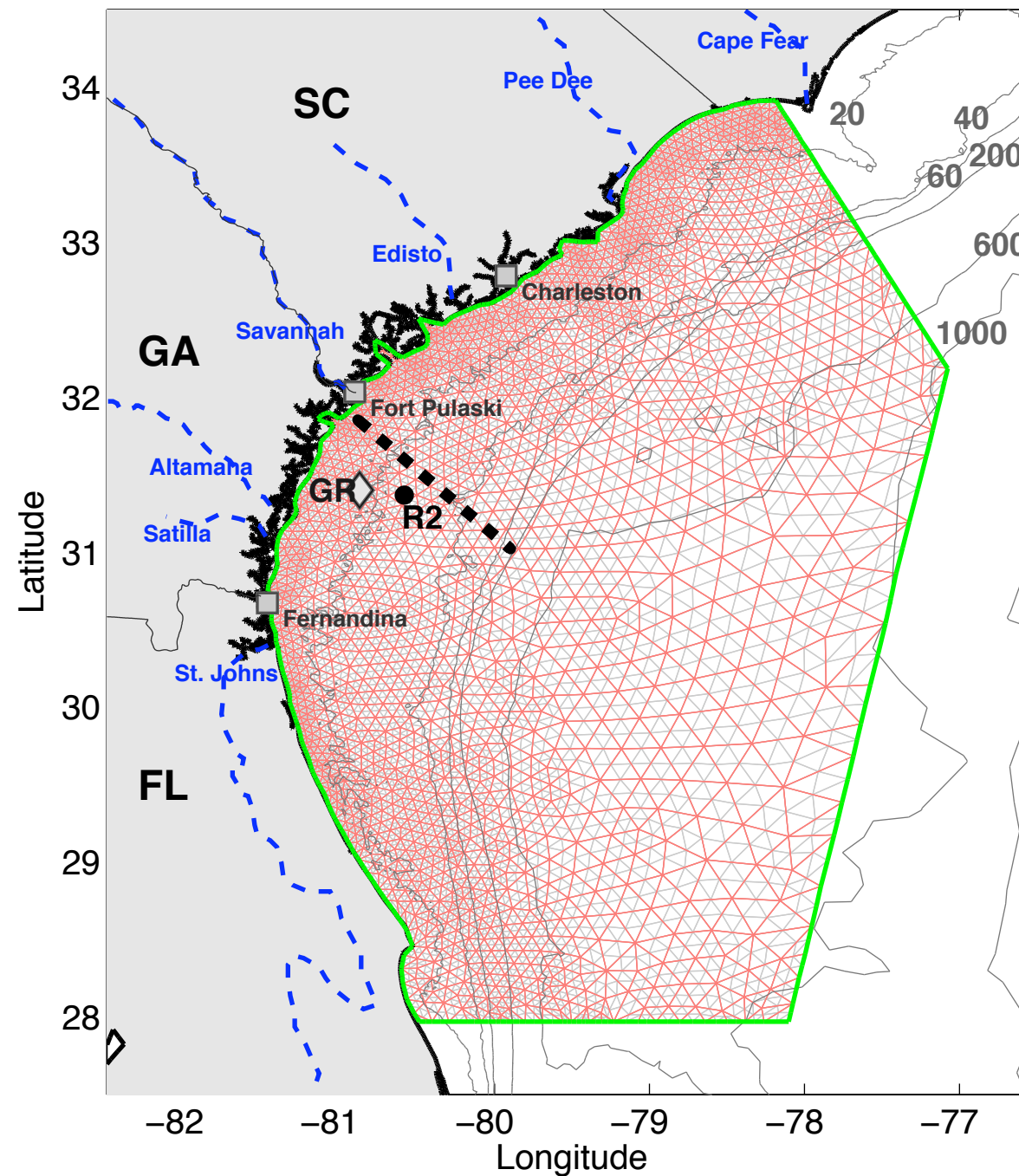
ΔT = Near-surface T minus long-terms means

$$\Delta T > -1^{\circ}\text{C}$$

$$-2^{\circ}\text{C} < \Delta T < -1^{\circ}\text{C}$$

$$\Delta T < -2^{\circ}\text{C}$$

Cold Event Study Domain



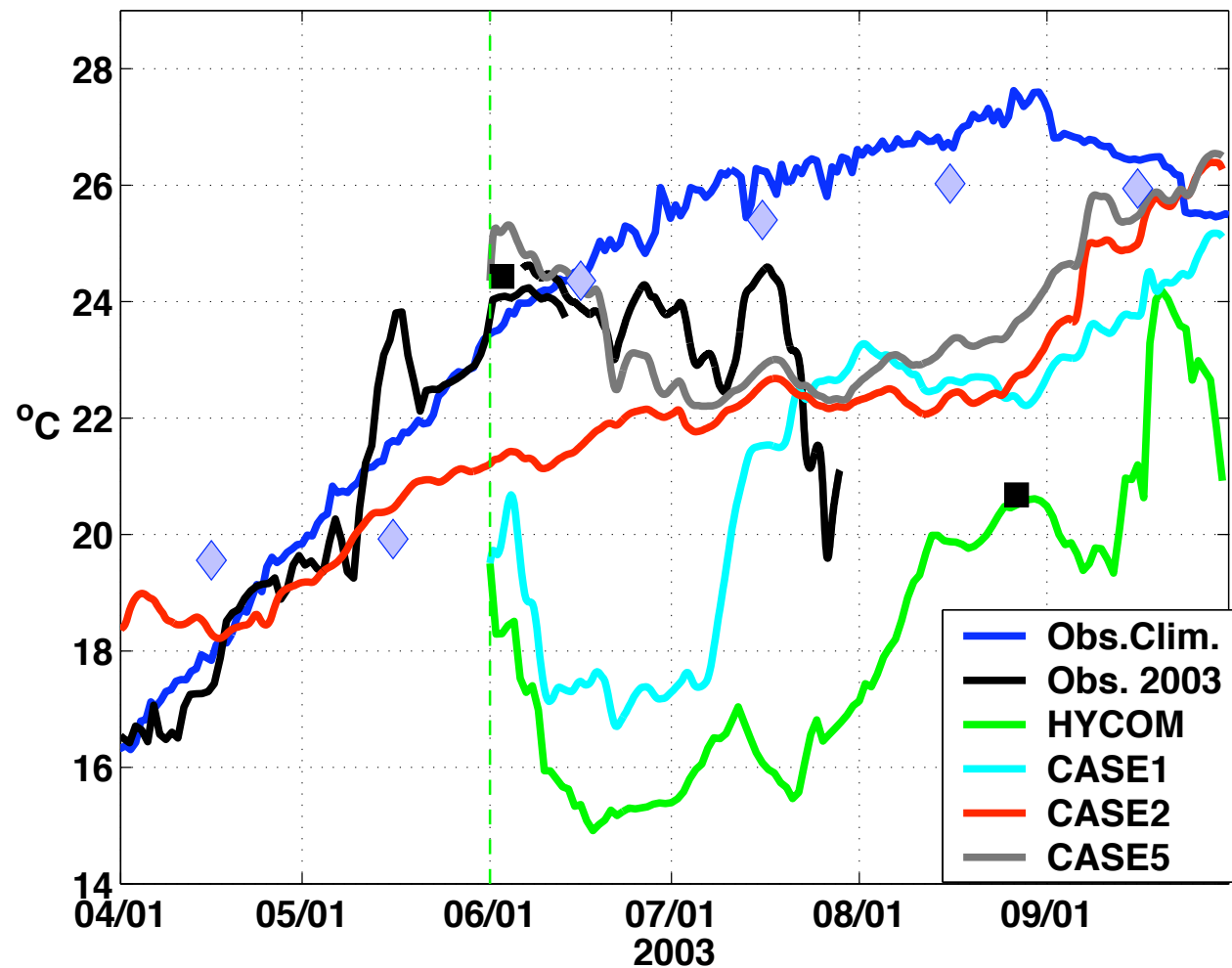
Quoddy Cases

CASE	Initial condition source and date	Open boundary conditions	River Discharge	EDAS forcing
CASE 1	HYCOM (01-Jun-2003)	HYCOM (Jun-Sep)	2003	2003
CASE 2	CLIMAT (Feb)	CLIM (Feb-Sep)	2003	2003
CASE 3	CLIMAT (Feb)	CLIM (Feb-May), HYCOM (Jun-Sep)	2003	2003
CASE 5	CLIMAT (Jun)	CLIM (Jun-Sep)	2003	2003
CASE 9	CLIMAT (Jun)	CLIM (Jun-Sep)	NO	2003
CASE 10	CLIMAT (Jun)	CLIM (Jun-Sep)	2003	2002



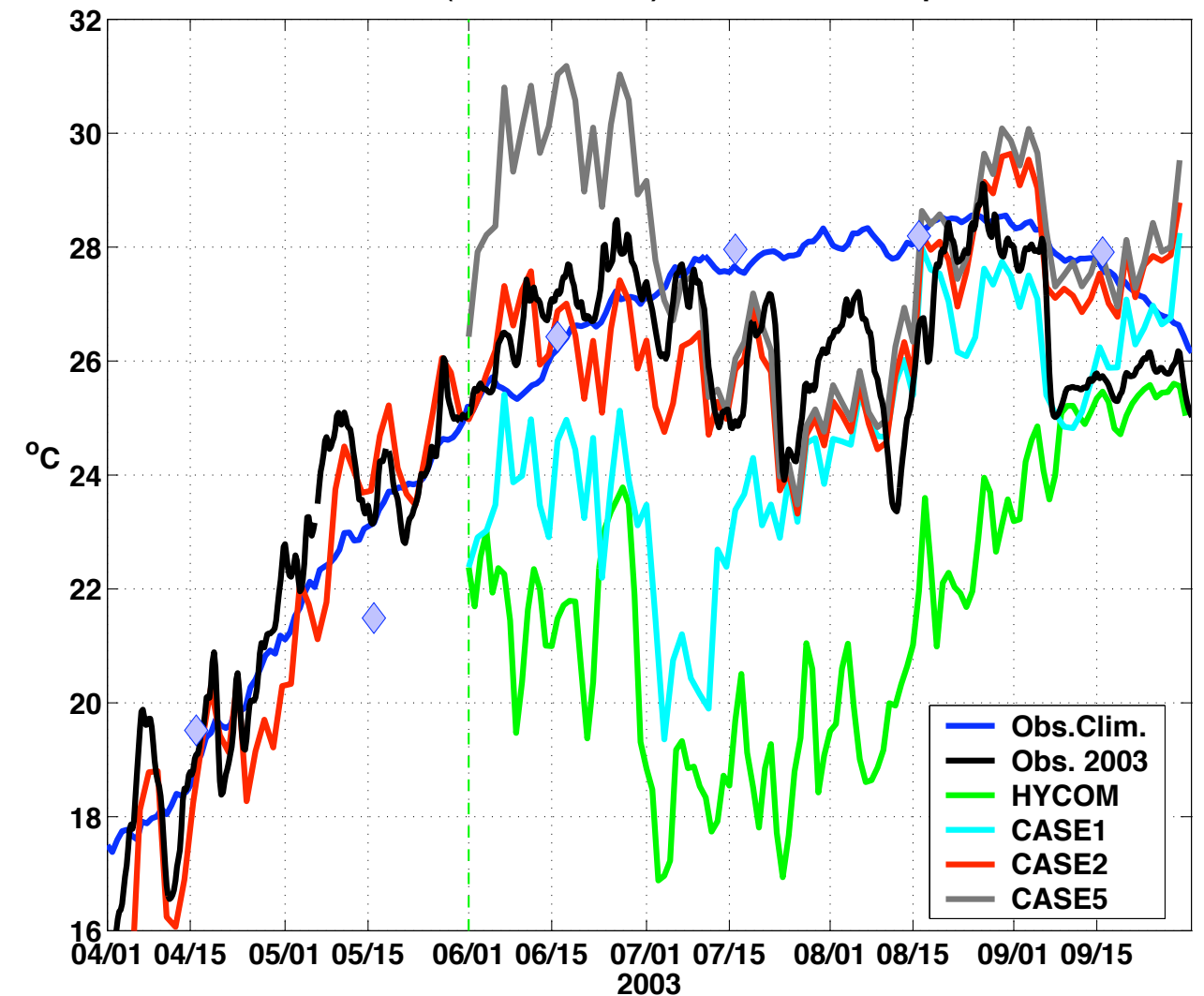
Mid-shelf T Comparison

Bottom R2 Temperature



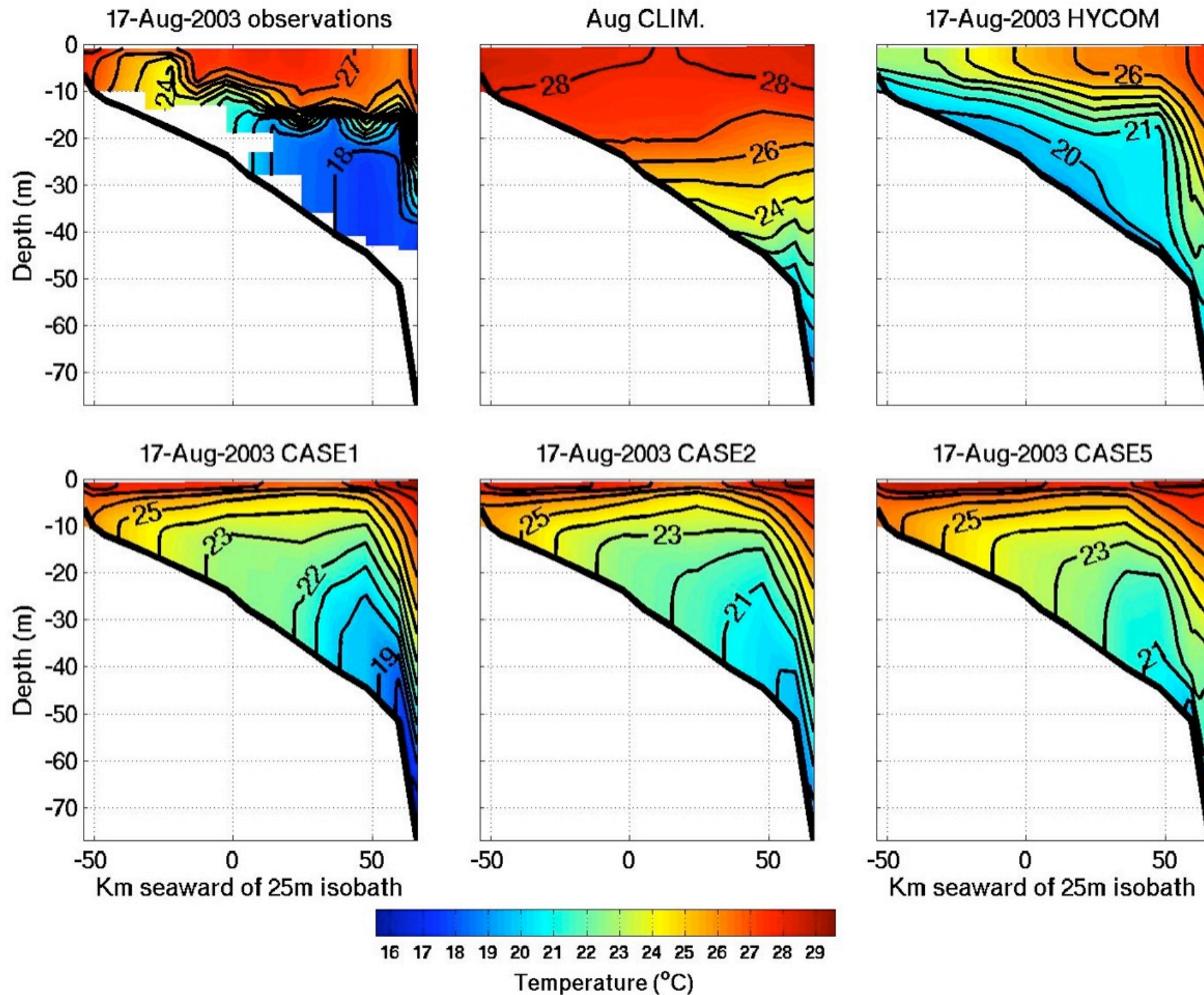
Bottom R2

NDBC 41008 (GRAY'S REEF) Near-surface Temperature

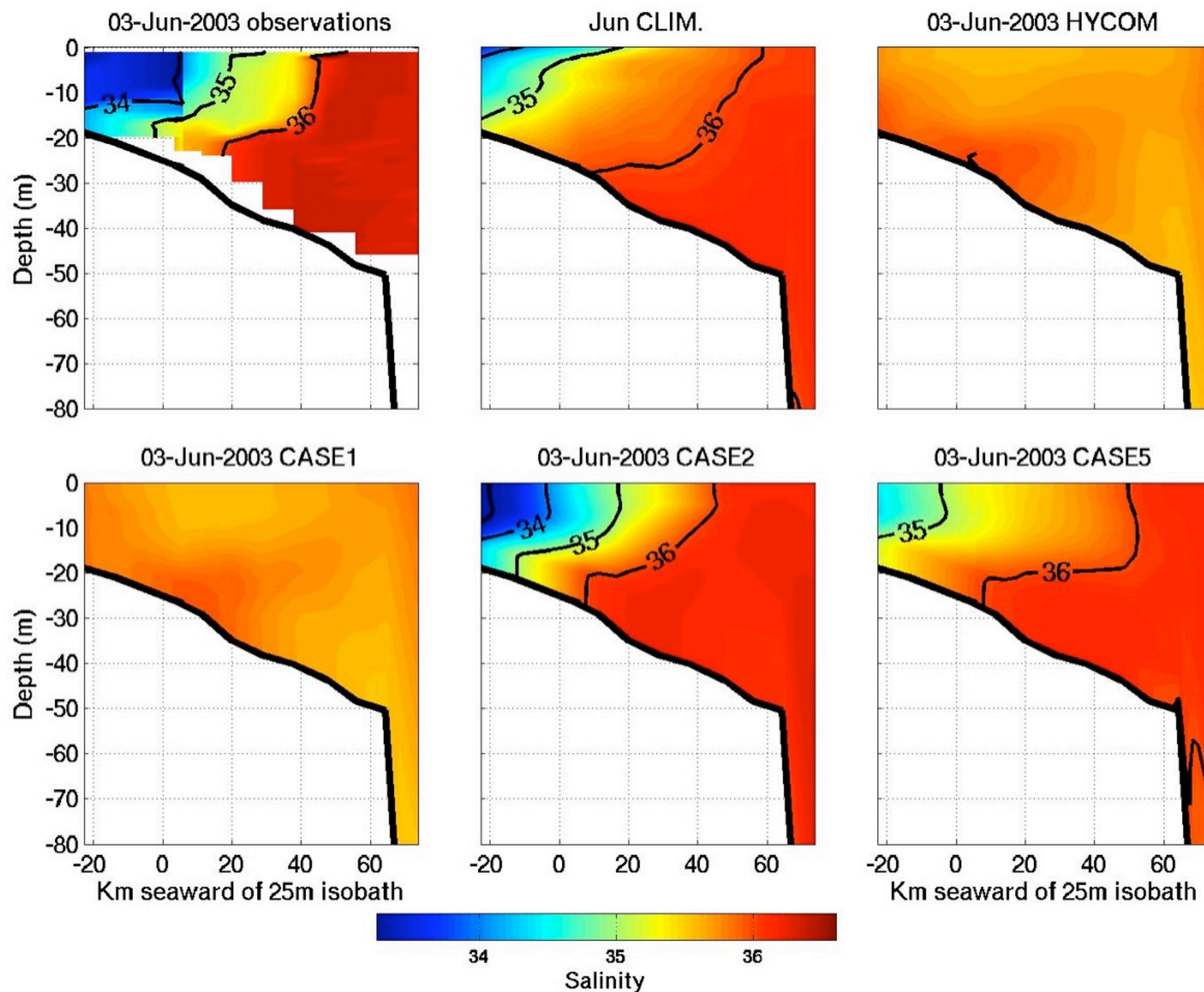


Surface Gray's Reef

Shelf Temperature



Shelf Salinity



- Aretxabaleta, et al. (2006) Cold event in the South Atlantic Bight during summer of 2003: Anomalous hydrographic and atmospheric conditions, *JGR*, **111**, C06007.
- Aretxabaleta, et al., Cold event in the South Atlantic Bight during summer of 2003: Model simulations and implications, *JGR* (undergoing revisions after positive reviews)

Future Steps

- Make NC/FC system more automatic and robust
- Access to more timely HYCOM results
- Documentation
- Evaluate performance of system w.r.t. available data
- Explore transition to baroclinic version of ADCIRC (MPI = significant speed increase over Quoddy)