HYCOM/Quoddy Nested Baroclinic Nowcast/Forecast System for the South Atlantic Bight

(and other things)

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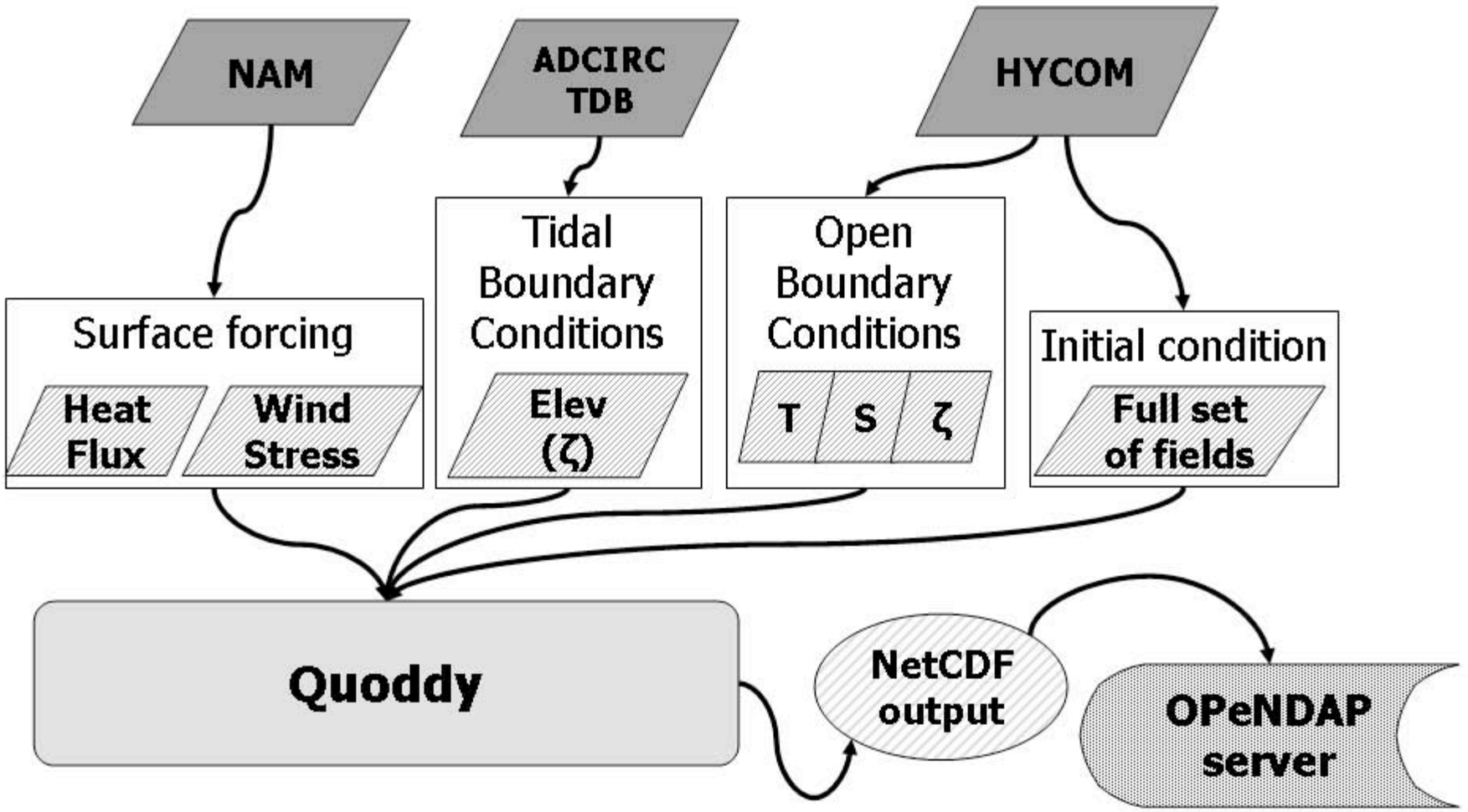
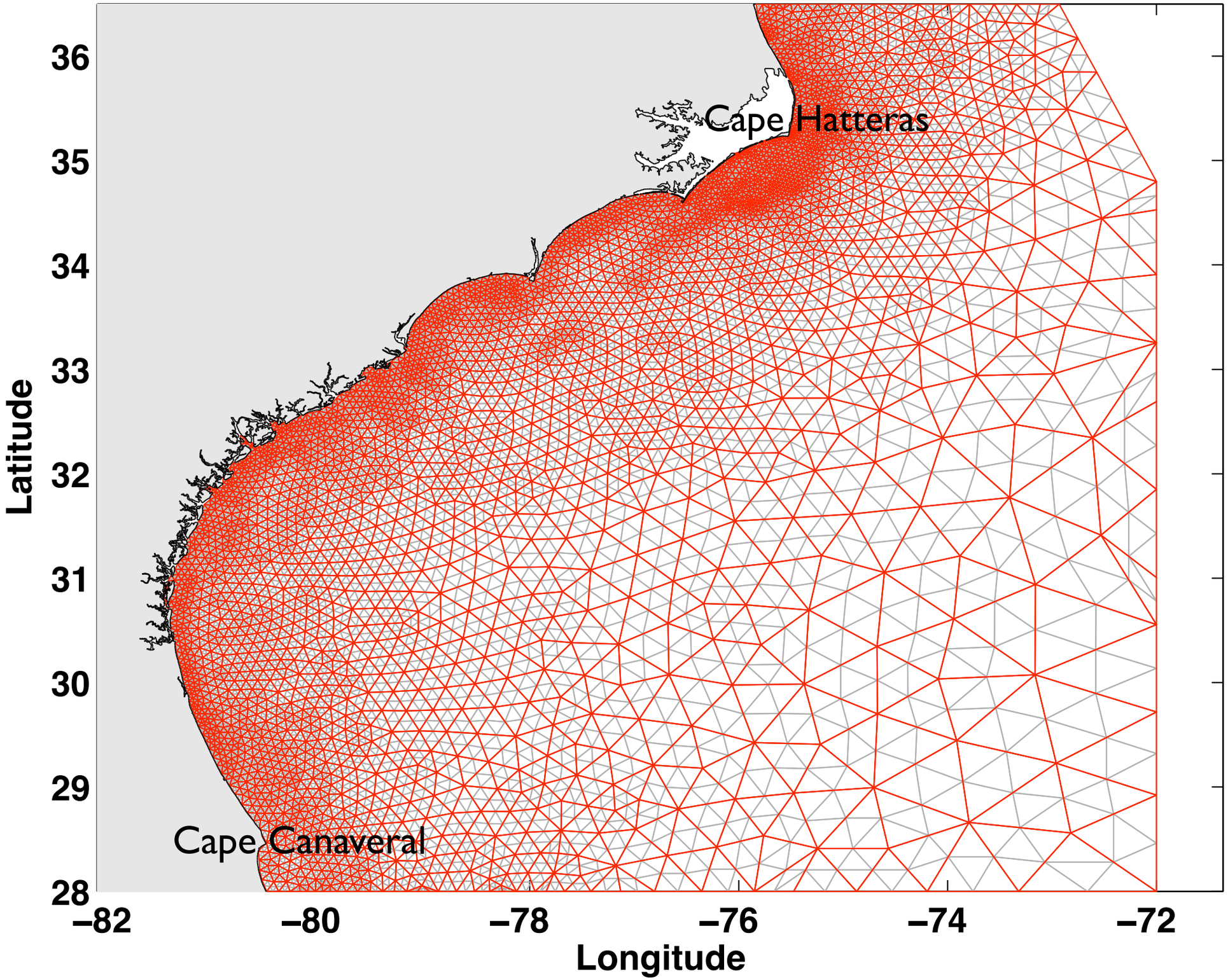
SAB NC/FC System

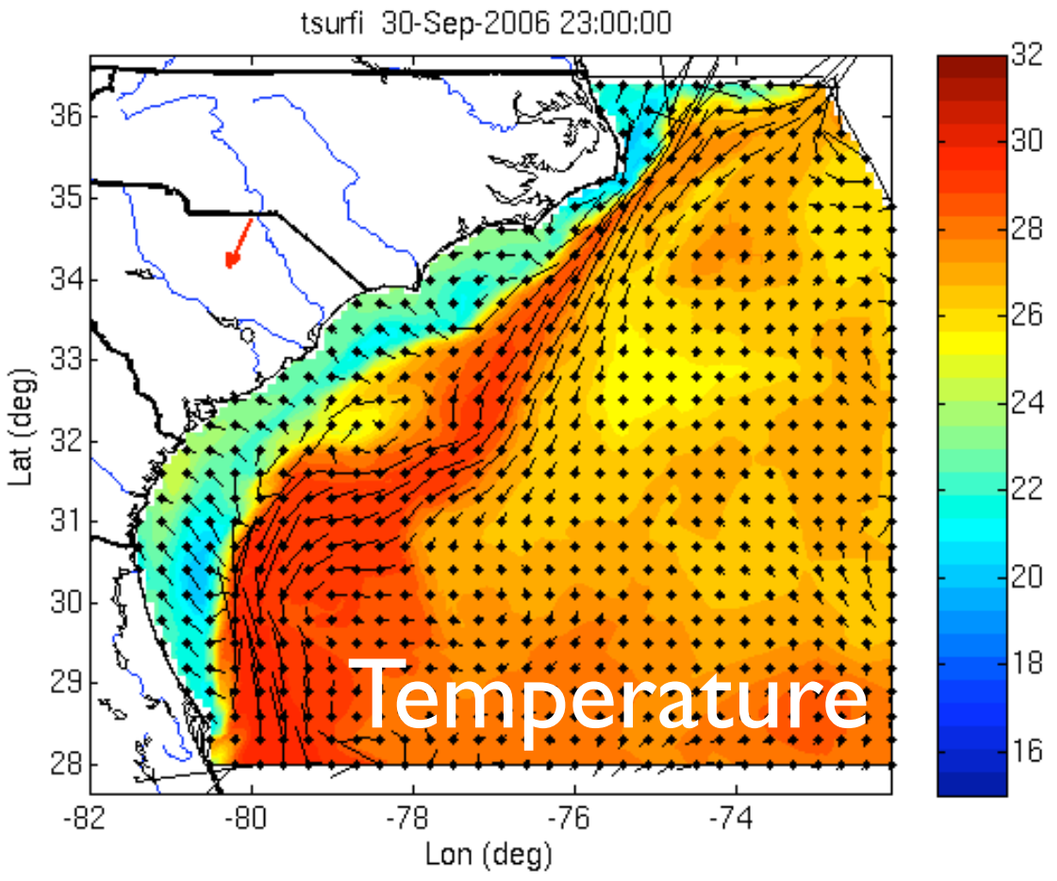
- SAB regional baroclinic model is Quoddy
- HYCOM provides IC and open BC
- Tidal open BC from ADCIRC TDB
- NCEP ETA (now WRF/NMM) for surface forcing (AWIP12)
- 4-day diagnostic run (spin up tides + mixing), up to 21-day prognostic run

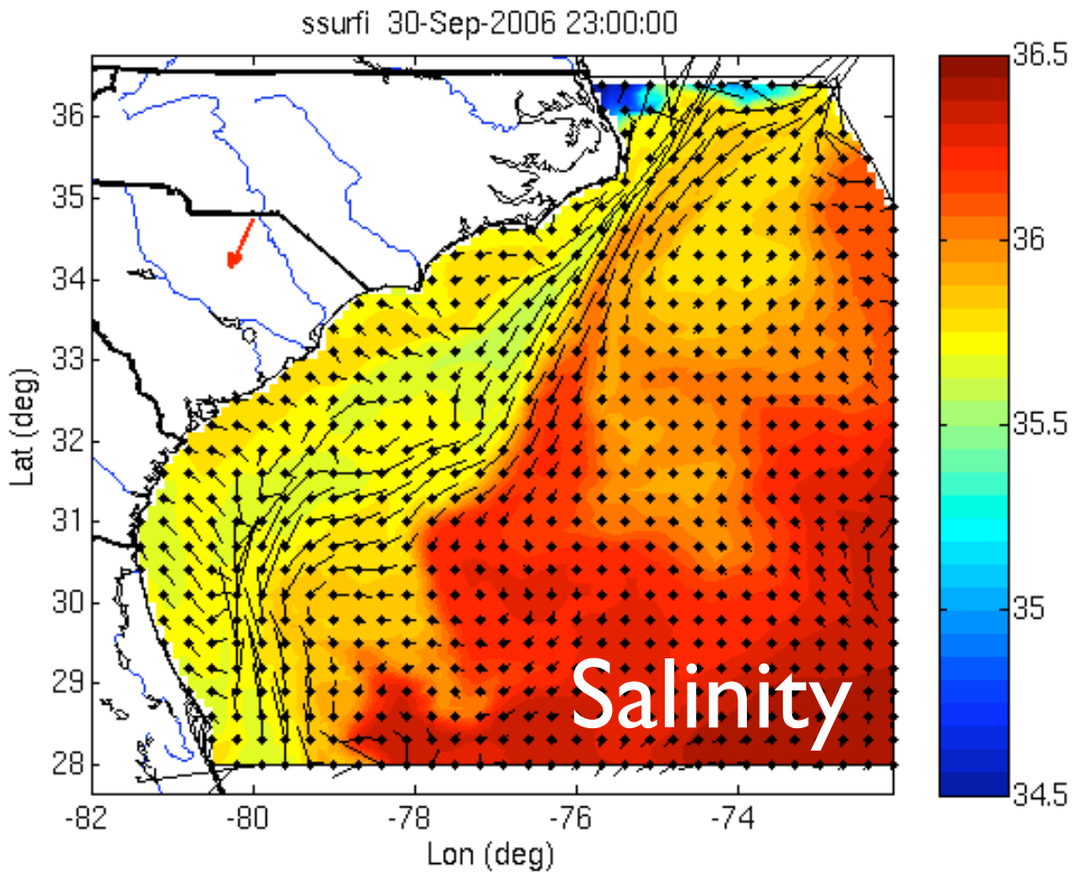
HYCOM/Quoddy NC/FC System

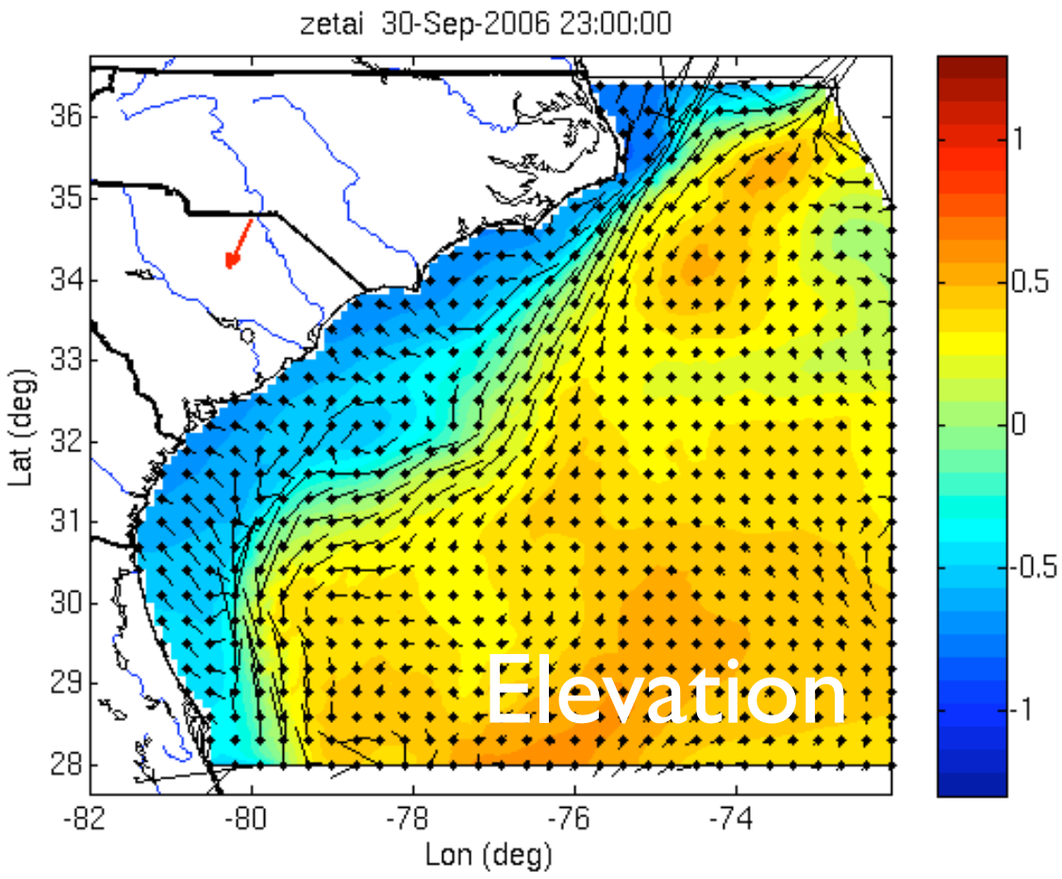


Quoddy SAB Domain



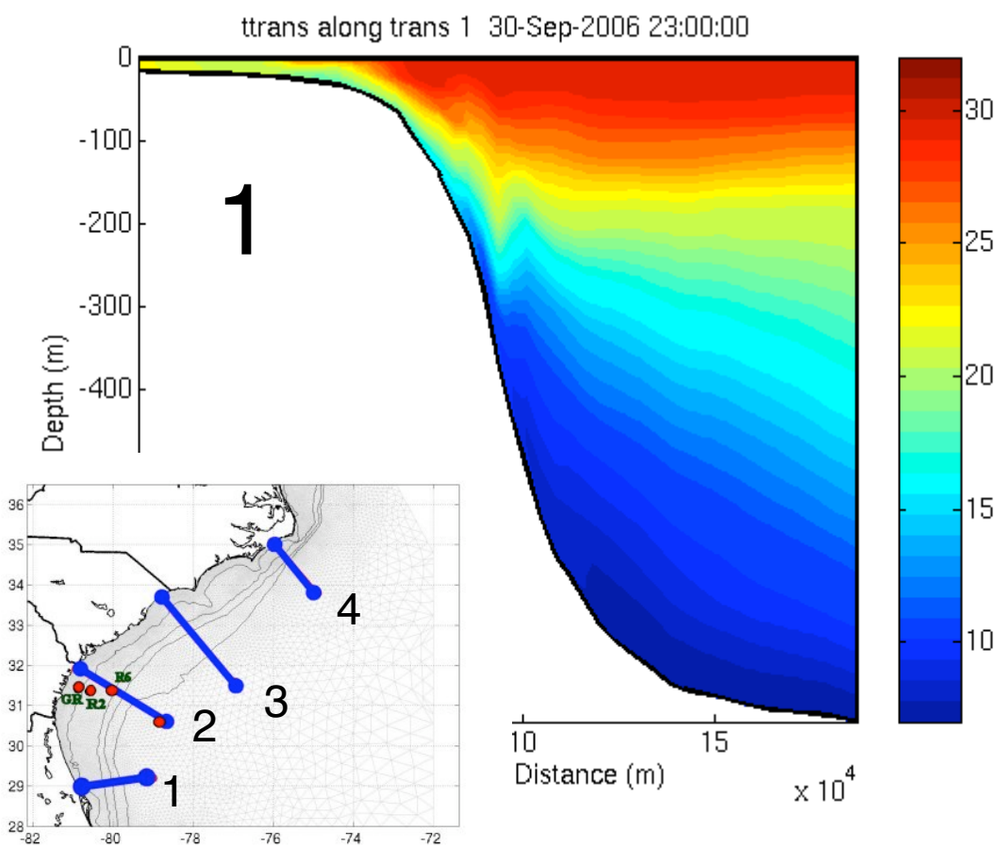


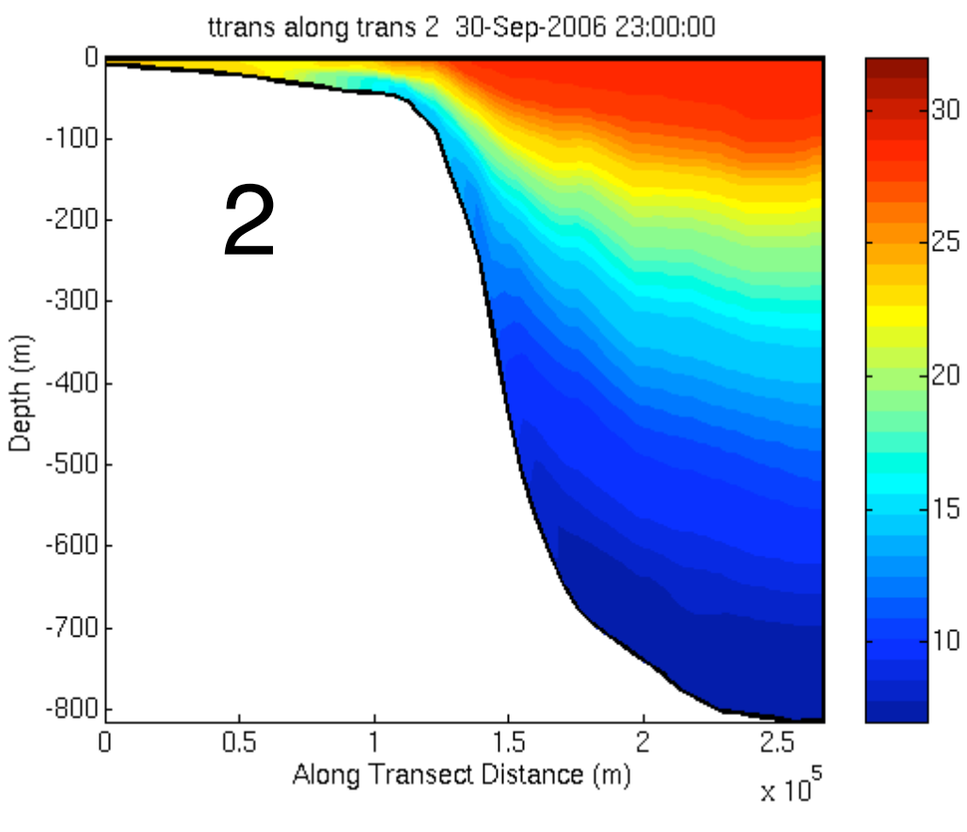


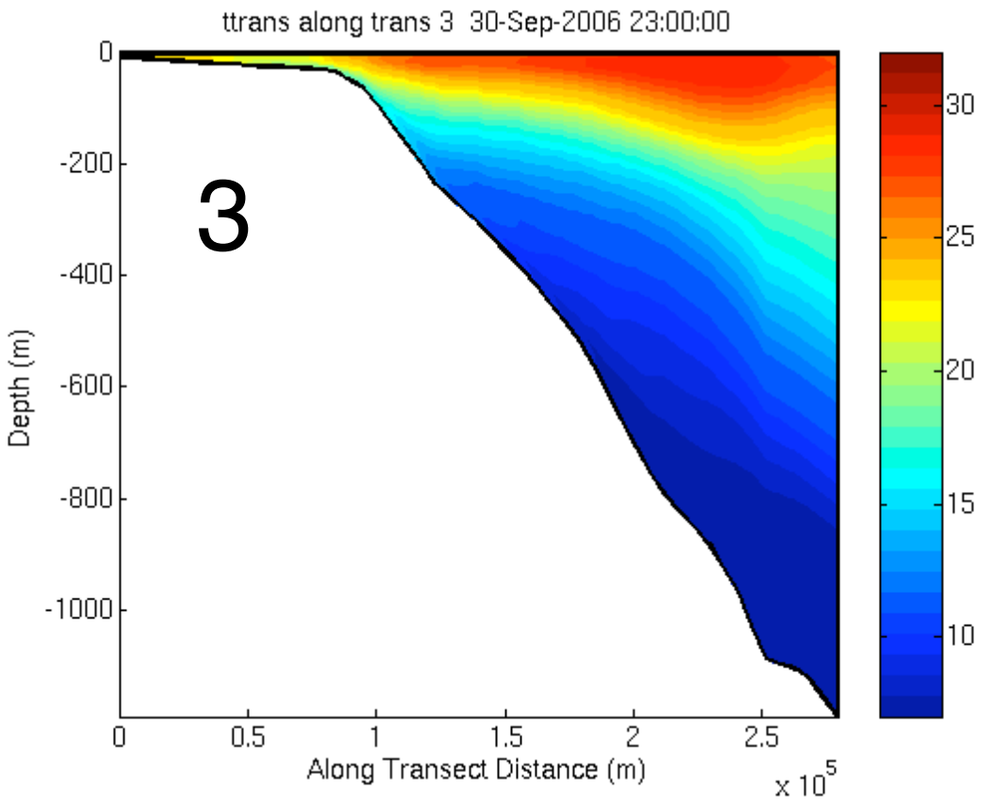


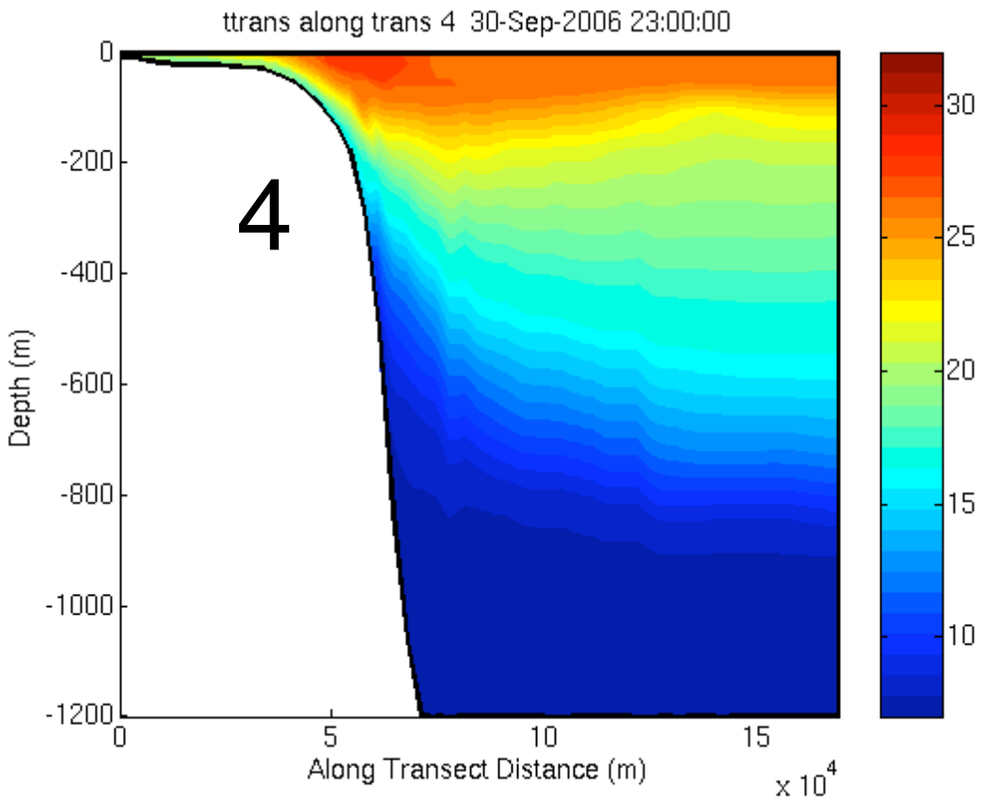
Quoddy output surface temperature, salinity, elevation, and velocity. Interpolated onto regular grid.

Temperature Sections

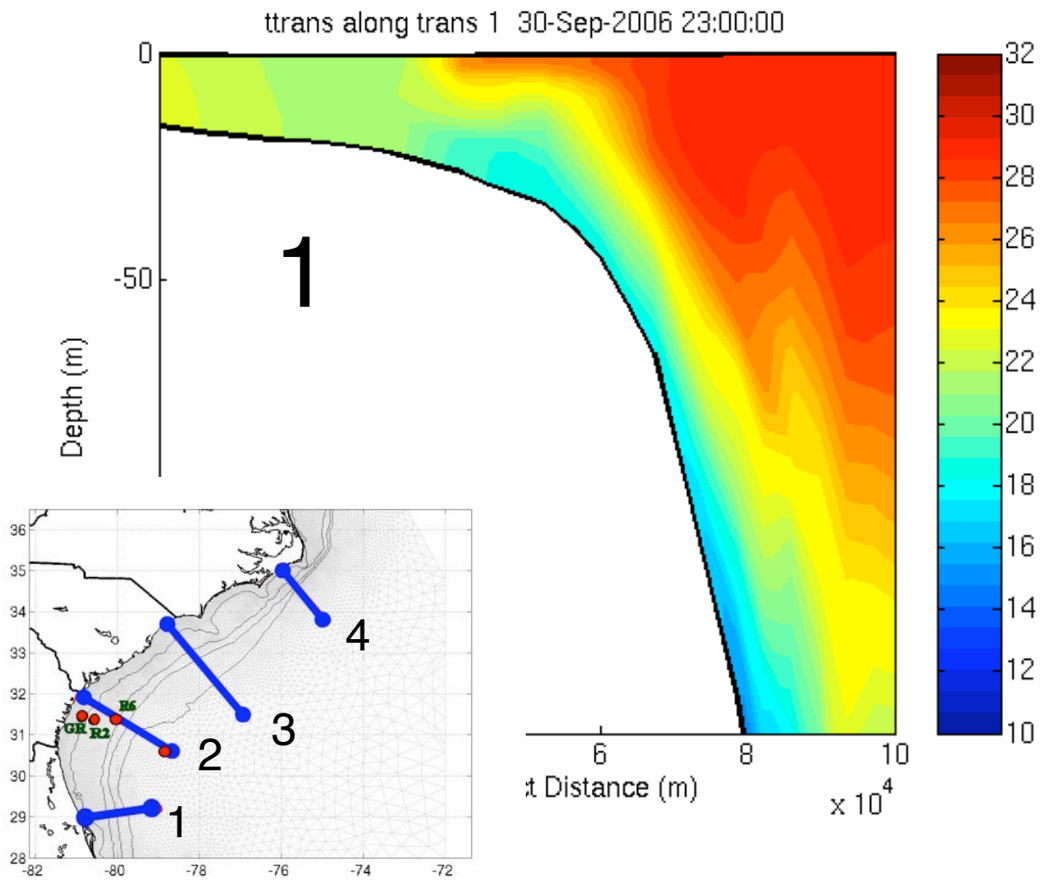


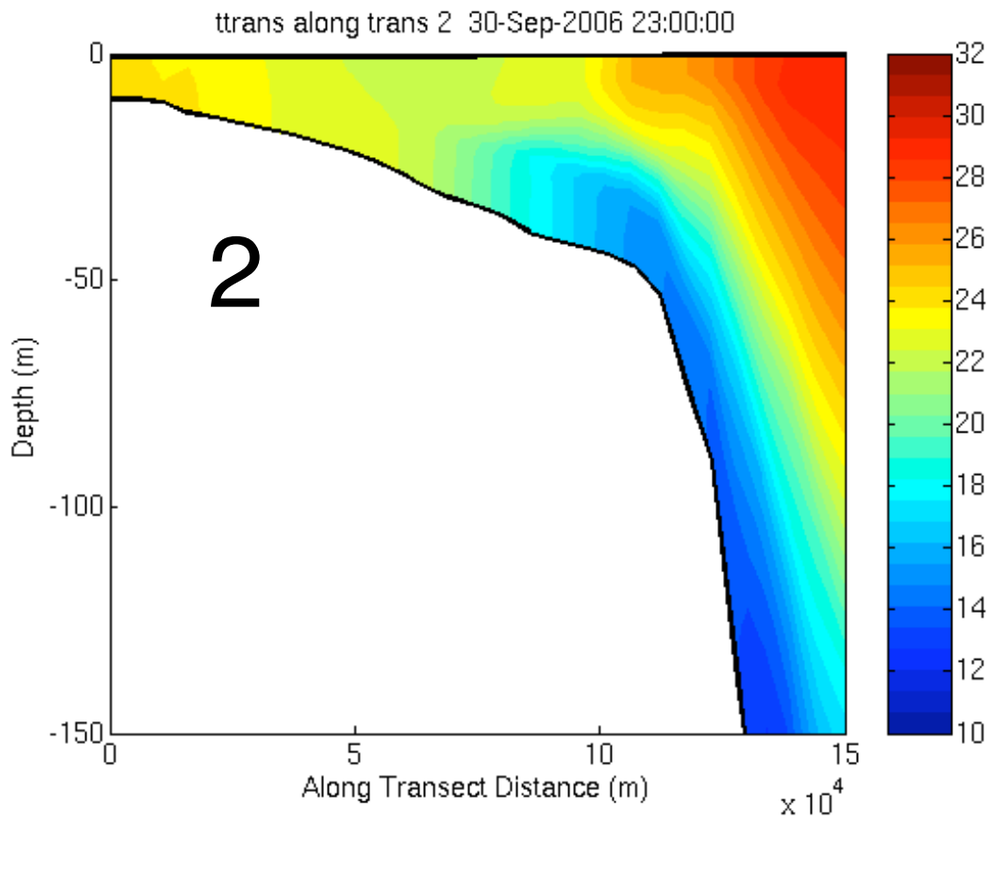


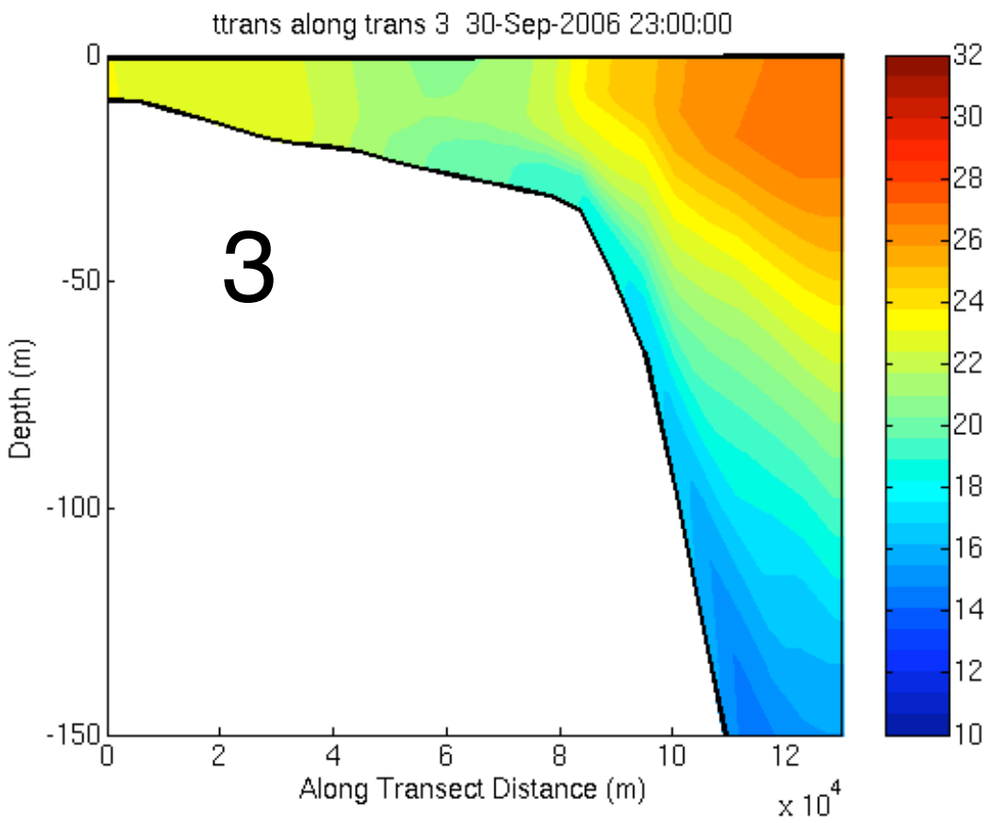


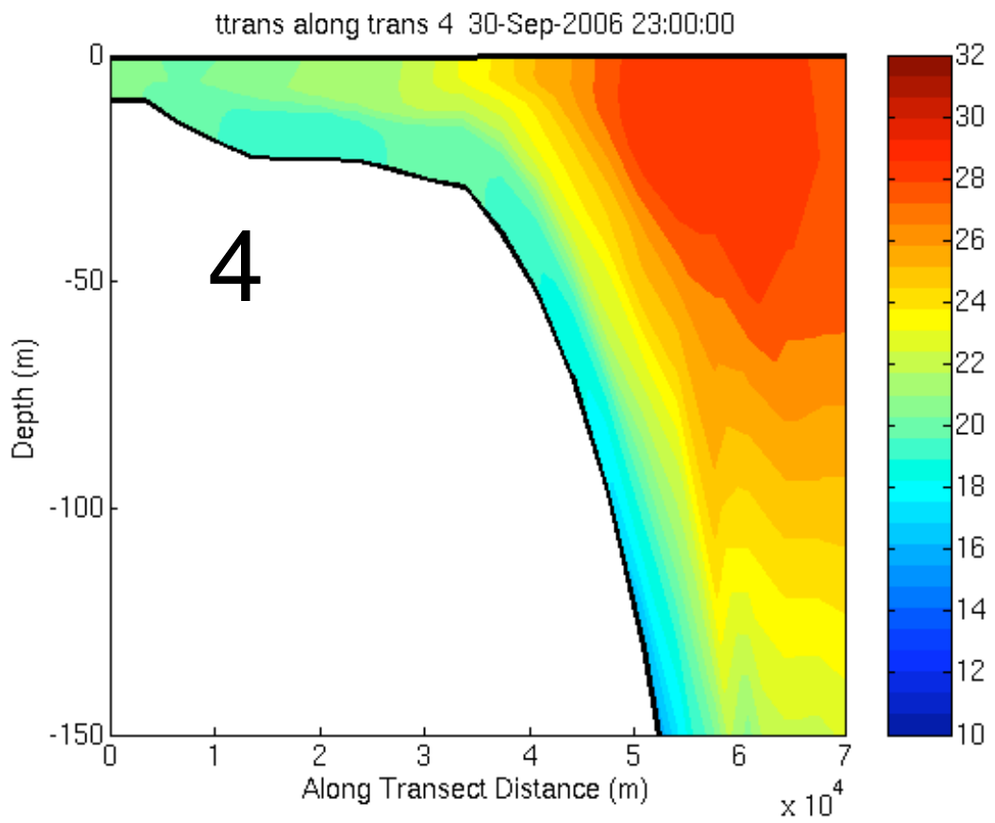


Shelf Temperature Sections

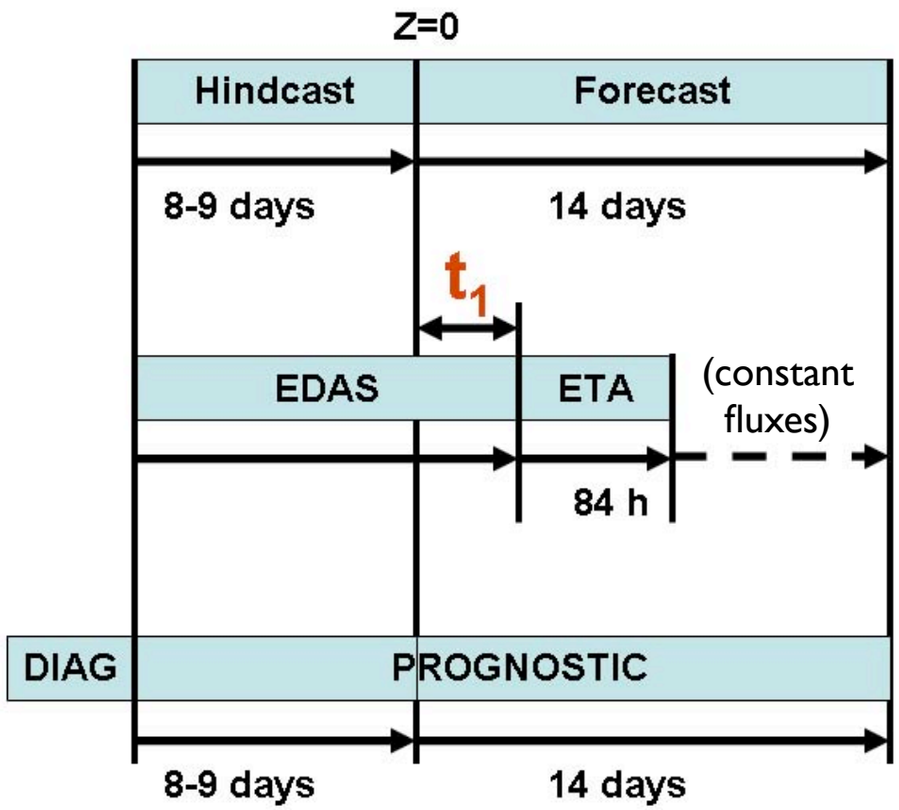




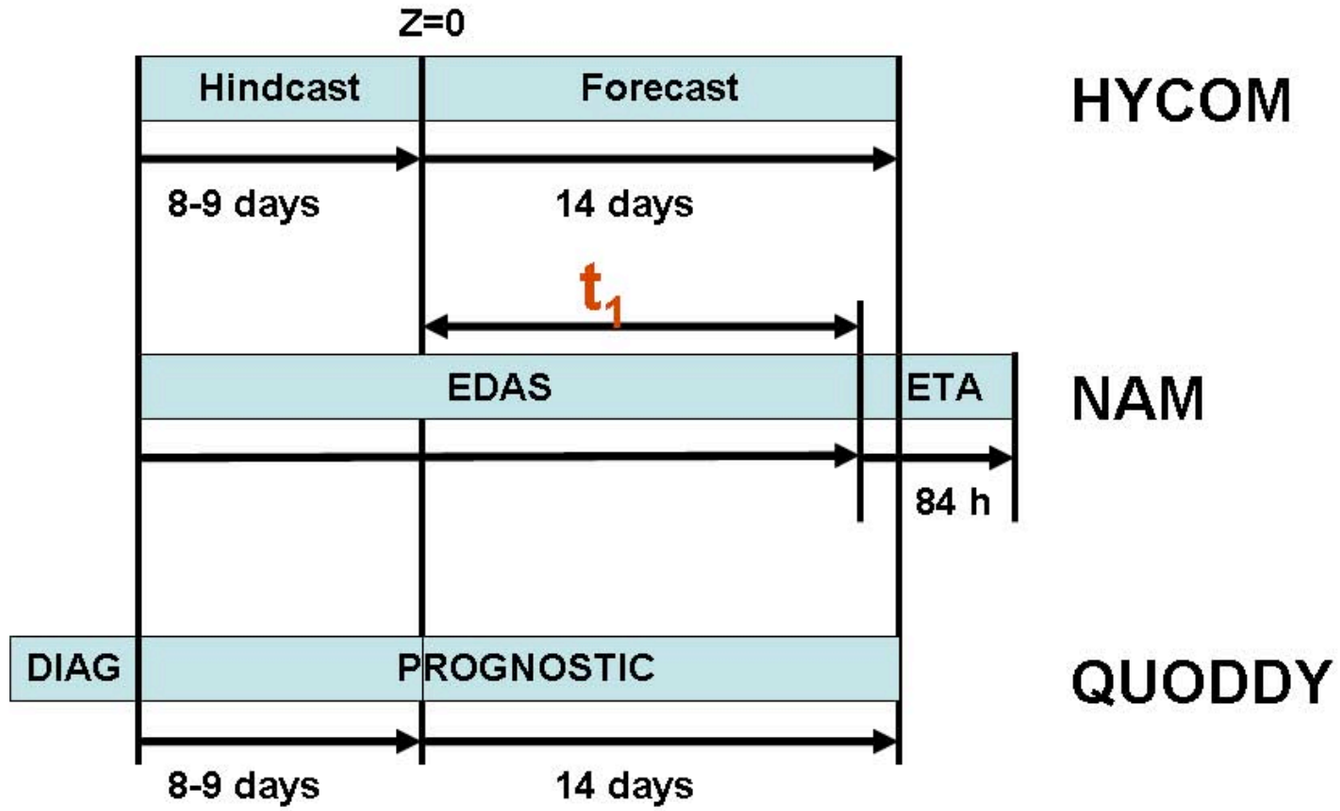




NC/FC System Timing



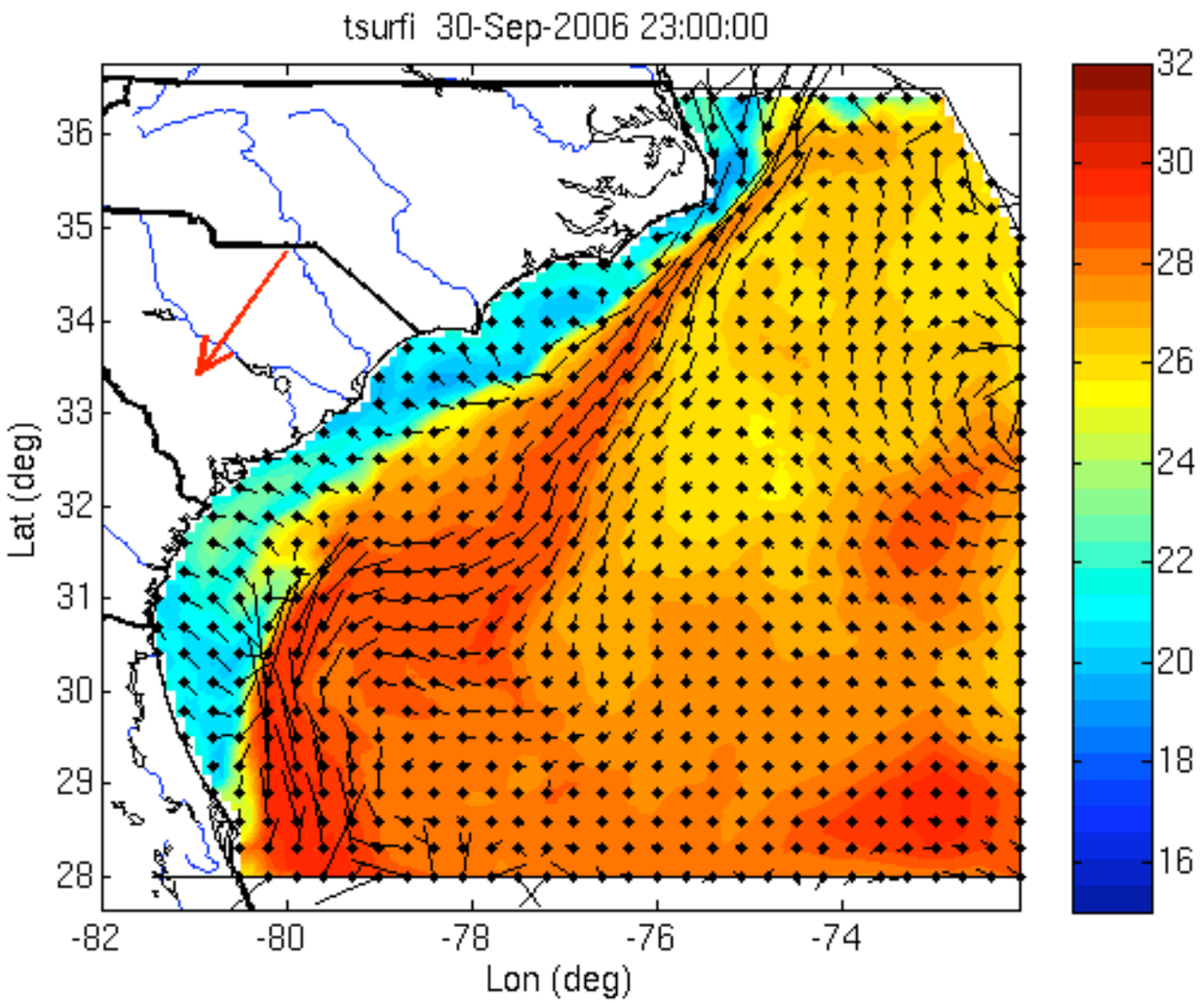
Ideal t_1 is <1 day



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

Effect of HYCOM Posting Delay

Typical

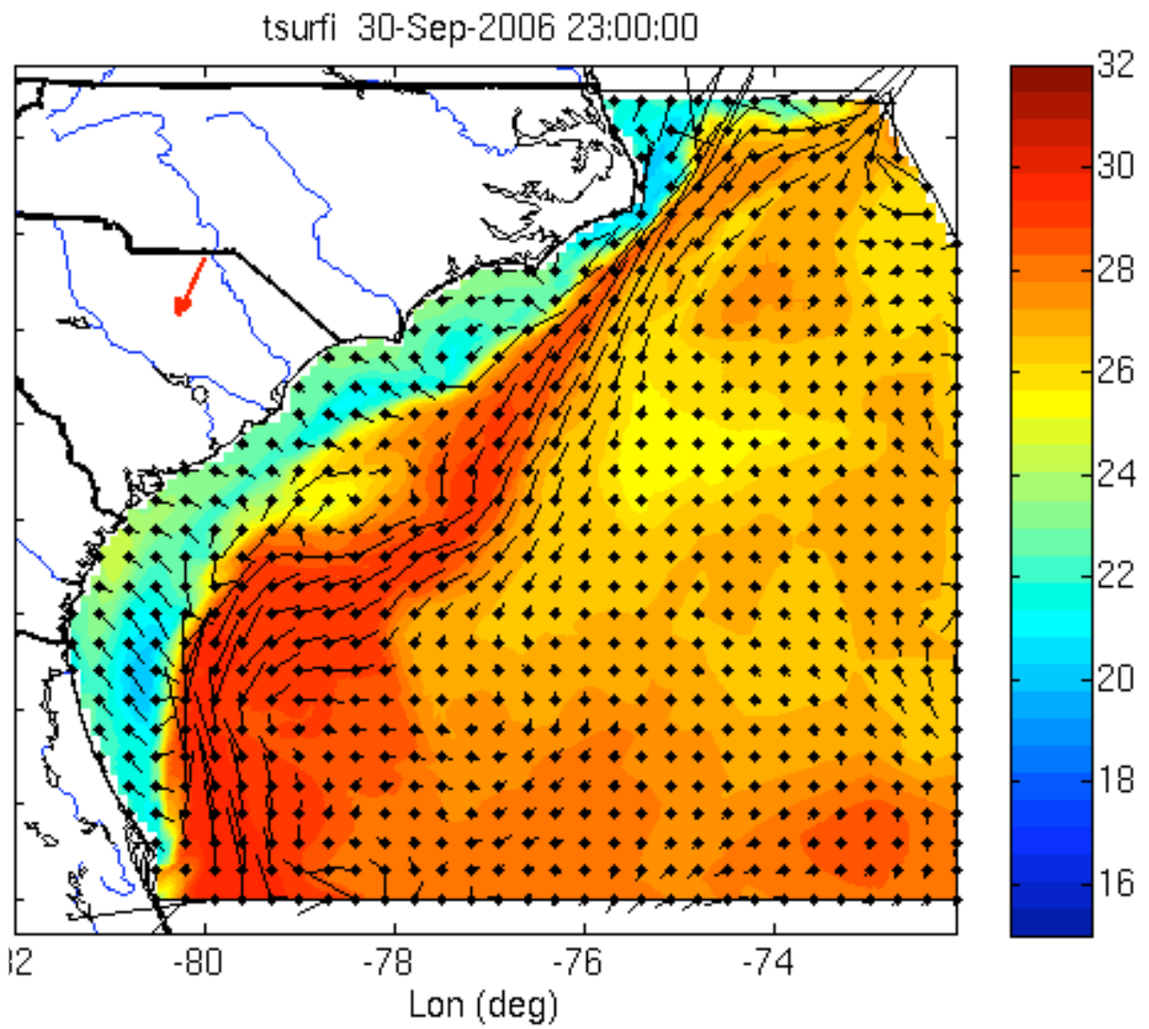


t1 = 8 days

20 Sep HYCOM nowcast

72 hour Quoddy forecast

Ideal

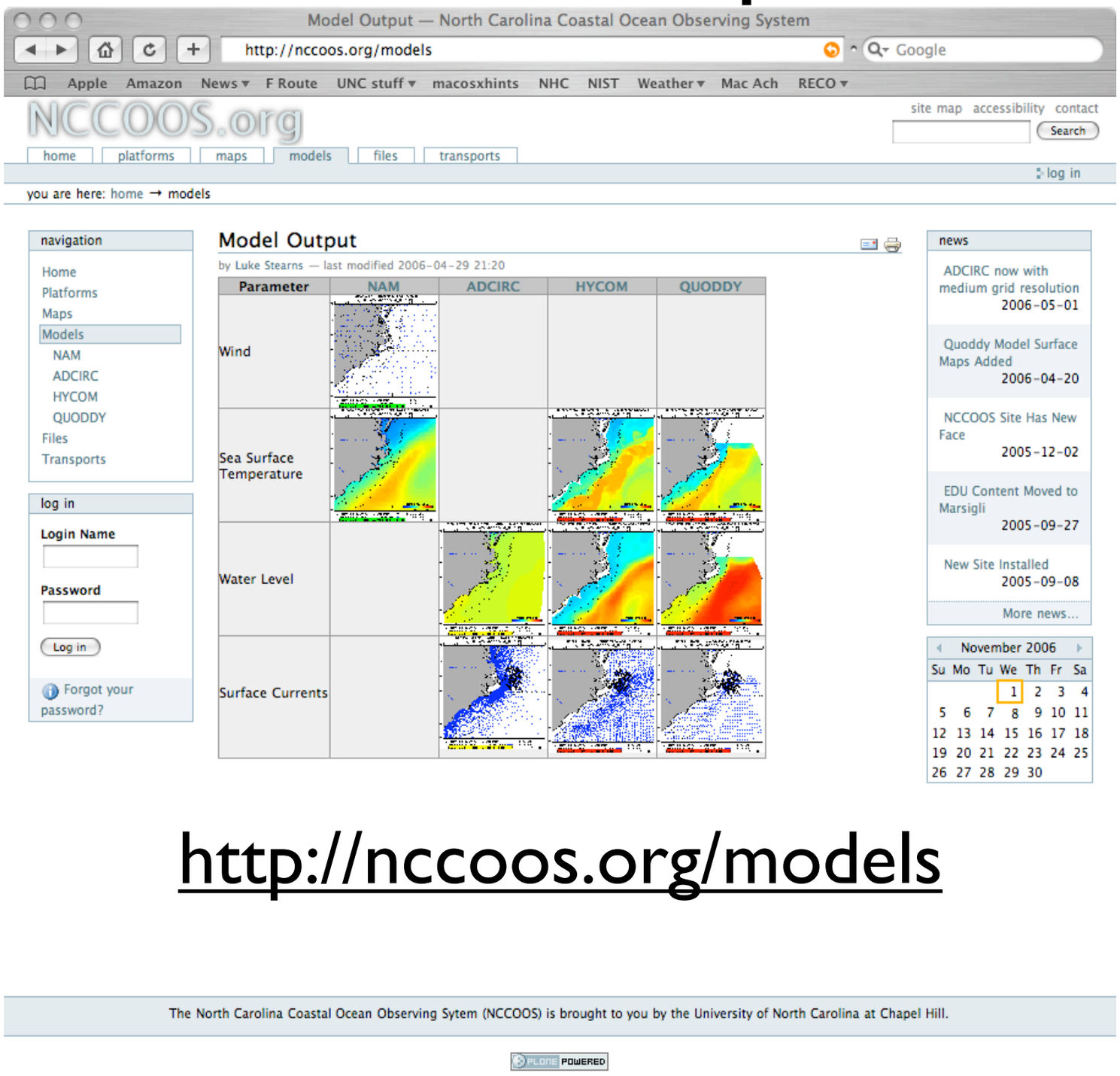


t1 < 1day

27 Sep HYCOM nowcast

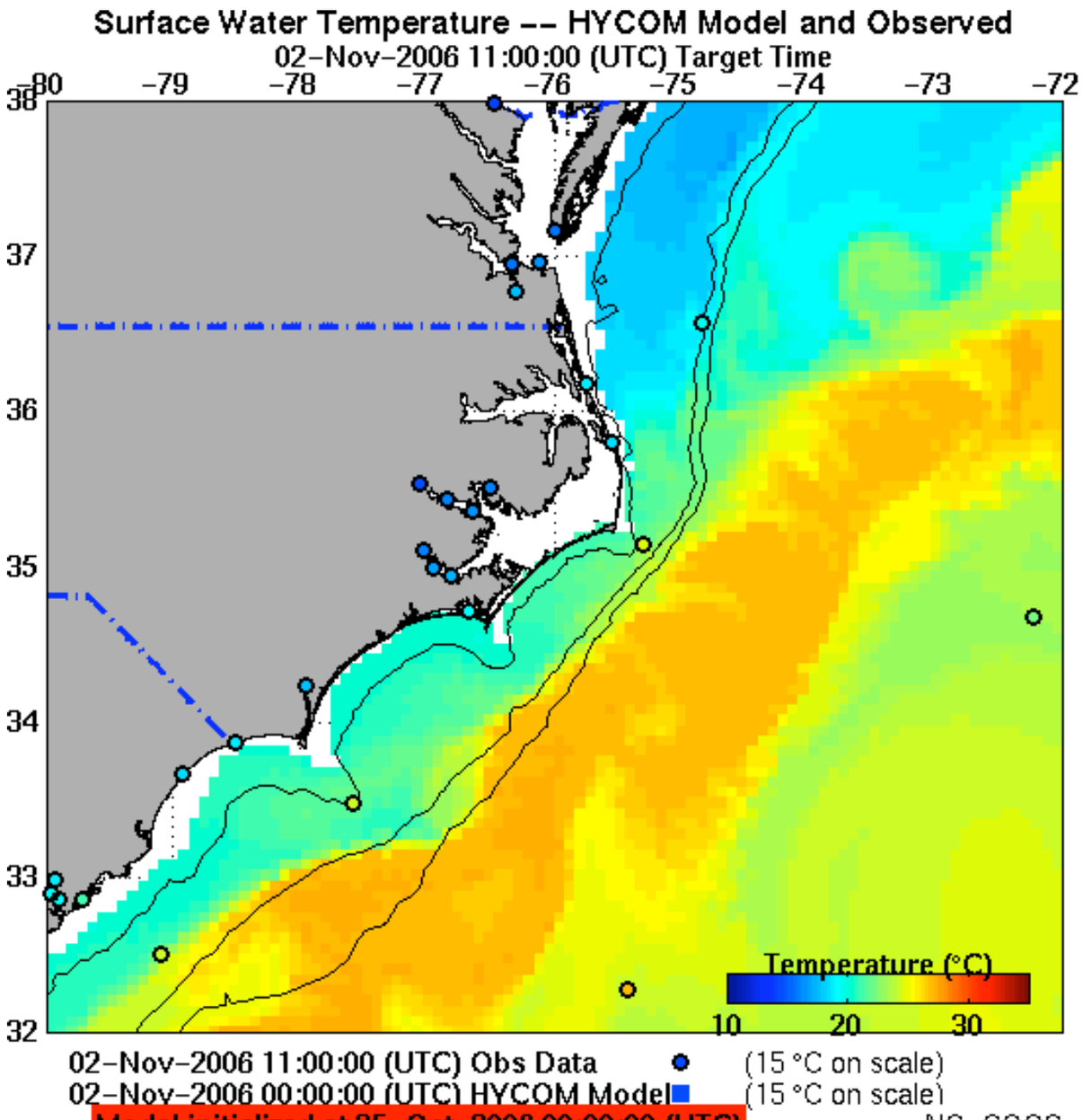
72 hour Quoddy forecast

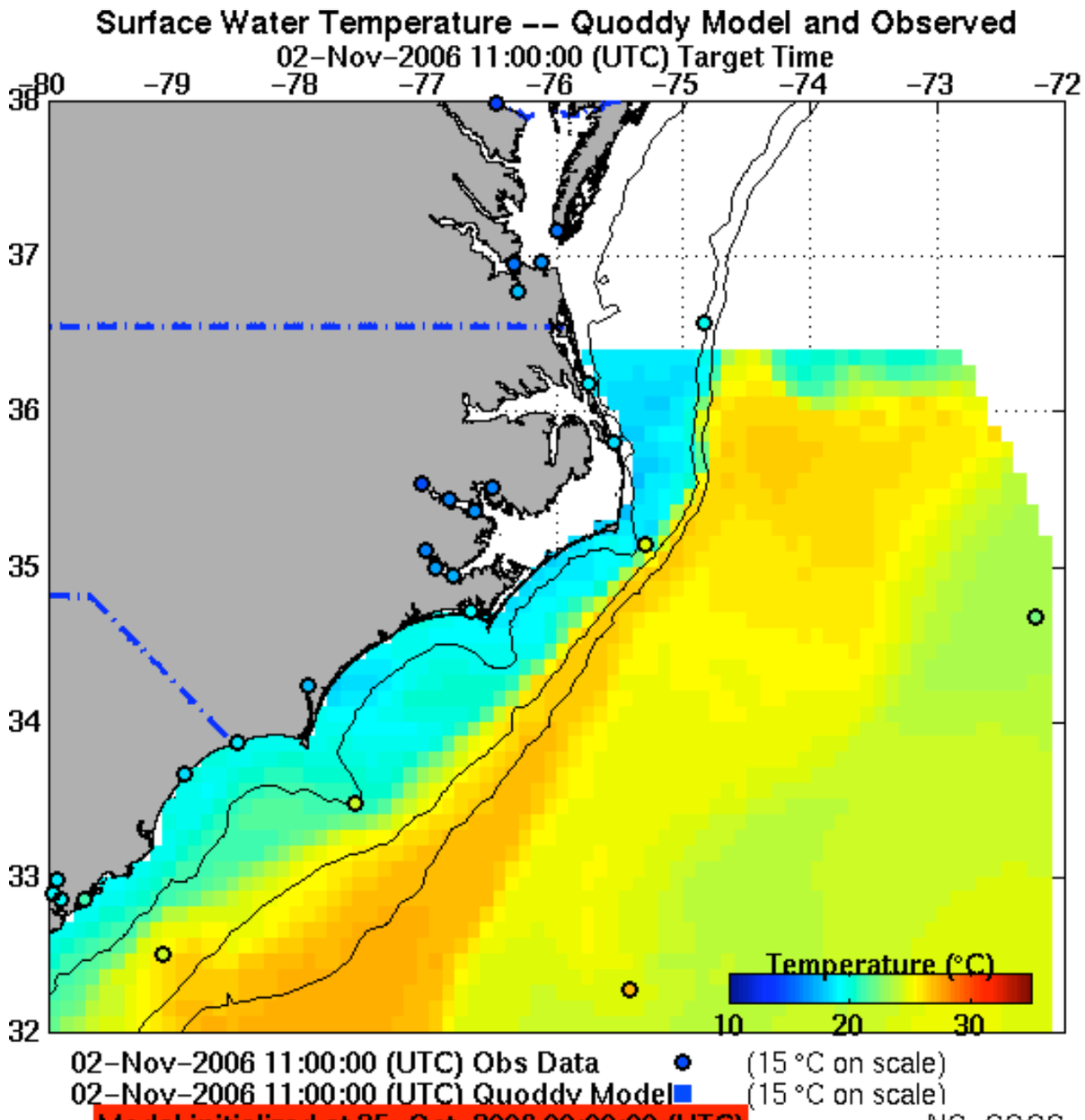
NCCOOS Model Output Web Page



http://nccoos.org/models

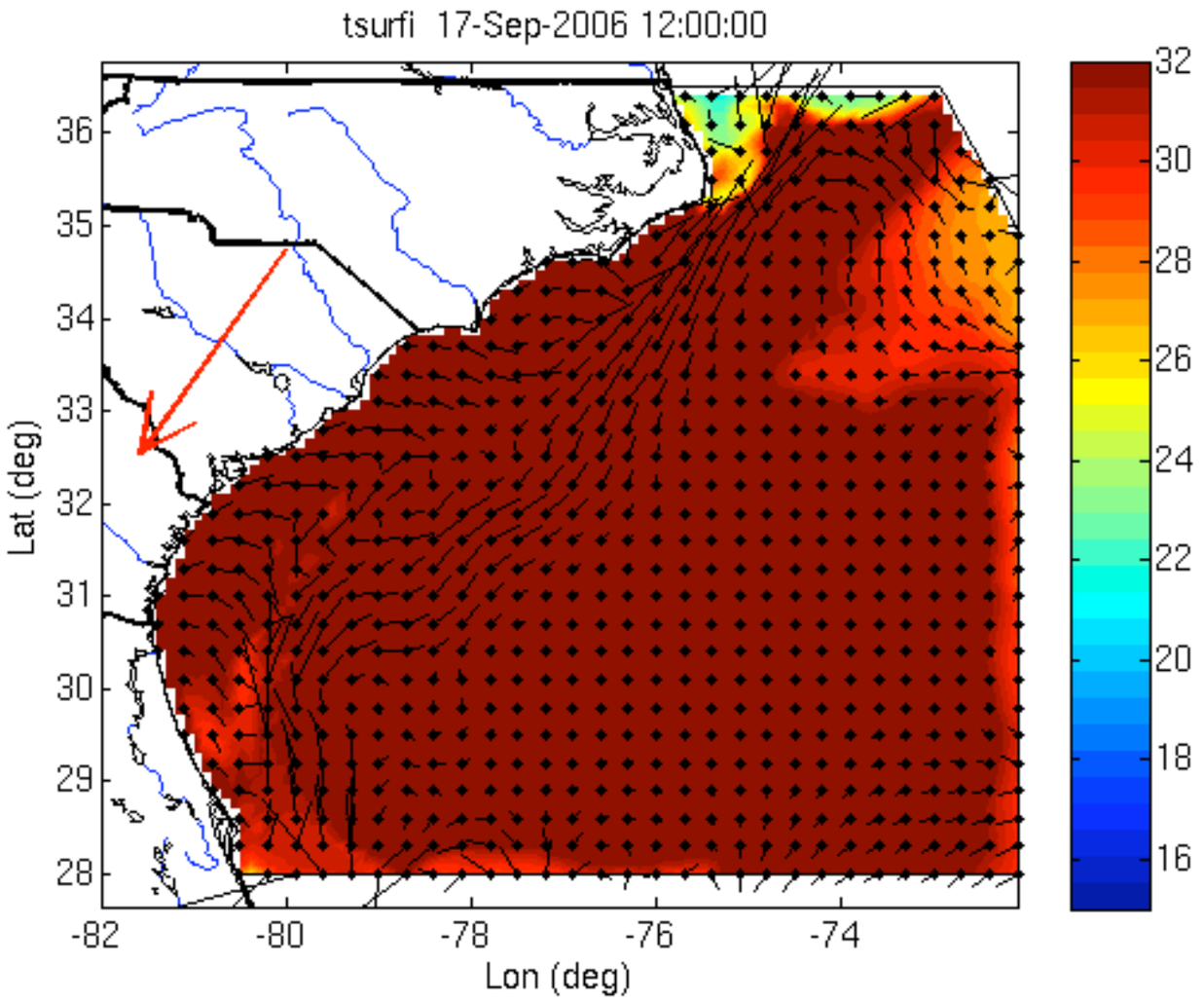
HYCOM and Quoddy SST
2 Nov 2006 1100UTC



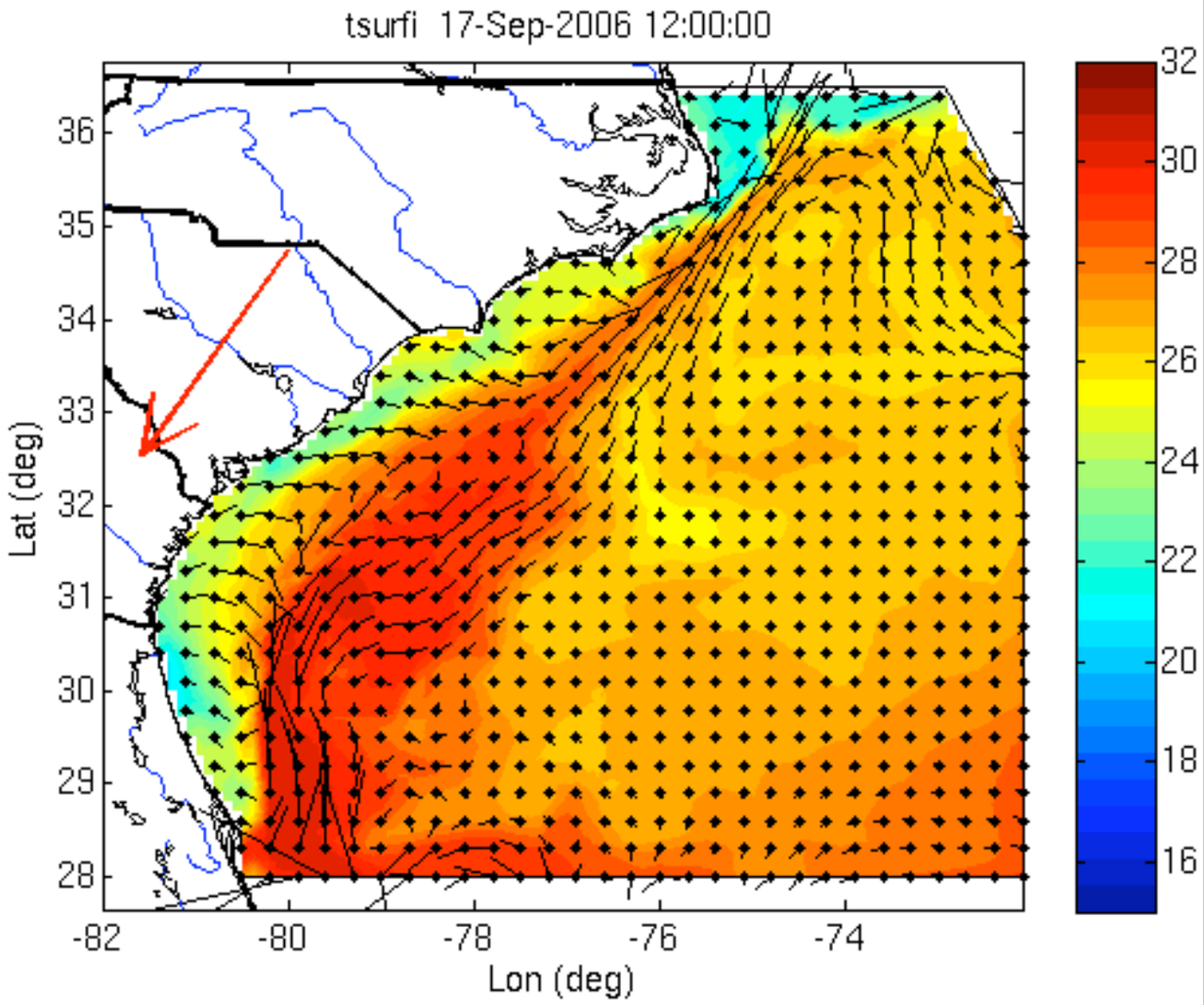


My Rookie Mistake

(NCEP Changed Sign of Heat Fluxes)



Using old sign convention after "stealth" change by NCEP

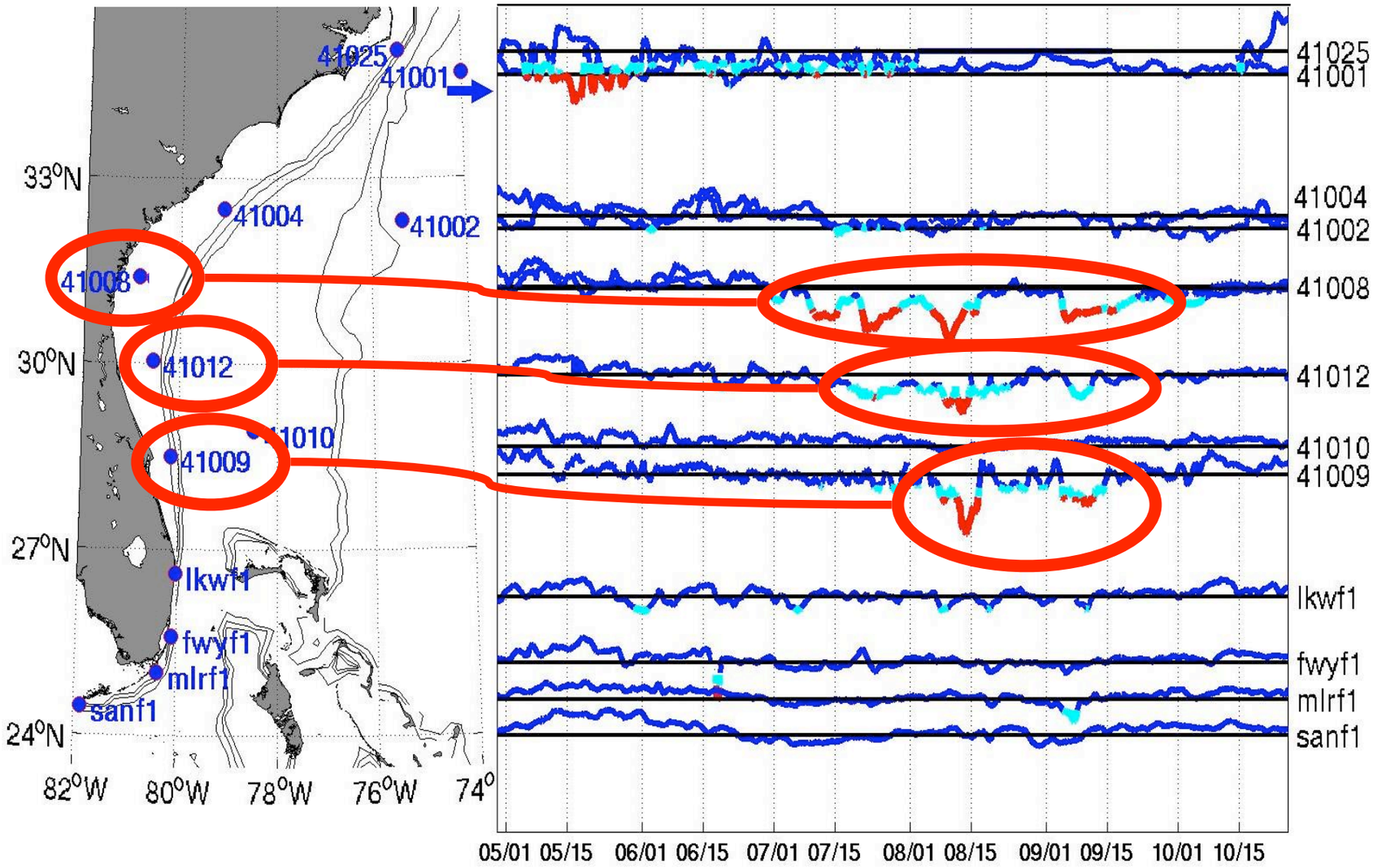


Using new sign convention

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



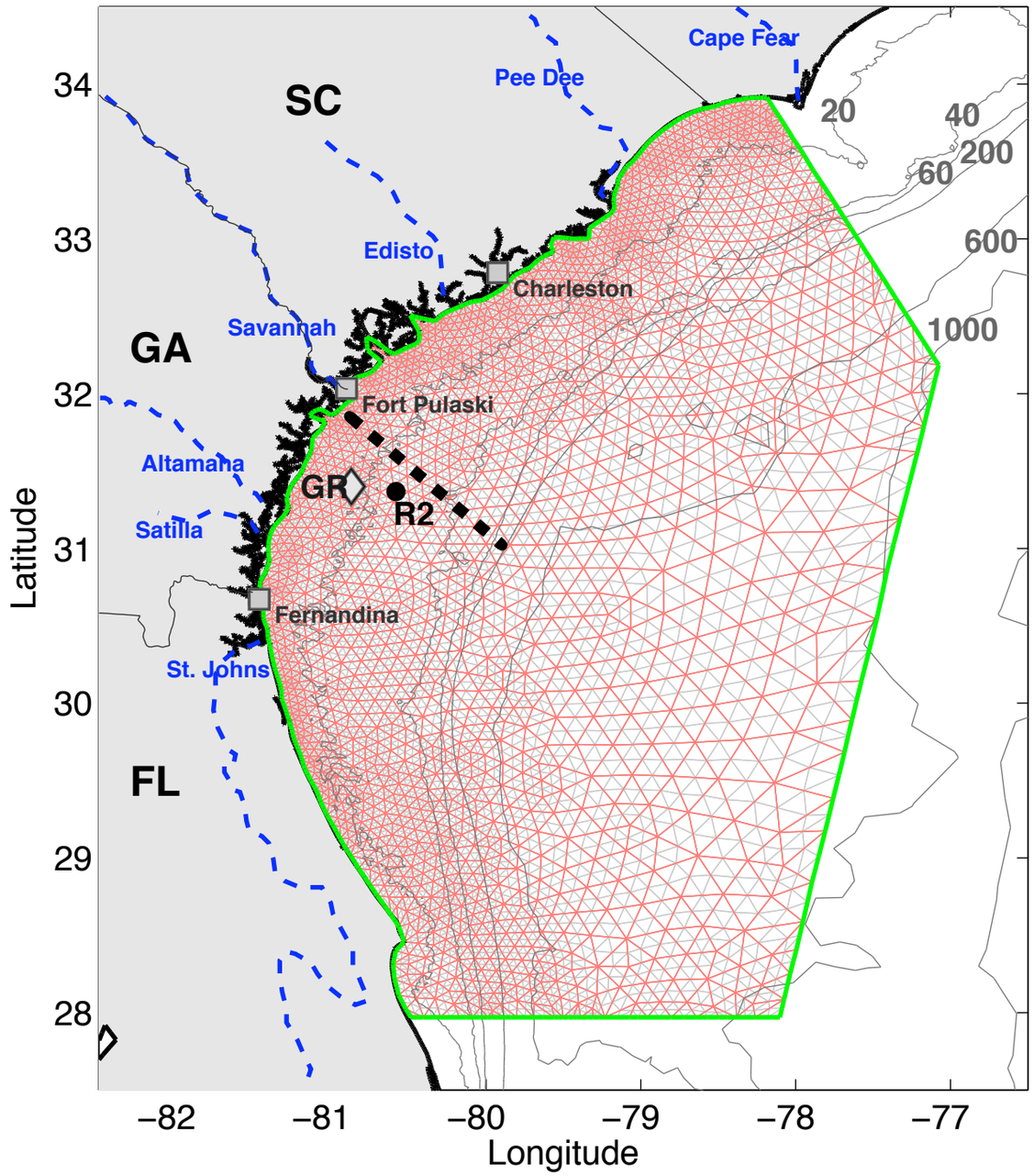
ΔT = Near-surface T minus long-terms means

ΔT > -1°C

-2°C < ΔT < -1°C

ΔT < -2°C

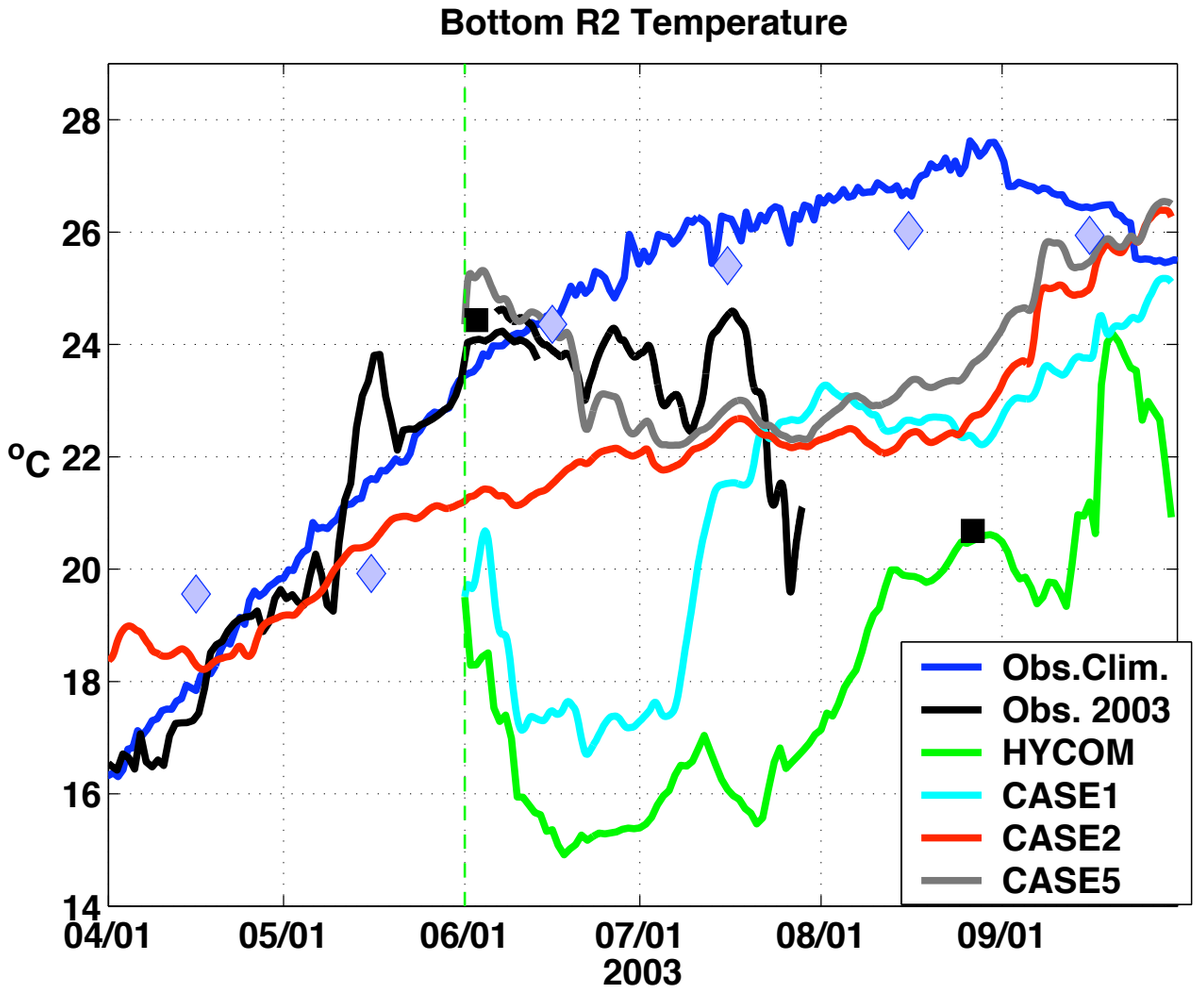
Cold Event Study Domain

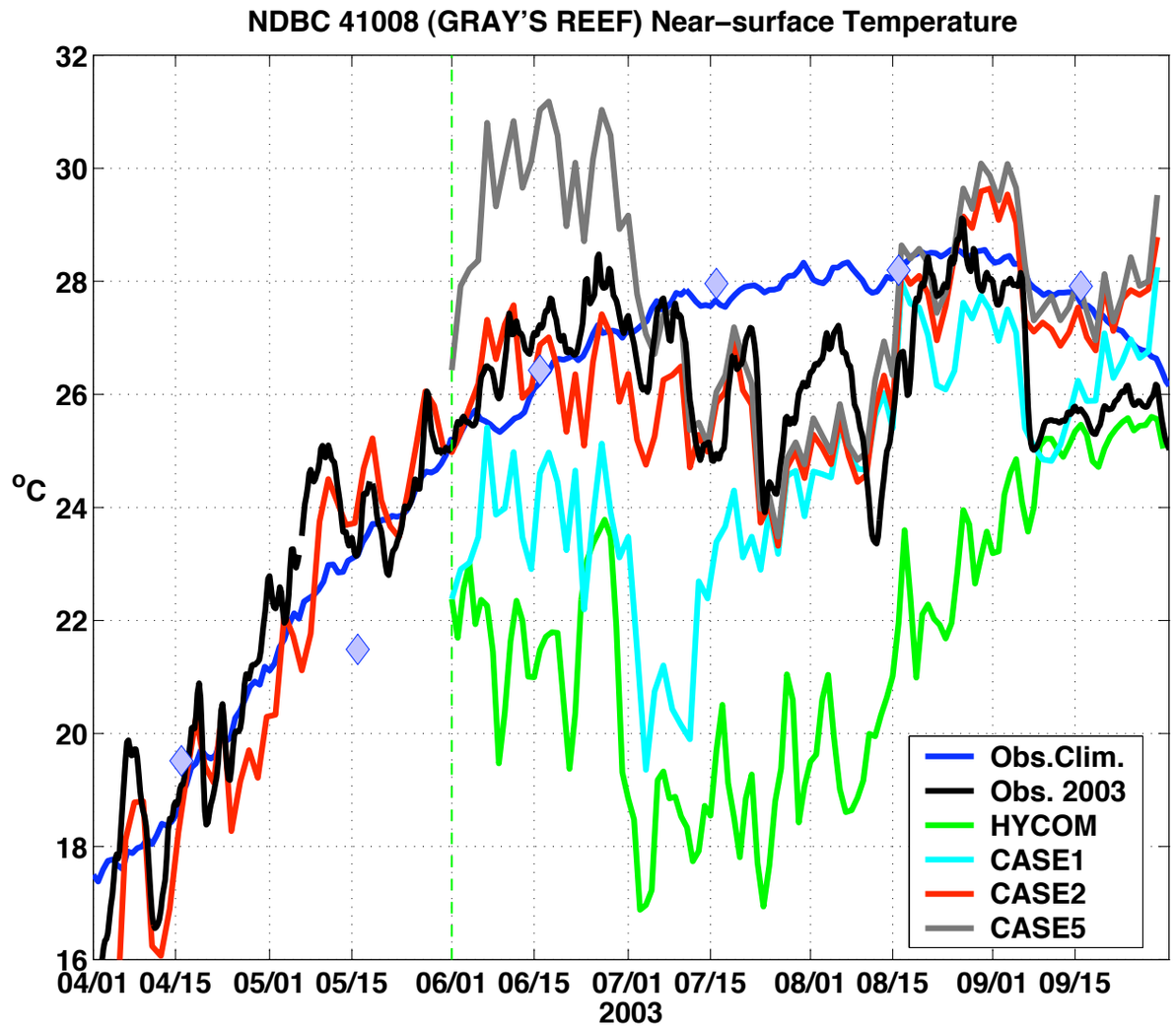


Quoddy Cases

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

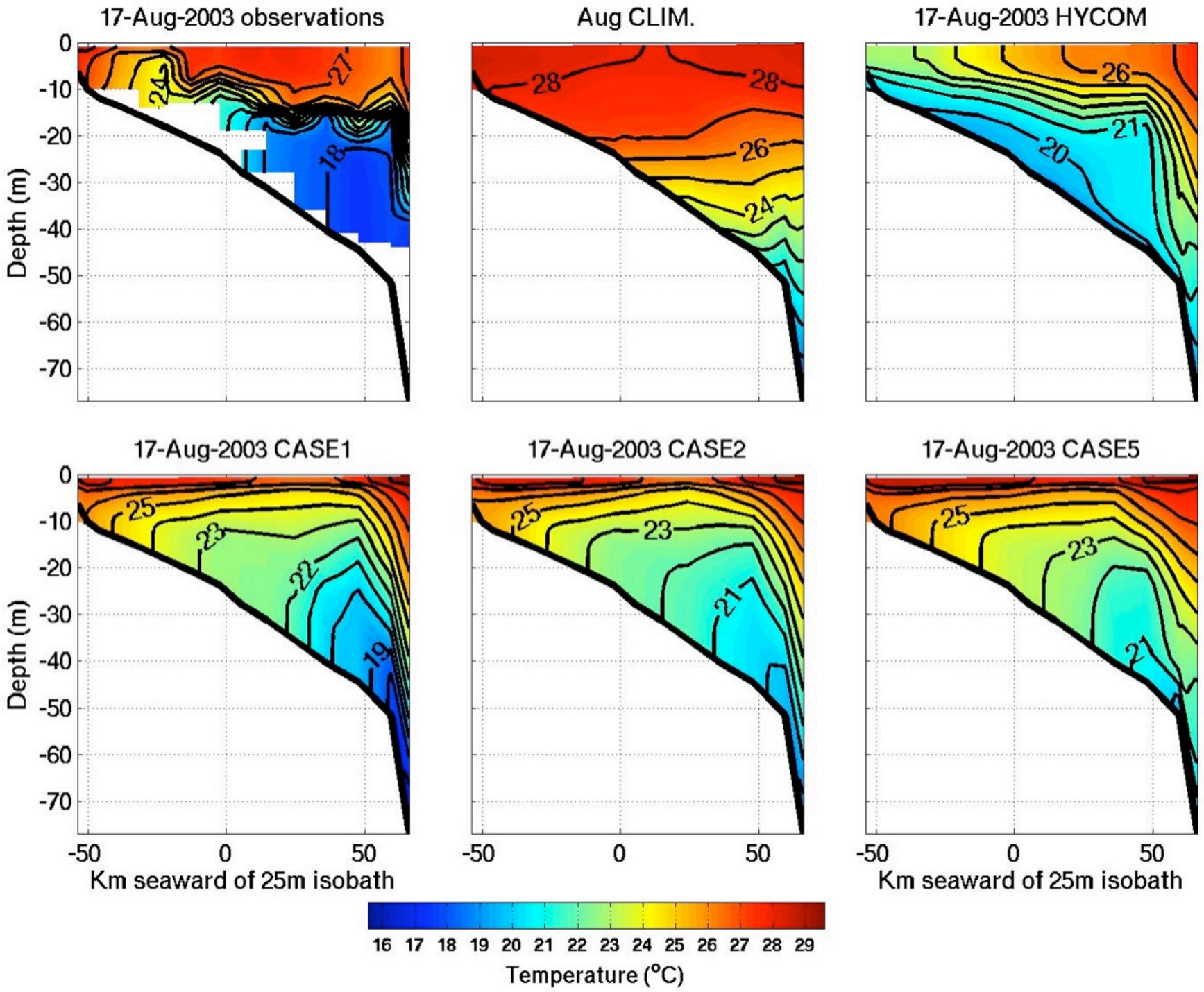




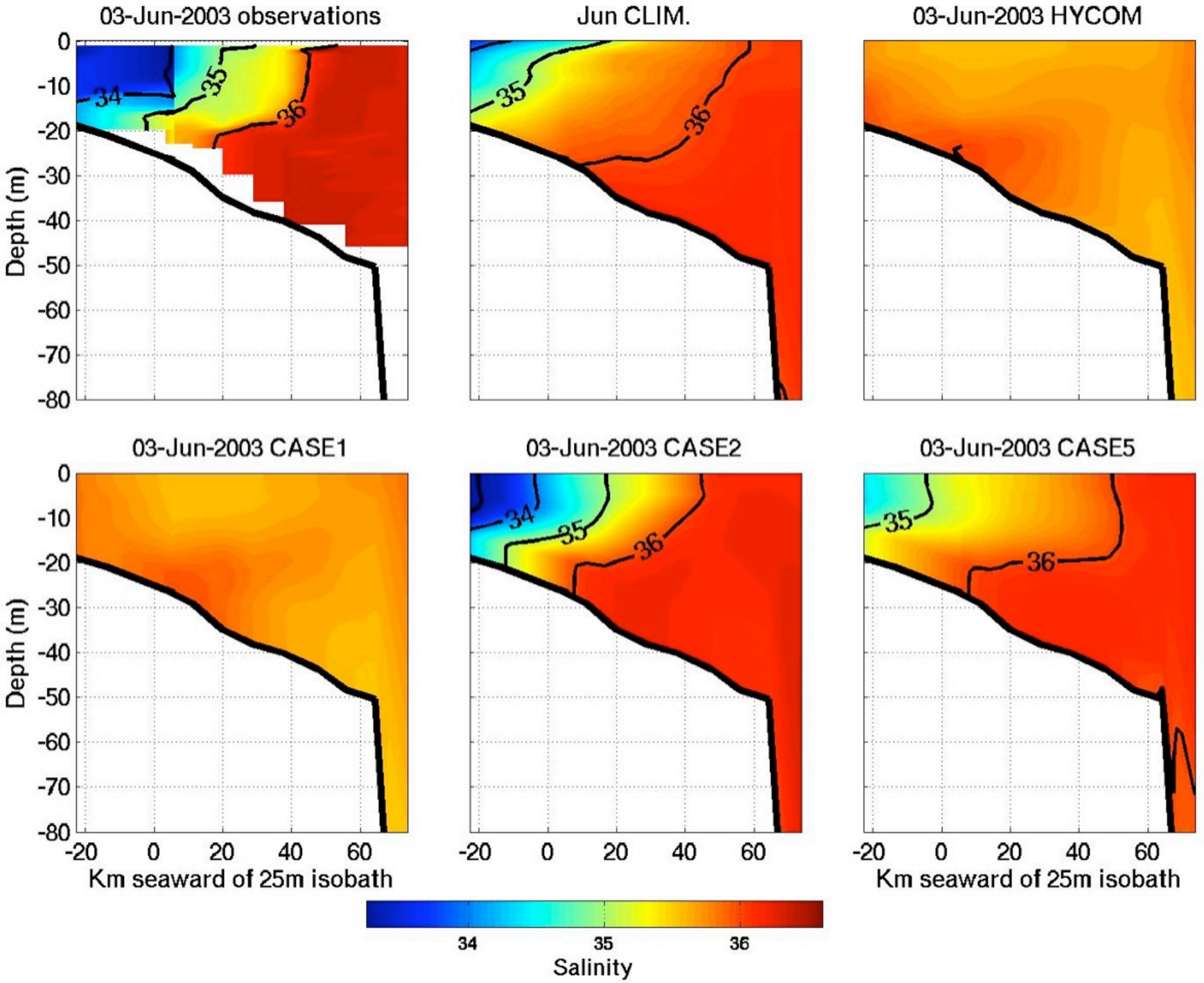
Bottom R2

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)