

Operational Oceanography in the South Atlantic Bight

A finite-element limited-area model
as a coastal client to GODAE/HYCOM

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HYCOM MTG - 28 Oct 2004

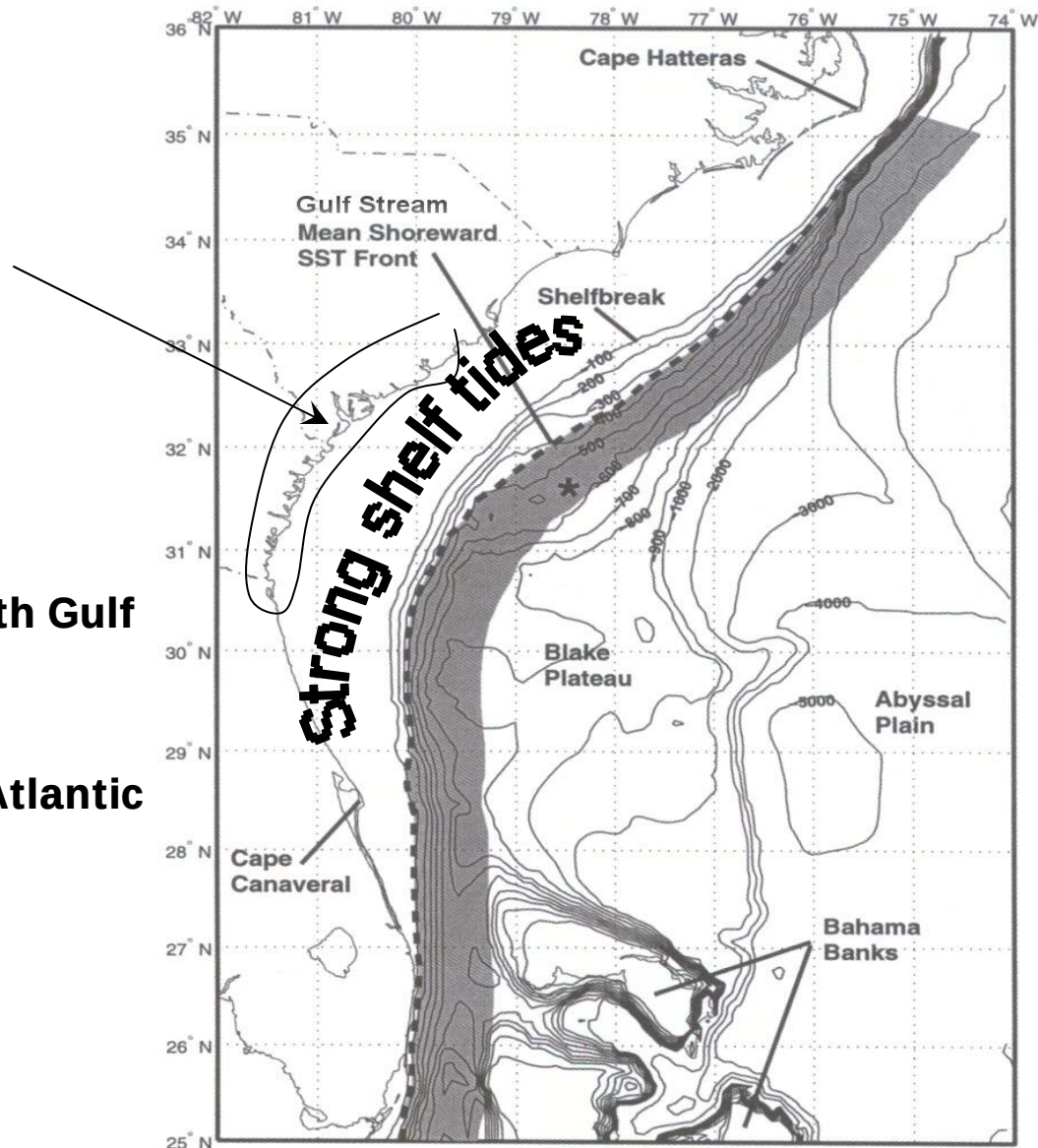
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South Atlantic Bight Characteristics

Significant tidal dissipation in estuaries and tidal inlets

Main inputs of Mass

- Atmospheric flux (P-E)
- Shelfbreak exchange with Gulf Stream (meanders and filaments)
- Exchange with the Mid Atlantic Bight through the Cape Hatteras region
- River discharge

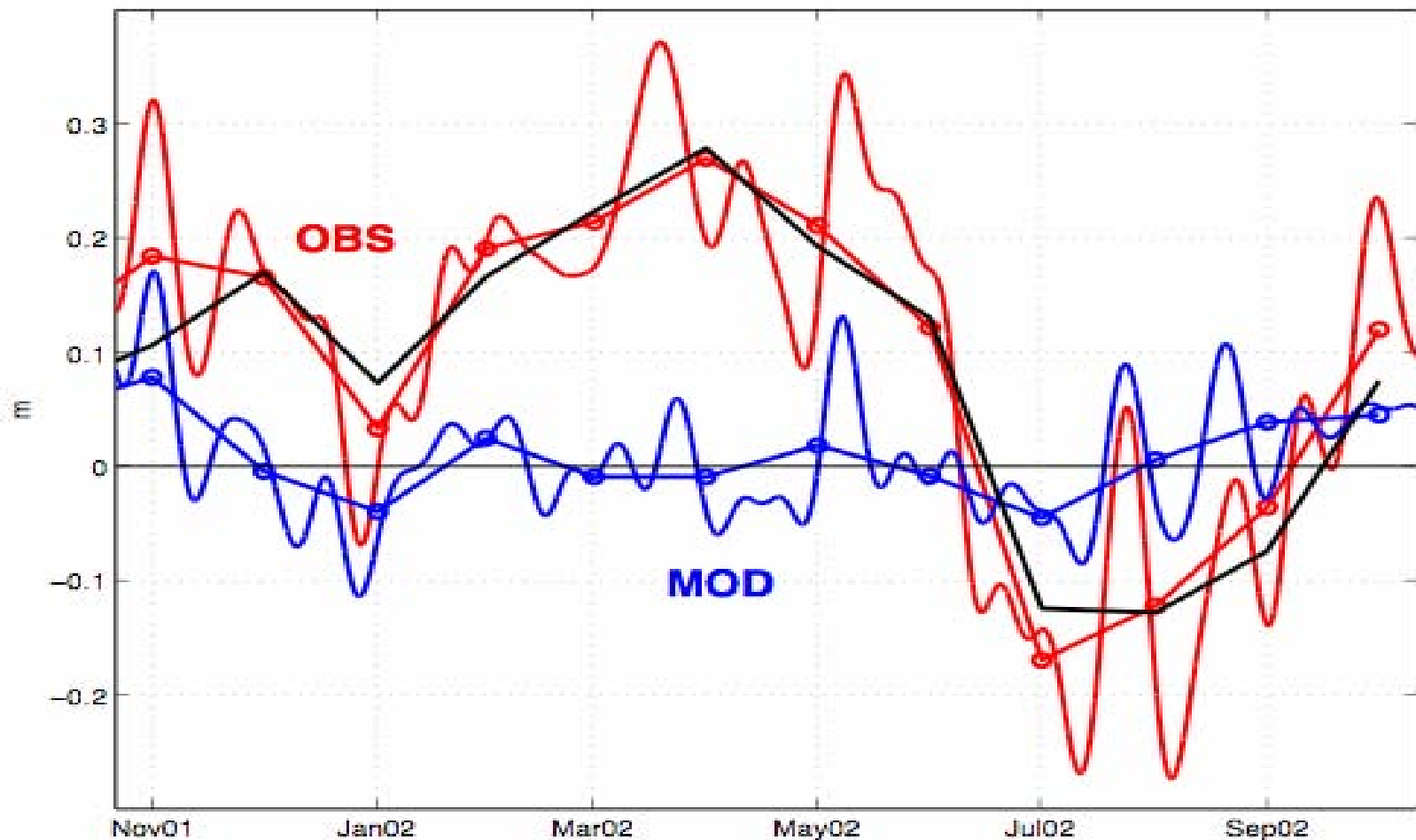


Coastal perspective

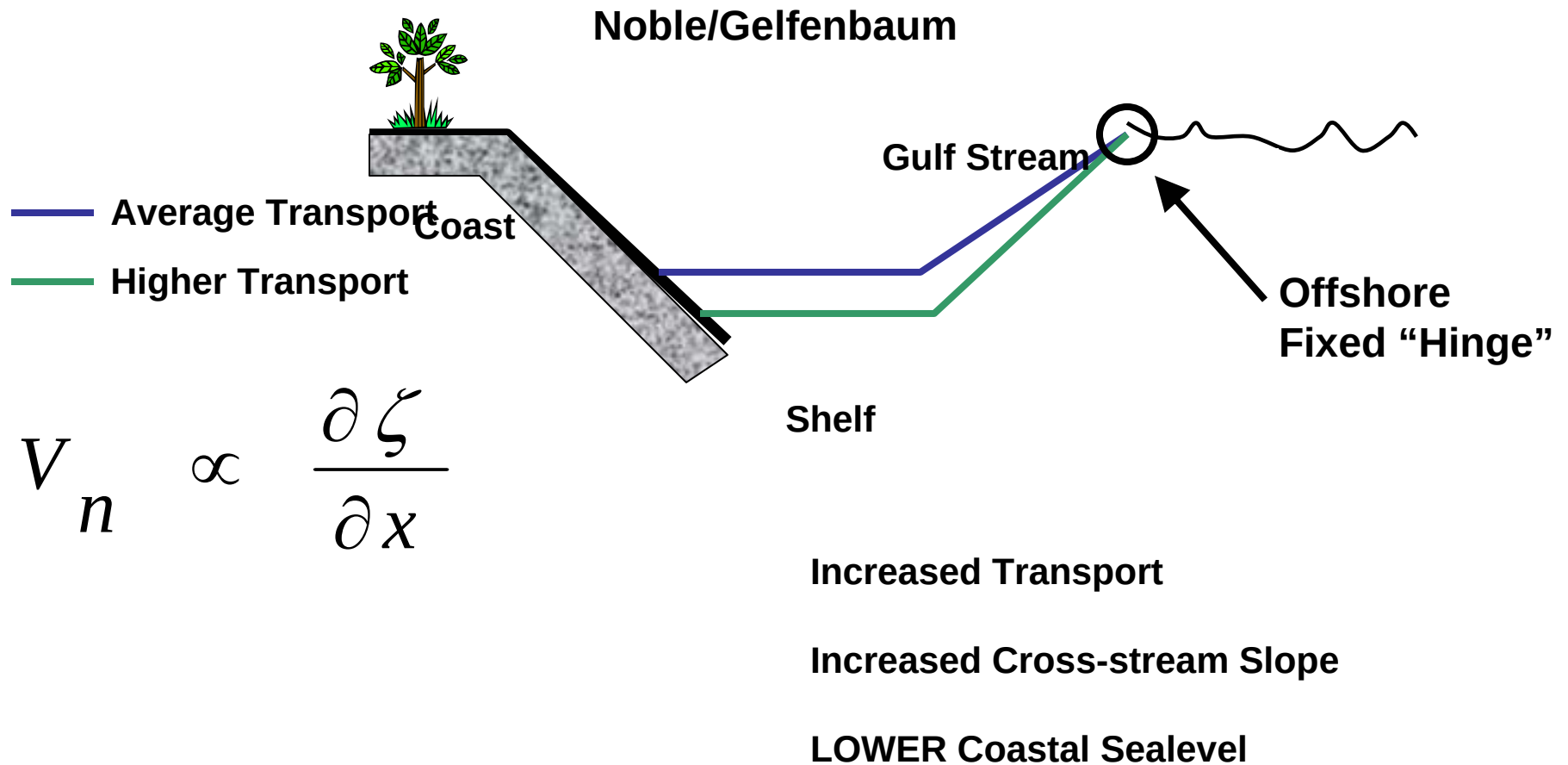
- ***Why do coastal customers/clients/users matter?*** Bec/ of the impact of “events” on coastal (hence national) economics. I.e., STORM SURGE.
- **OceanUS** recommendations for coastal observing systems in conjunction with nowcast/forecast coastal ocean prediction systems
- Barotropic mode from “deep” ocean to continental shelf
- Use basin-scale models (HYCOM) for TS initialization
 - Use “regional” HYCOM
 - OR regional “familiar” models (ADCIRC, QUODDY)
- “Coastal” doesn’t mean “shelf-break”

ADCIRC St. Johns Water Level

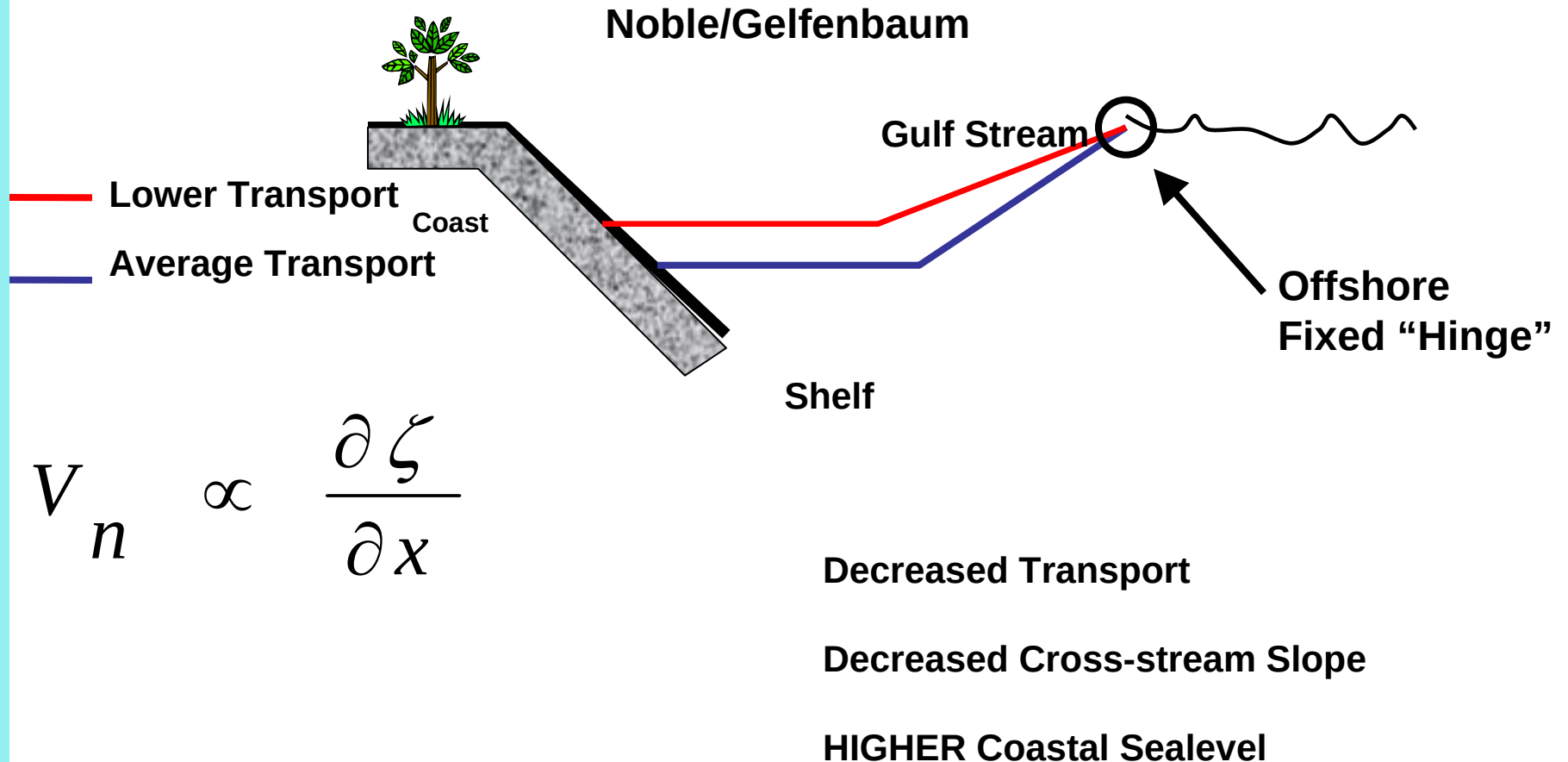
Very-Low-Frequency ($<1/15$ c.p.d)



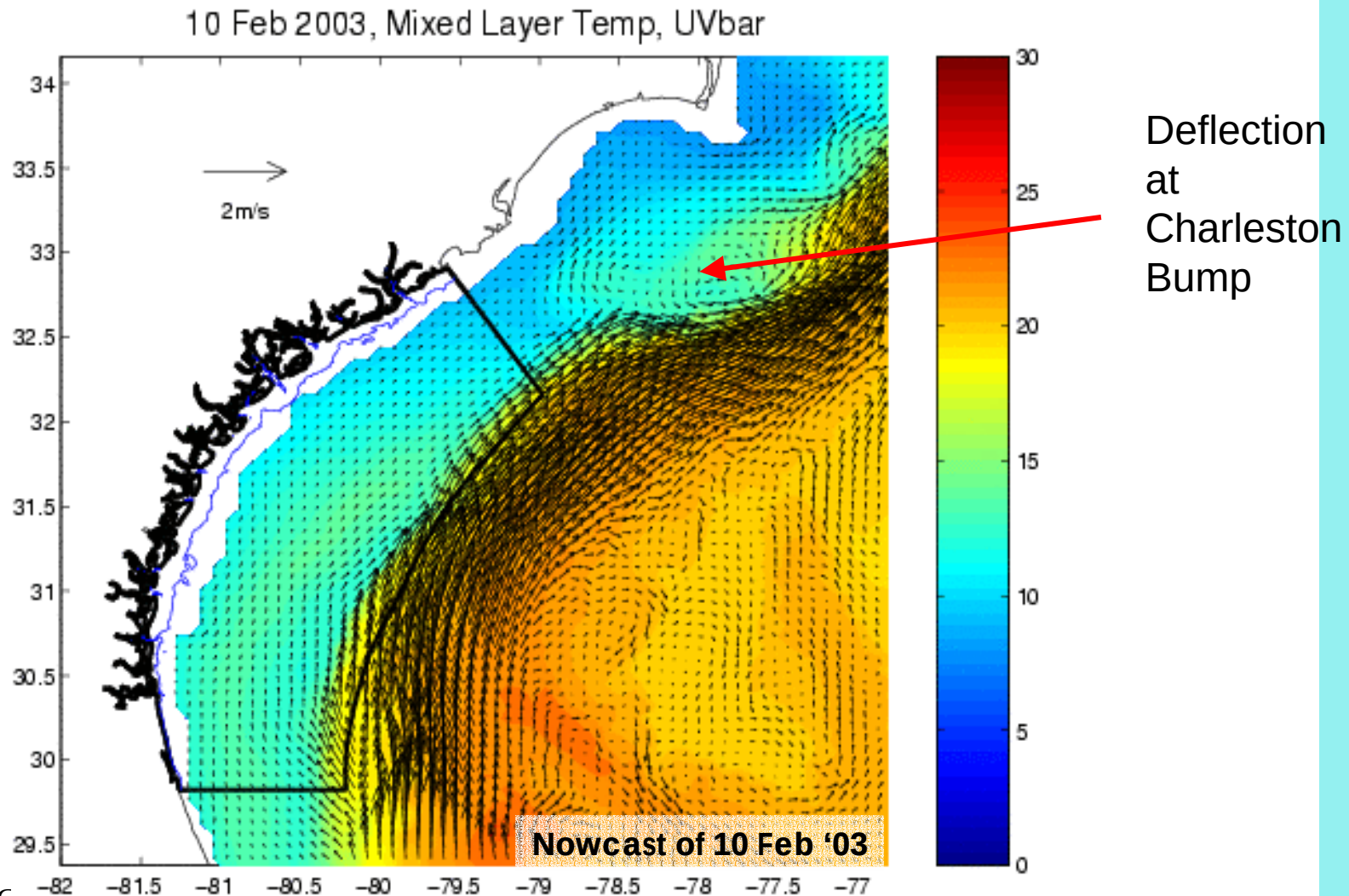
Lower Mean Sealevel



Higher Mean Sealevel



HYCOM, Charleston Bump

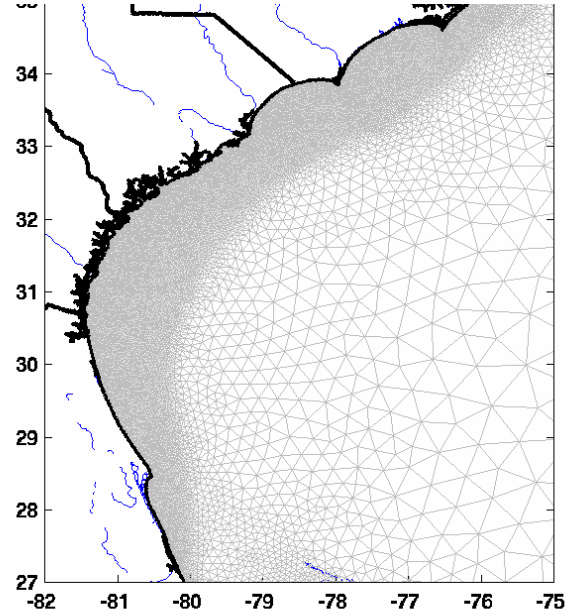
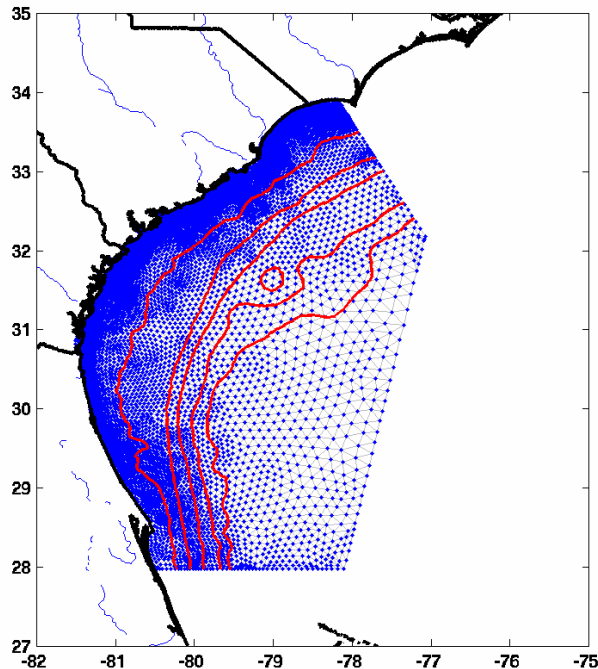


General “Operational” Procedure

- Acquire GODAE/HYCOM nowcast from OPeNDAP
(http://hycom.rsmas.miami.edu/cgi-bin/nph-dods/datasets/NAT_Nowcast)

General “Operational” Procedure

- Map to unstructured QUODDY domain
 - Finite element, 21 sigma levels
 - Tides+Winds+HeatFlux
 - Advection: Pointwise Corrected Transport via Nodal Quadrature

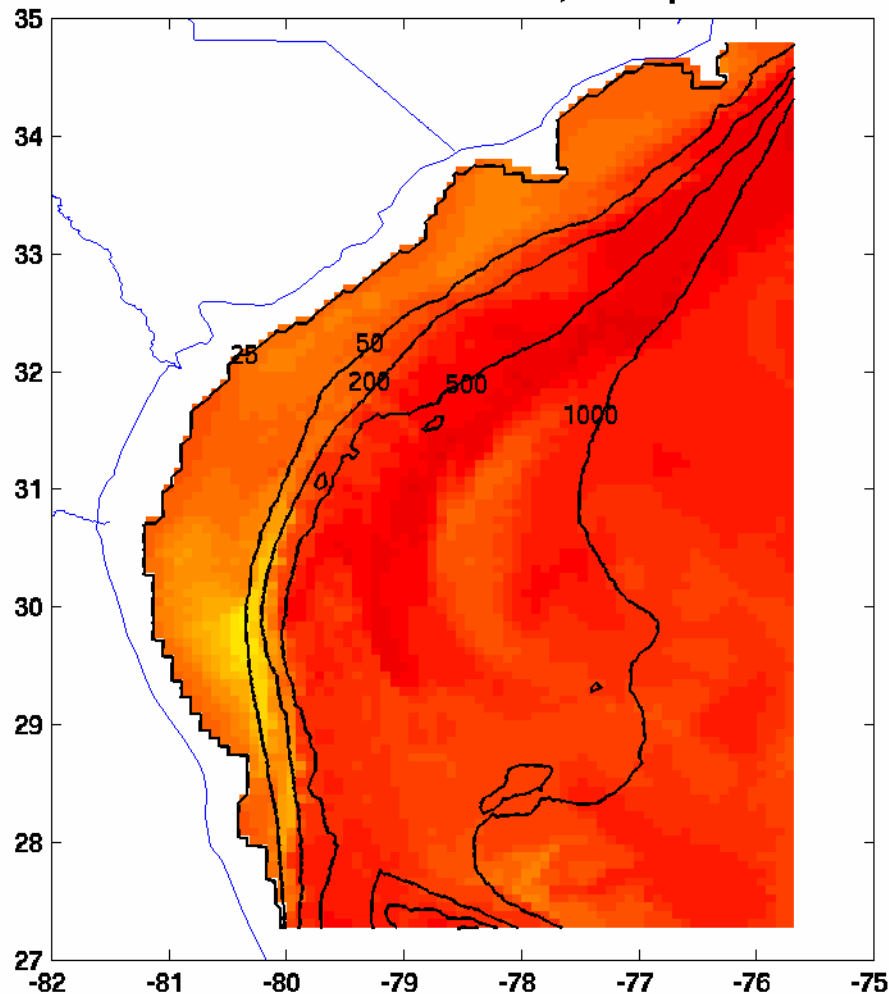


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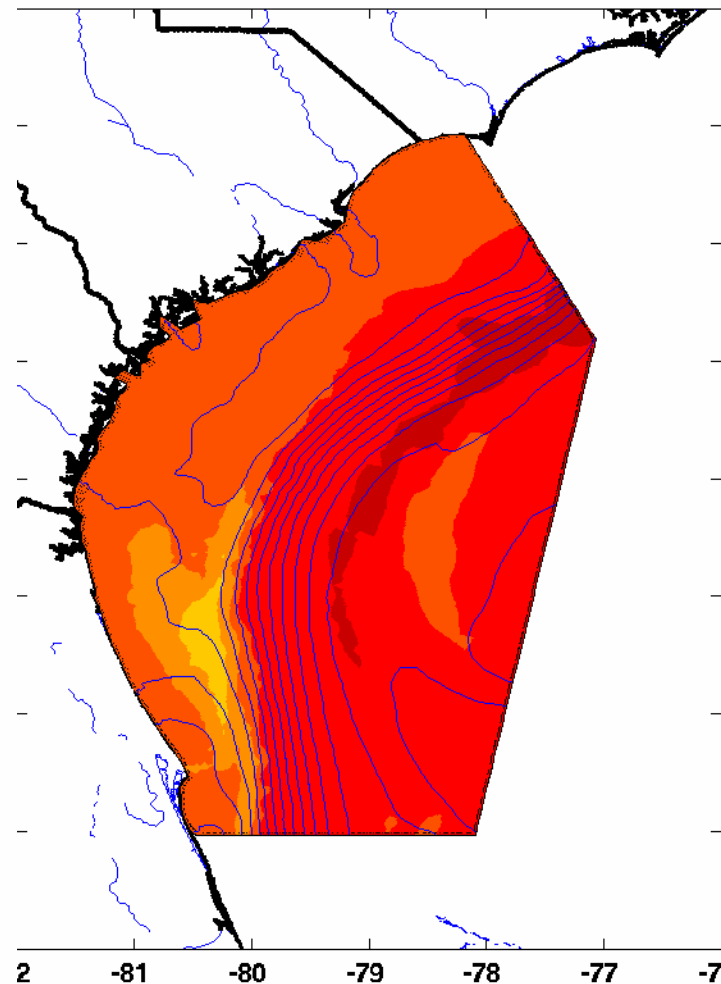
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 - Tides+Winds+HeatFlux
 - Advection: Pointwise Corrected Transport via Nodal Quadrature
- **Spin up tides+winds, diagnostic (7 days)**
- **Let loose netQ and advection**

SST Mapping

HYCOM SST Nowcast, 7 Sep 2004



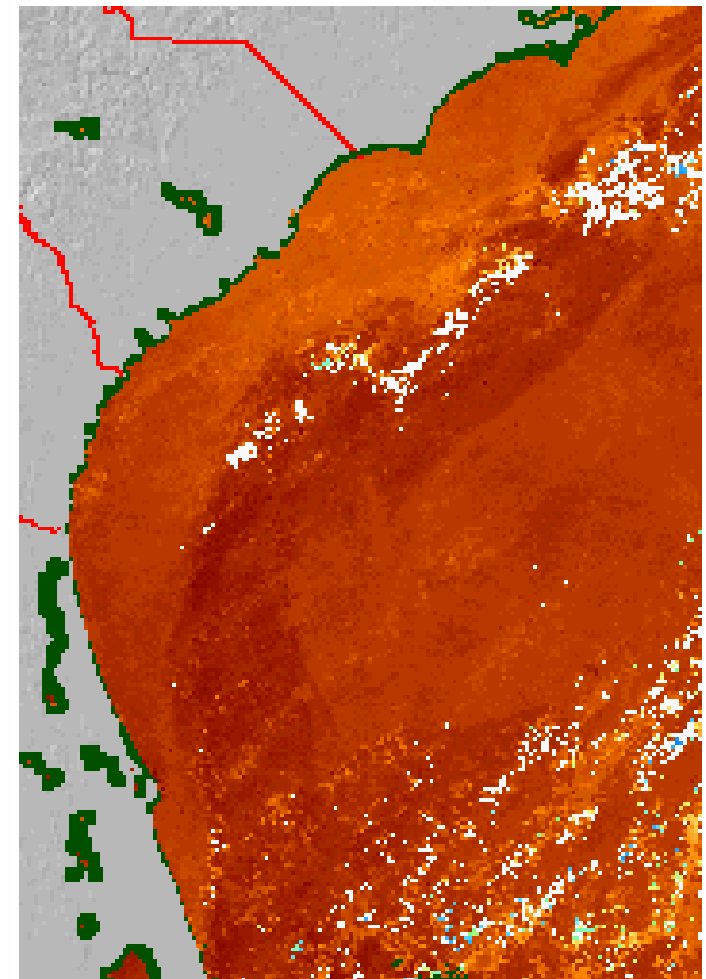
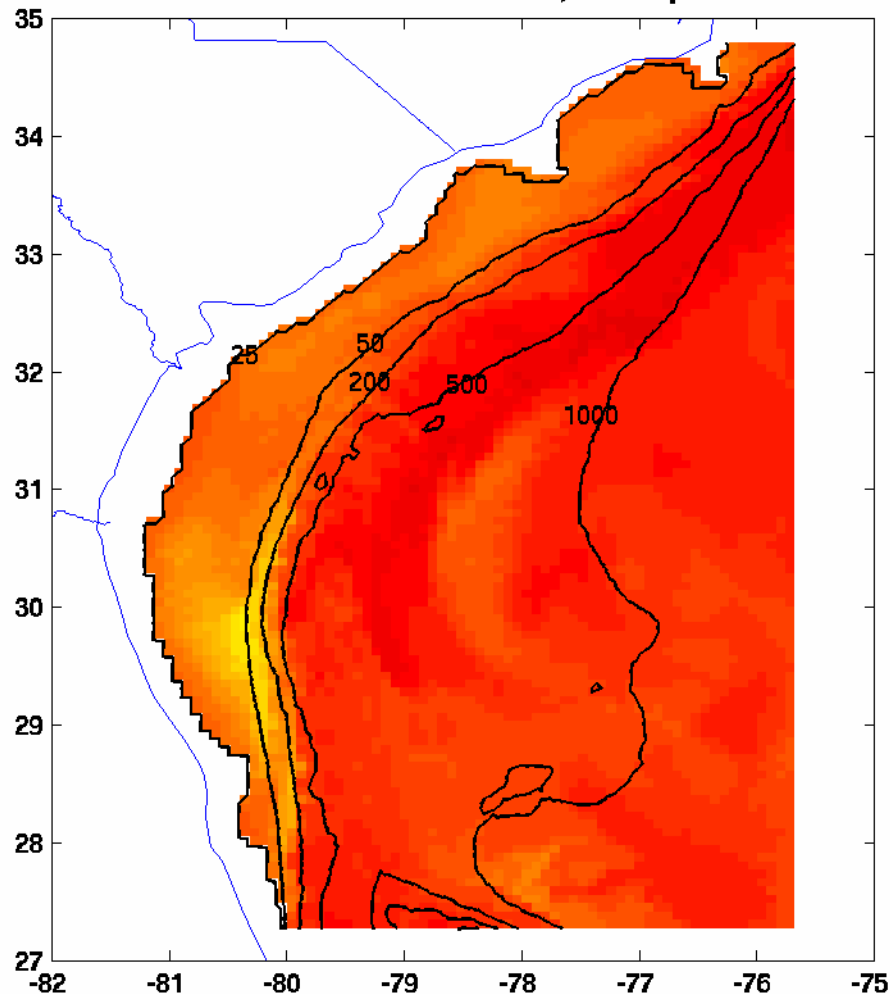
QUODDY Initial SST



SST Comparison

AVHRR 7 Sep, 2004
7-day composite

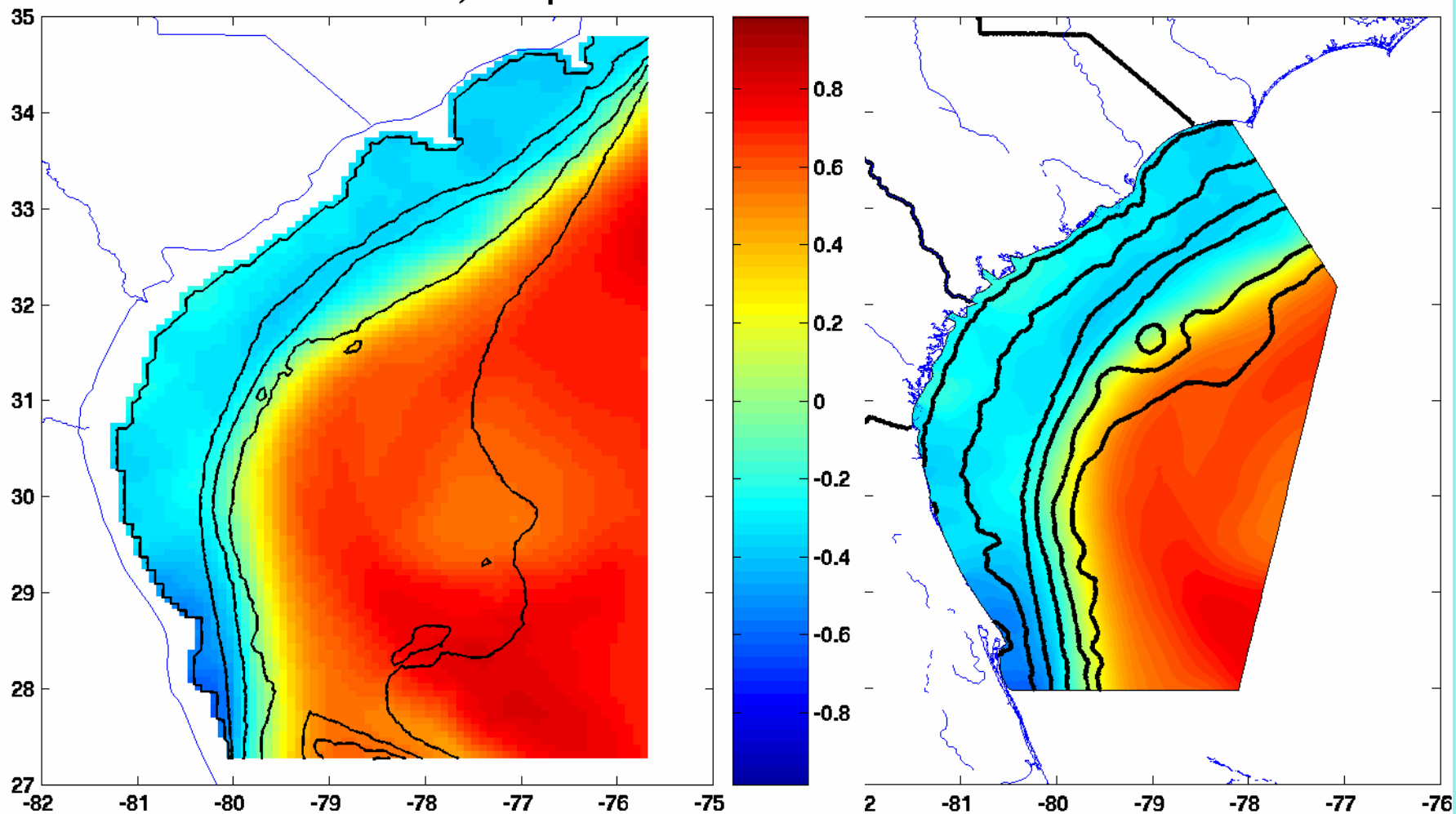
HYCOM SST Nowcast, 7 Sep 2004



Miami, 27-29 Oct 2004

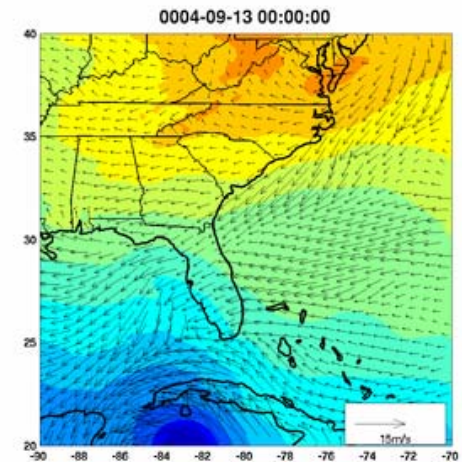
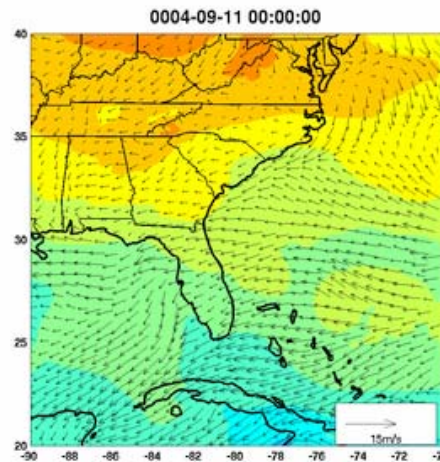
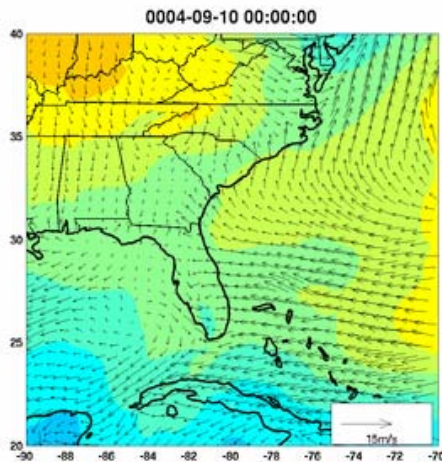
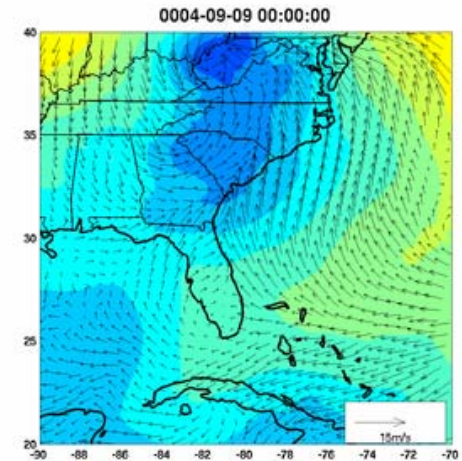
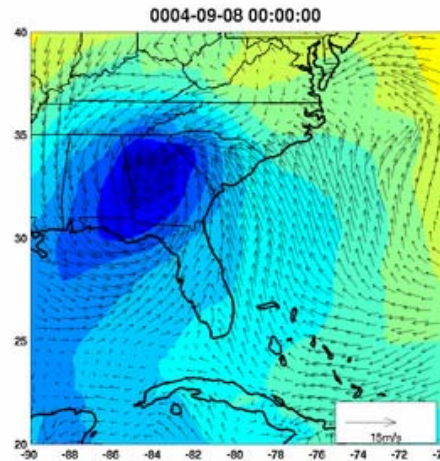
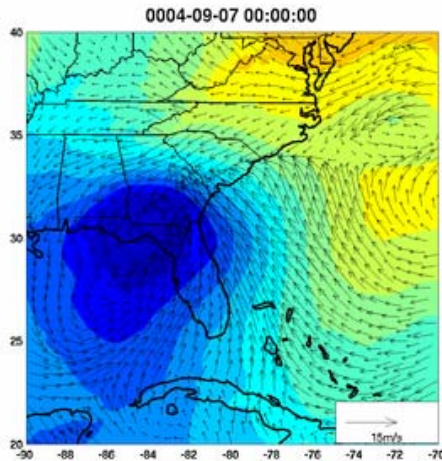
SSH ...

HYCOM SSH Nowcast, 7 Sep 2004

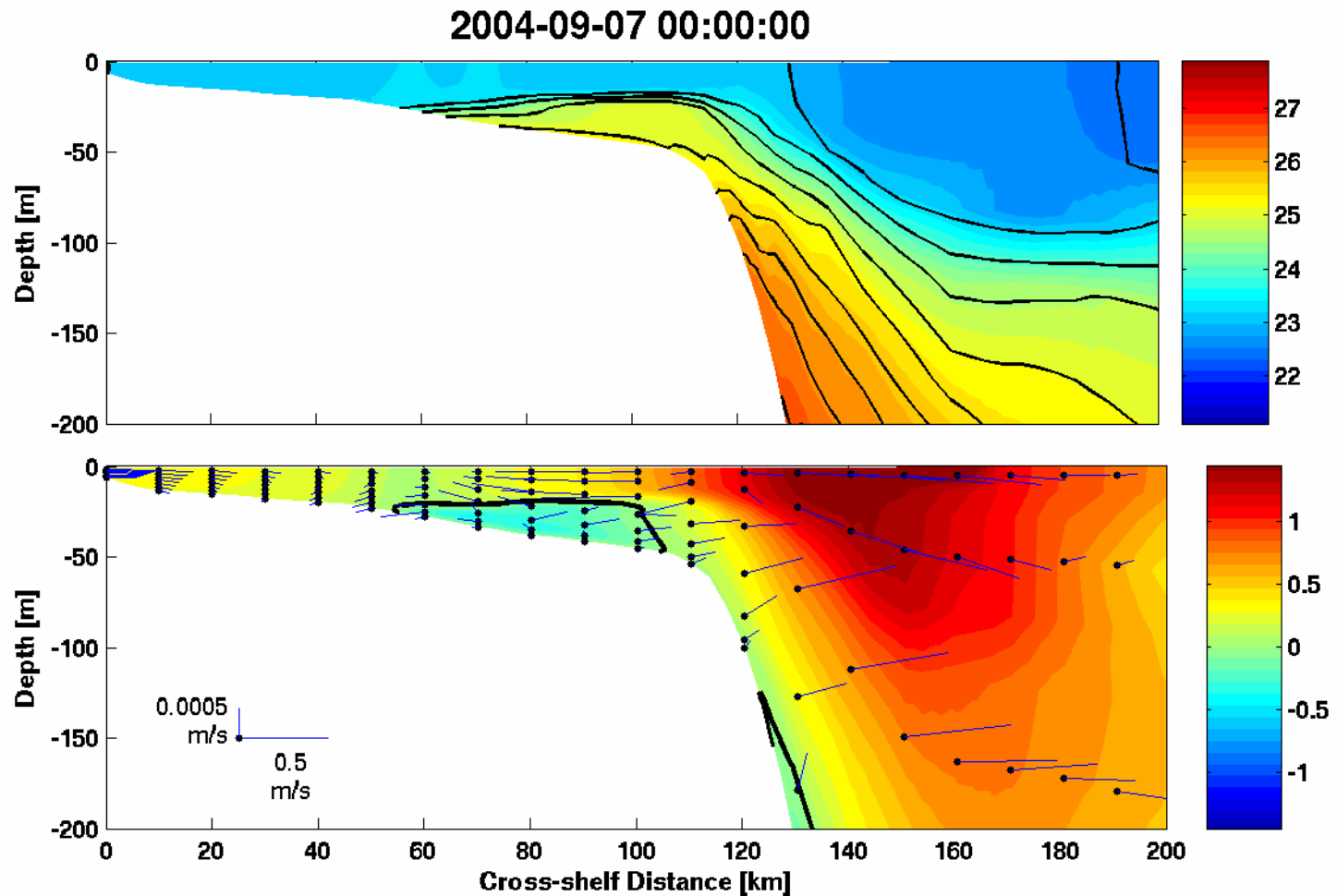


Synoptic Situation

NCEP/Eta PRMSL, UV_{10m}



SAB Cross-shelf Transect



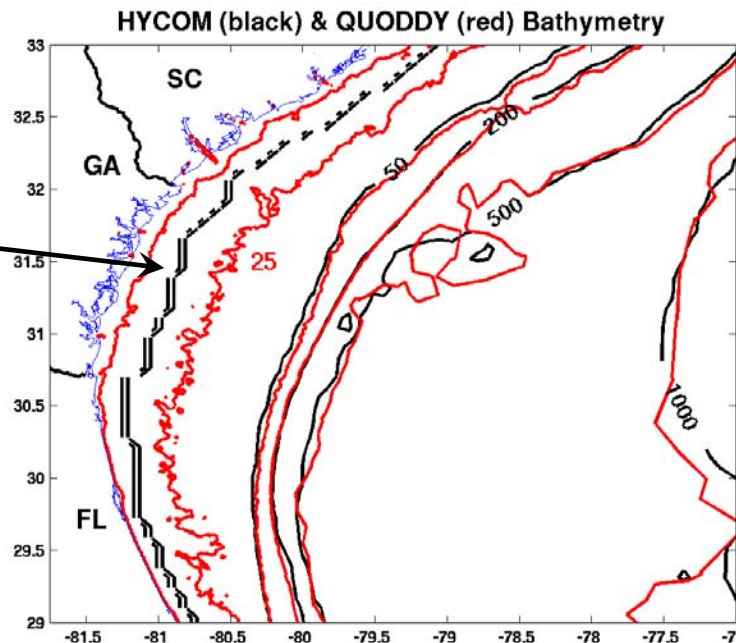
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QuickTime™ and a
GIF decompressor
are needed to see this picture.

Issues

- Forcing compatability (ECMWF vs NCEP/ETA)
- Bathymetry/coastline

**HYCOM
Coastal Wall**



Future ...

- HYCOM SSH, TS comparison in SAB
 - Point-wise comparison of HYCOM products
- Very short-term ($\sim$ 3-4 day) forecasts of shelf state
- Use of HYCOM as best prior estimate of shelf ocean state
 - OI/EnskF of shelf observations from Navy Towers
- “GRID”-based distribution of regional/limited-area results