U.S. GODAE: Global Ocean Prediction with

HY COM

HYbrid Coordinate Ocean Model

Community Effort: NRL, U. of Miami, FSU, NASA-GISS, NOAA/NCEP, NOAA/AOML, NOAA/PMEL, PSI, FNMOC, NAVOCEANO, SHOM, LEGI, OPeNDAP, UNC, Rutgers, USF, Fugro-GEOS, Orbimage, Shell, ExxonMobil

Logistics

- Bathrooms are located on first and second floors in both atriums

- Please use the parking next to the pond

- Open wireless access

- PCs, Macs, and workstations are available in the computer lab – no login needed, except for the Unix workstations (guest -HYCOM)

- Lunch will served in the atrium in the back of COAPS – will need a head count for Thursday

Logistics

- Group photo at 3:00pm
- Tonight at 6:30pm, reception at the University Center Club – directions on the back to the agenda.
- Speakers, please download your presentation to conference laptop

Objectives and Goals

- A broad partnership of institutions that collaborate in developing and demonstrating the performance and application of eddy-resolving, real-time global and basin-scale ocean prediction systems using HYCOM.

- To be transitioned for operational use by the U.S. Navy at NAVOCEANO and FNMOC and by NOAA at NCEP.

Objectives and Goals

- Strong participation of the coastal ocean modeling community in using and evaluating boundary conditions from the global and basin-scale ocean modeling prediction systems

- Efficient data distribution (100 Terrabytes Storage Area Network)

  - The data are available to the community at large within 24 hours via Live Access Server (LAS), ftp, and OPeNDAP at http://www.hycom.org

Roadmap

- <u>Basin-scale</u>
  - FY04 to FY07: Improvements to the present near real time NRL and NOAA/NCEP North Atlantic configurations. Evaluation of MVOI (NCODA) and of the SEEK and ROIF filters. Overlap in FY07 with the global configuration for assessment of the global system in the Atlantic.
 - The NOAA/NCEP Pacific configuration will become operational in FY08.

Roadmap

- ## Global configuration

  - Development has been taking place since FY04.

  - Transition to NAVOCEANO (1/12º) and FNMOC (1/4º) with MvOI (NCODA) in FY07.

  - Operational testing in year FY08.

 - Increase to 1/25° resolution globally (~3-4 km mid-latitude) by the end of the decade

Global HYCOM configuration

HY COM — HYbrid Coordinate Ocean Model

- Horizontal grid: 1/12° equatorial resolution
  - 4500 x 3298 grid points, ~6.5 km spacing on average, ~3.5 km at pole, 5 m minimum depth
- Mercator 79°S to 47°N, then Arctic dipole patch
- 32 σ_2* vertical coordinate surfaces:
- GISS mixed layer model
- Thermodynamic sea-ice model
- Surface forcing: wind stress, wind speed, thermal forcing, precipitation, weak relaxation to climatological SSS
- Monthly river runoff (986 rivers)
- Initialized from January climatology (GDEM3) T and S

1/12° Global HYCOM Snapshot: SSH and ice (gray)

GLBa0.08
ci 3.0
-205. to 215.

May 2 model year 8

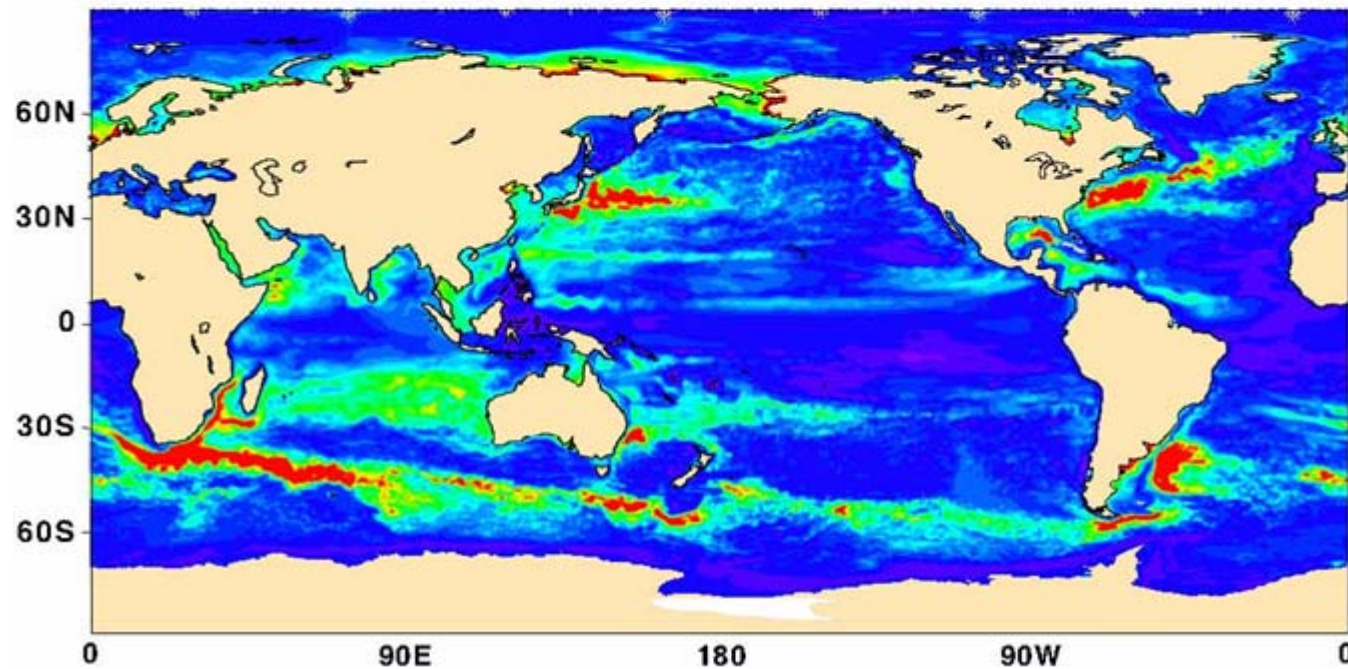-150   -100   -50   0   50   100   150
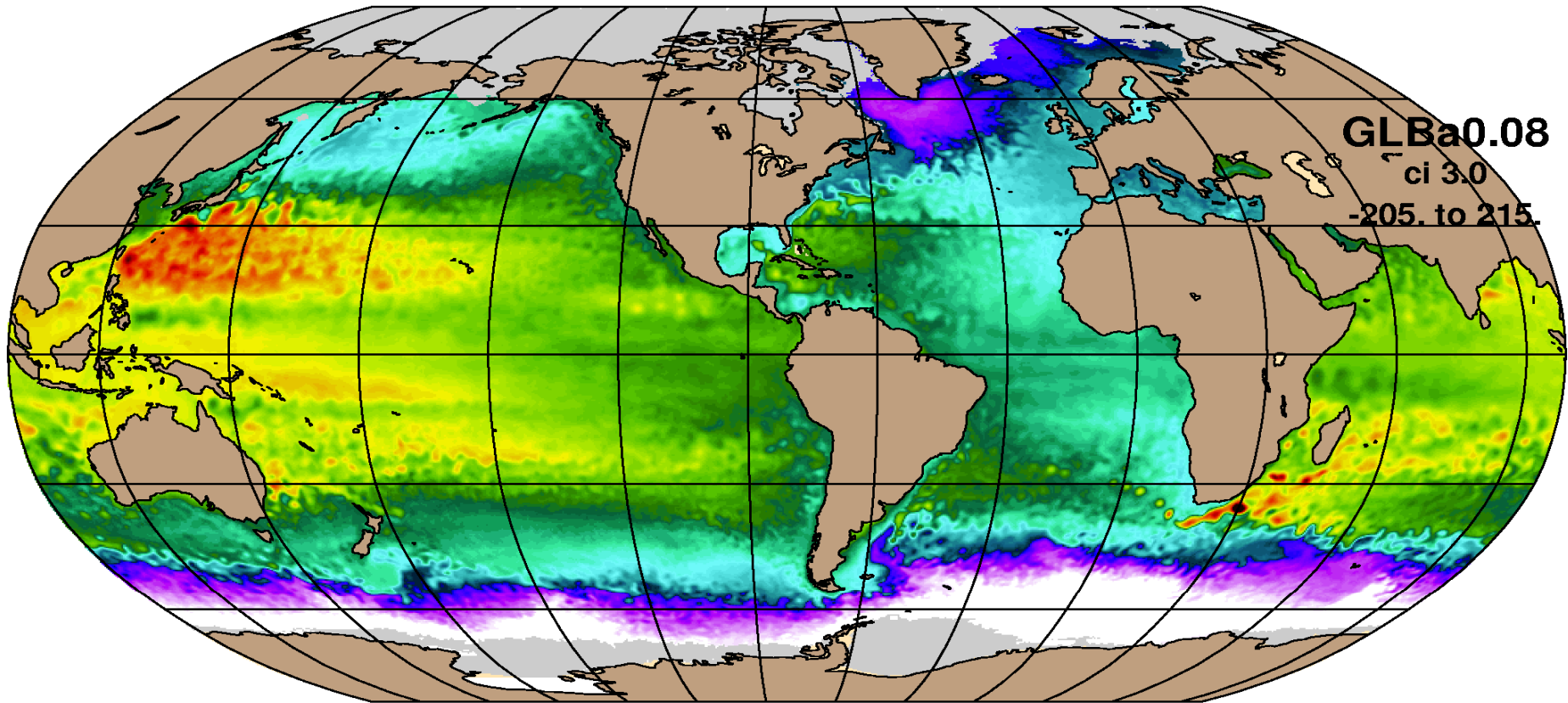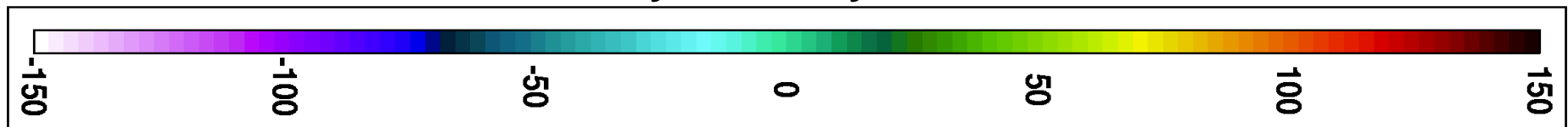
216,000 CPU hrs/model year on 784 IBM Power 4+ CPUs

7.2 TB/model year for daily 3-D output
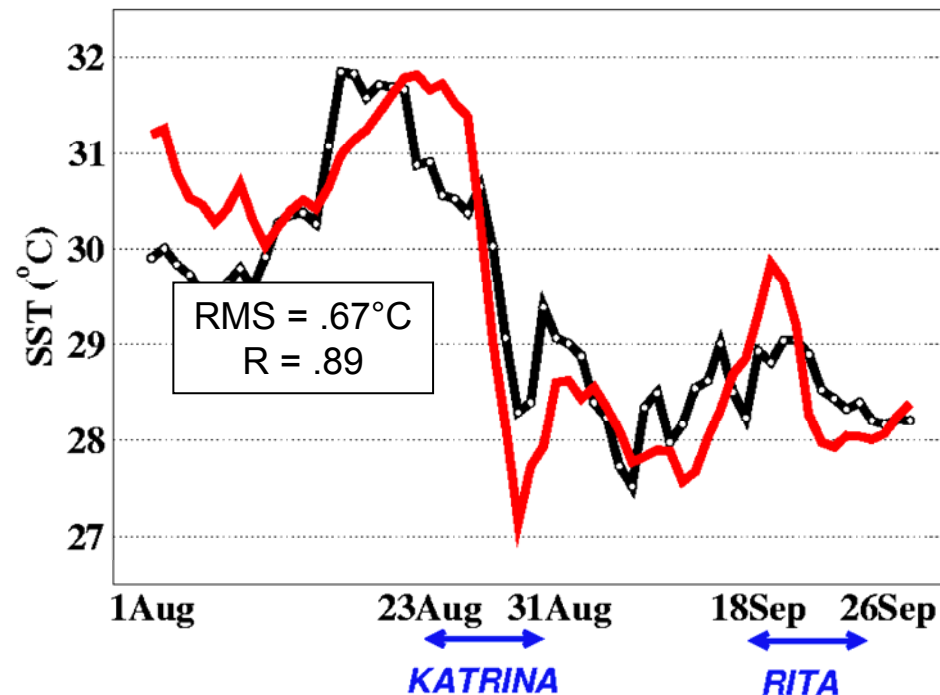
Free Running Global HYCOM (Metzger et al.)
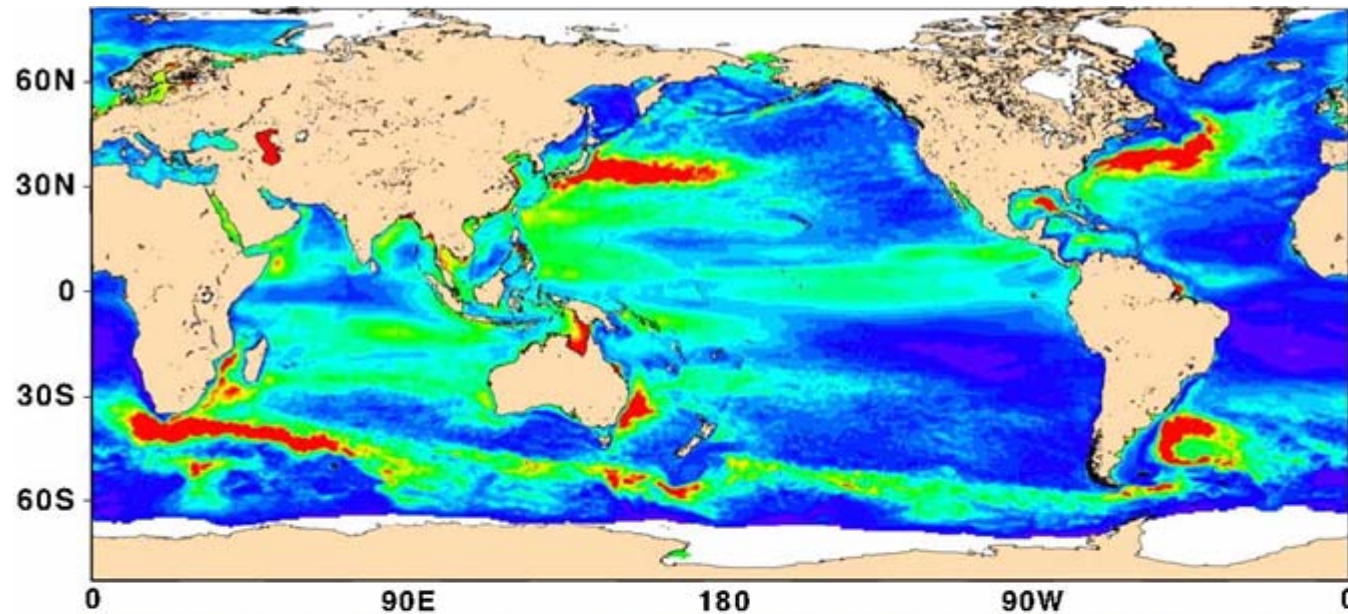
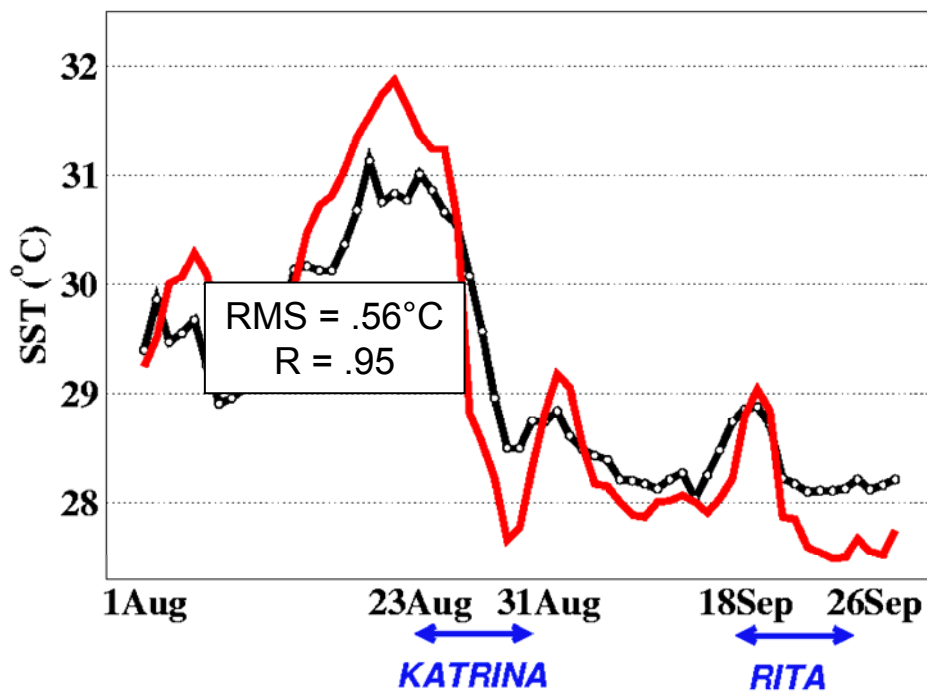1992 – 2005 SSH variability based on T/P, ERS-1, and ERS-2 altimeters (Courtesy CLS)

SSH variability from 1/12° global HYCOM σ_2* with climatological wind and thermal forcing

SST Response in 1/12° Global HYCOM to Hurricanes Katrina and Rita

HYCOM reproduces the deterministic SST response to the wind forcing.
Implies realistic upwelling and mixing of subsurface waters as well
as realistic atmospheric wind and heat flux forcing.

Roadmap

- <u>Product evaluation</u>
  - Assessment of the outputs by comparison to independent observations
  - Comparison with other GODAE products (i.e. MERSEA collaboration)
  - Strong involvement of coastal ocean modeling groups to use and evaluate boundary conditions provided by the global and basin HYCOM real time prediction system outputs

West Florida Shelf Modeling

HYCOM — HYbrid Coordinate Ocean Model

WFS ROMS SST and surface velocity is shown inside the dashed line and outside of this area is the North Atlantic HYCOM.

Warm water is detached from the Loop Current and transported northward as mesoscale eddies and filaments.
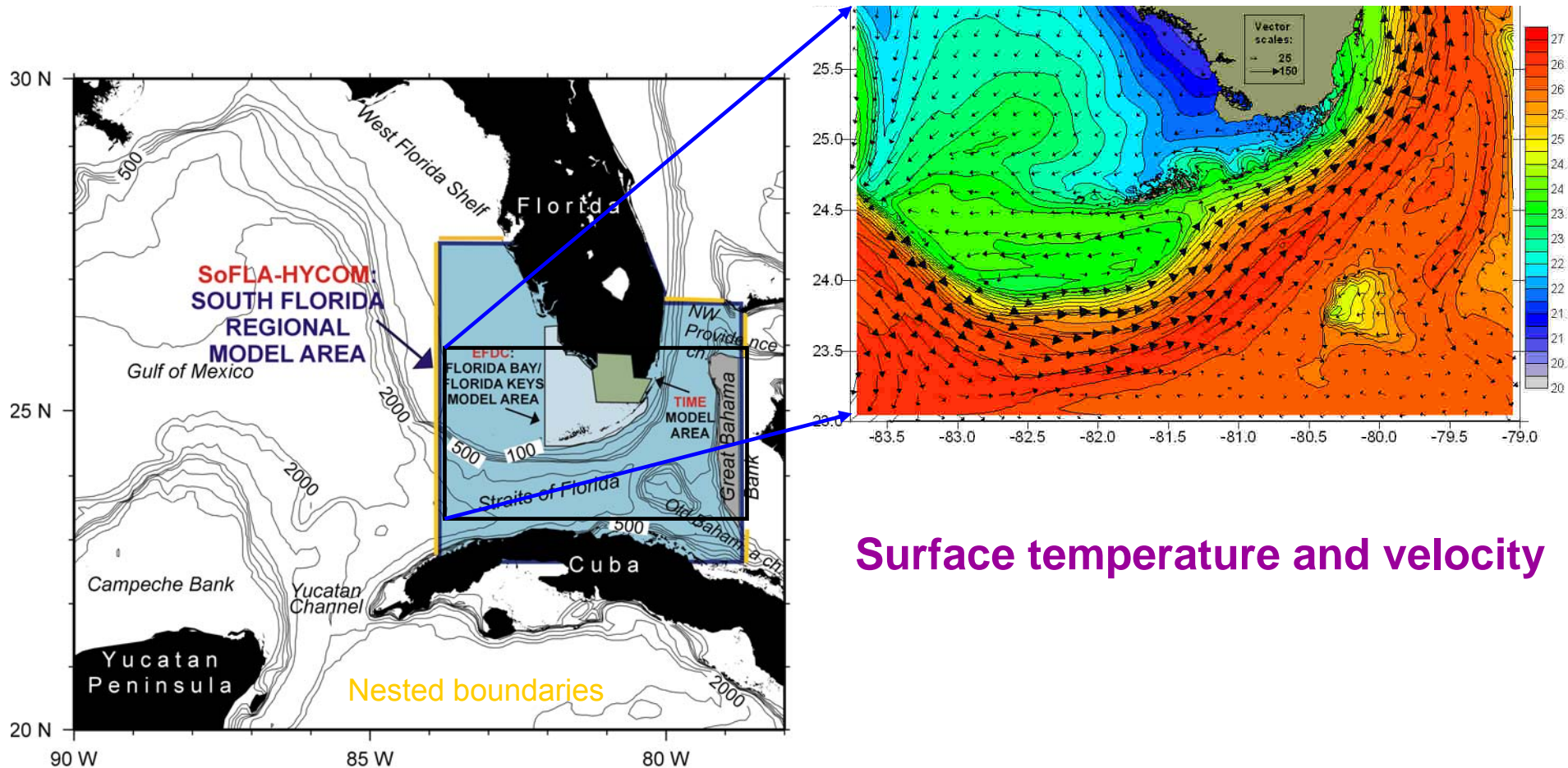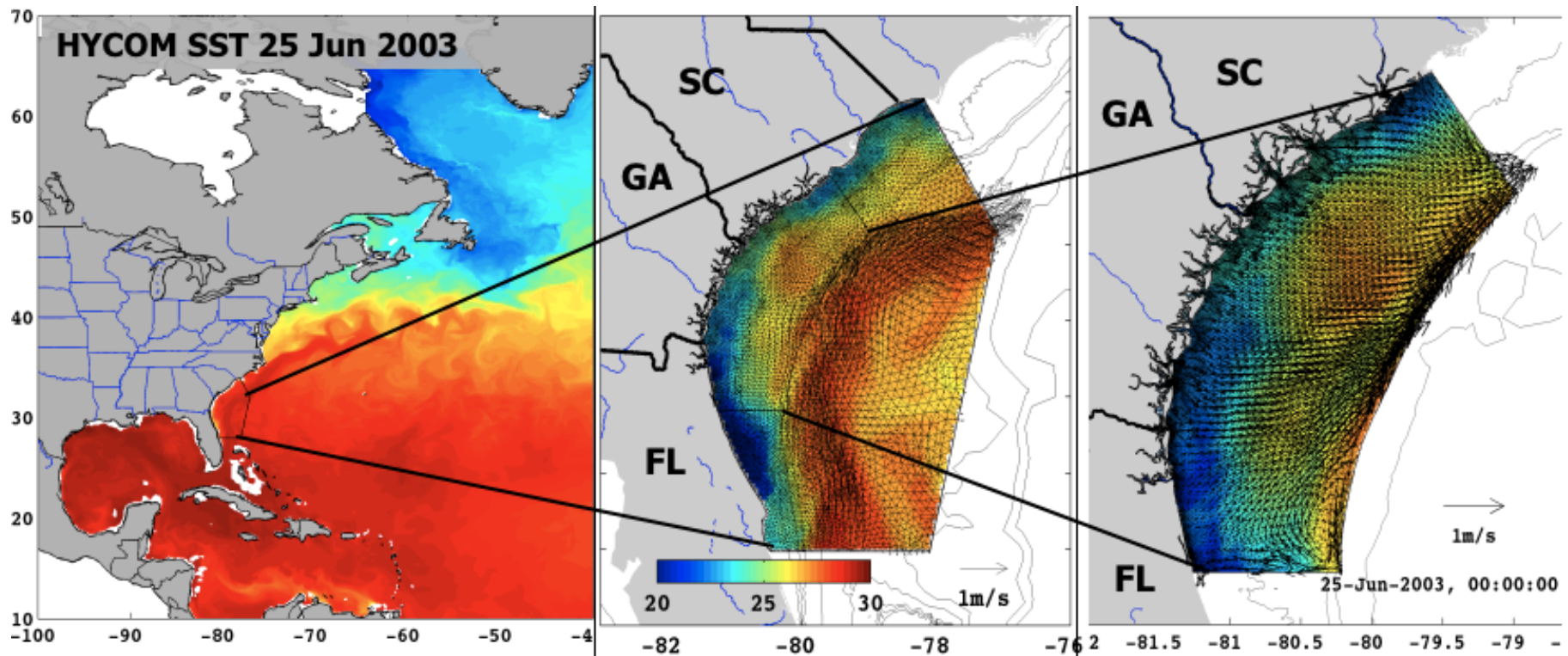
Barth et al. (USF)

surf. vel. and SST 2004-01-02
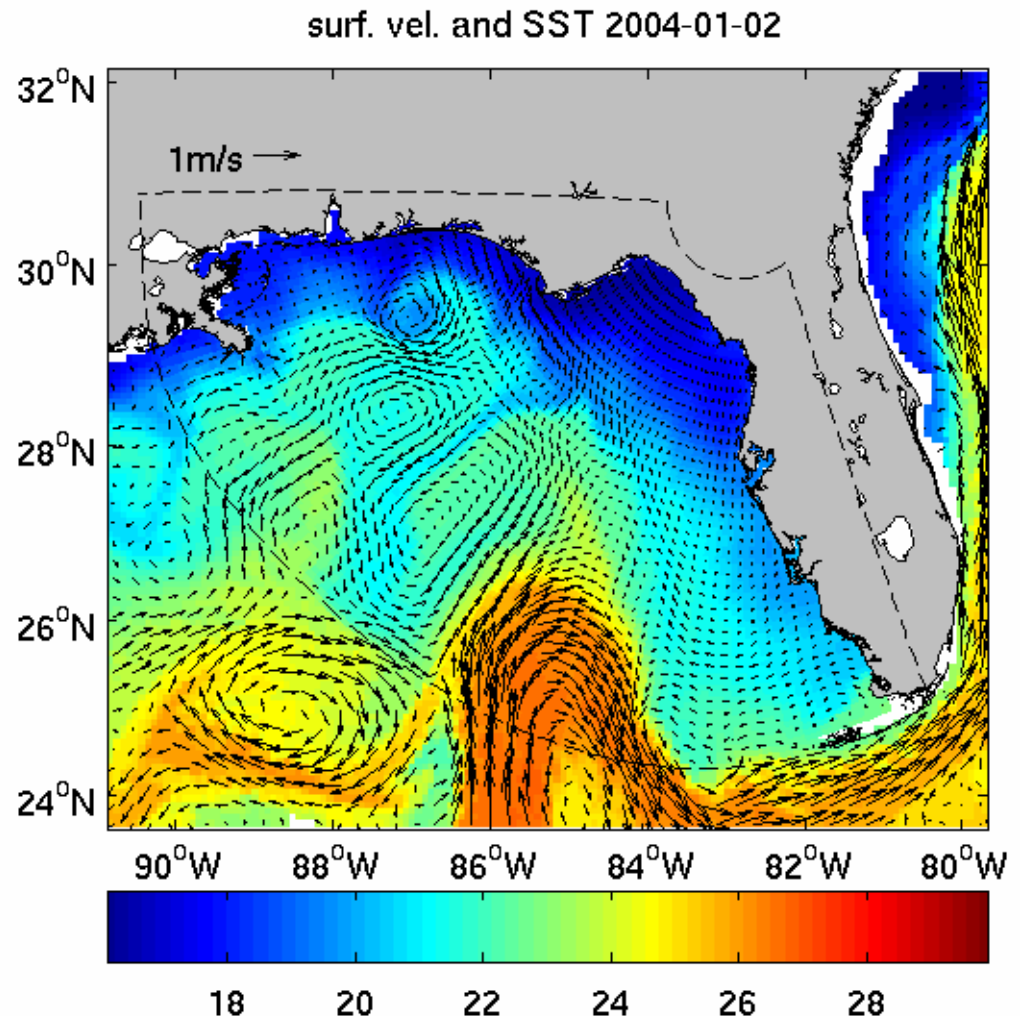
Regional model for South Florida seas
SoFLA-HYCOM
(South Florida Hybrid Coordinate Ocean Model)
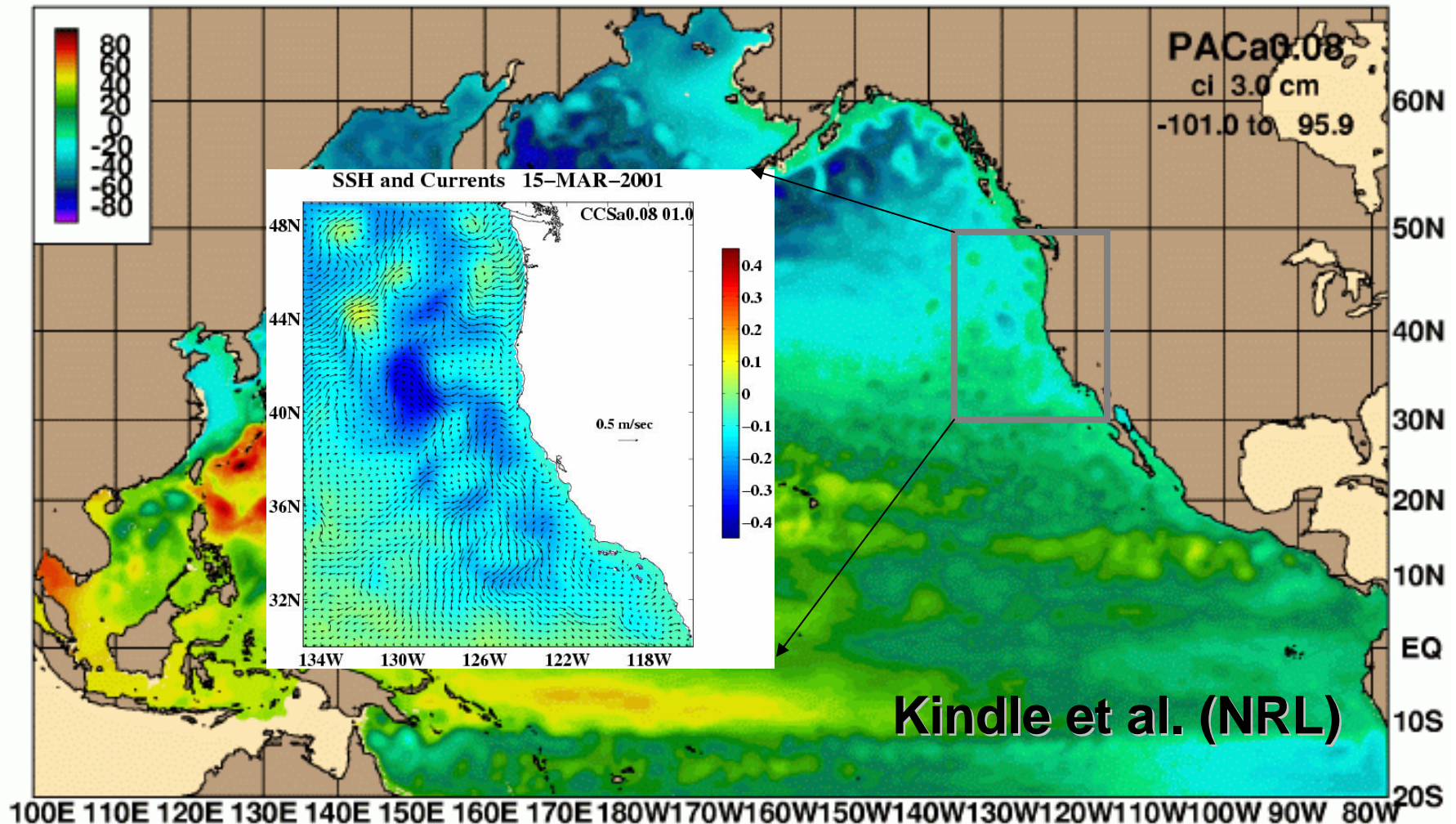

Surface temperature and velocity

Kourafalou et al. (U. of Miami)
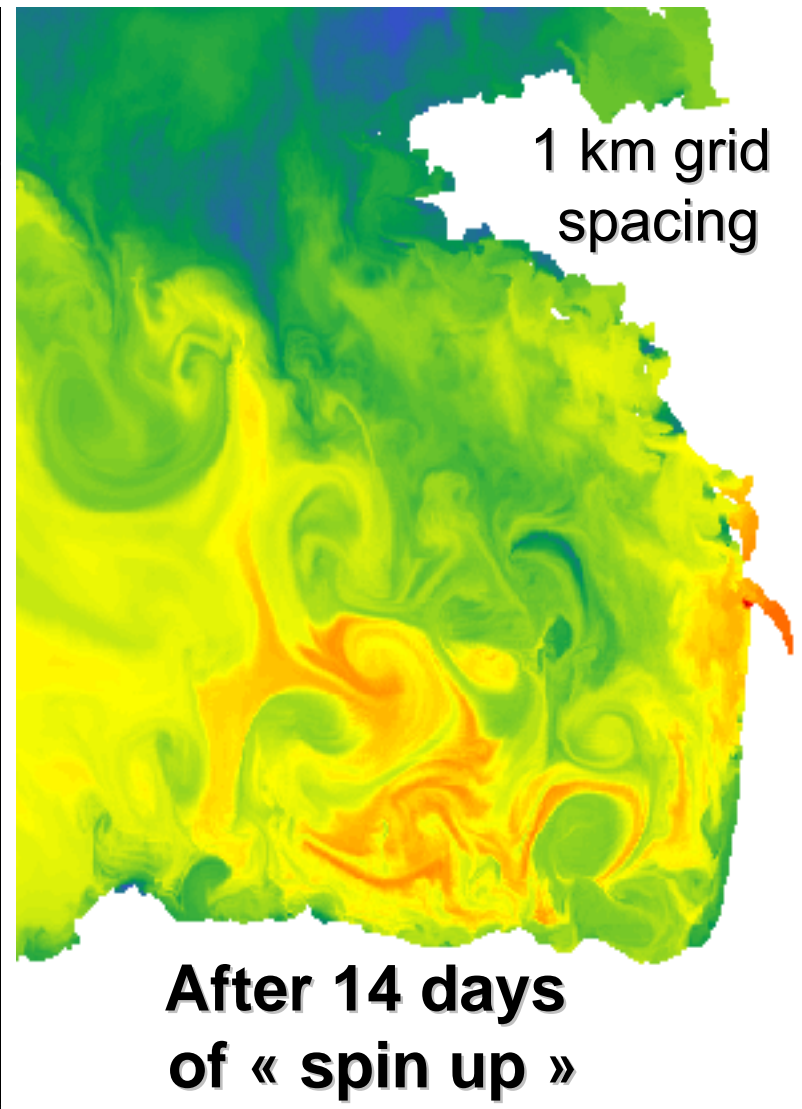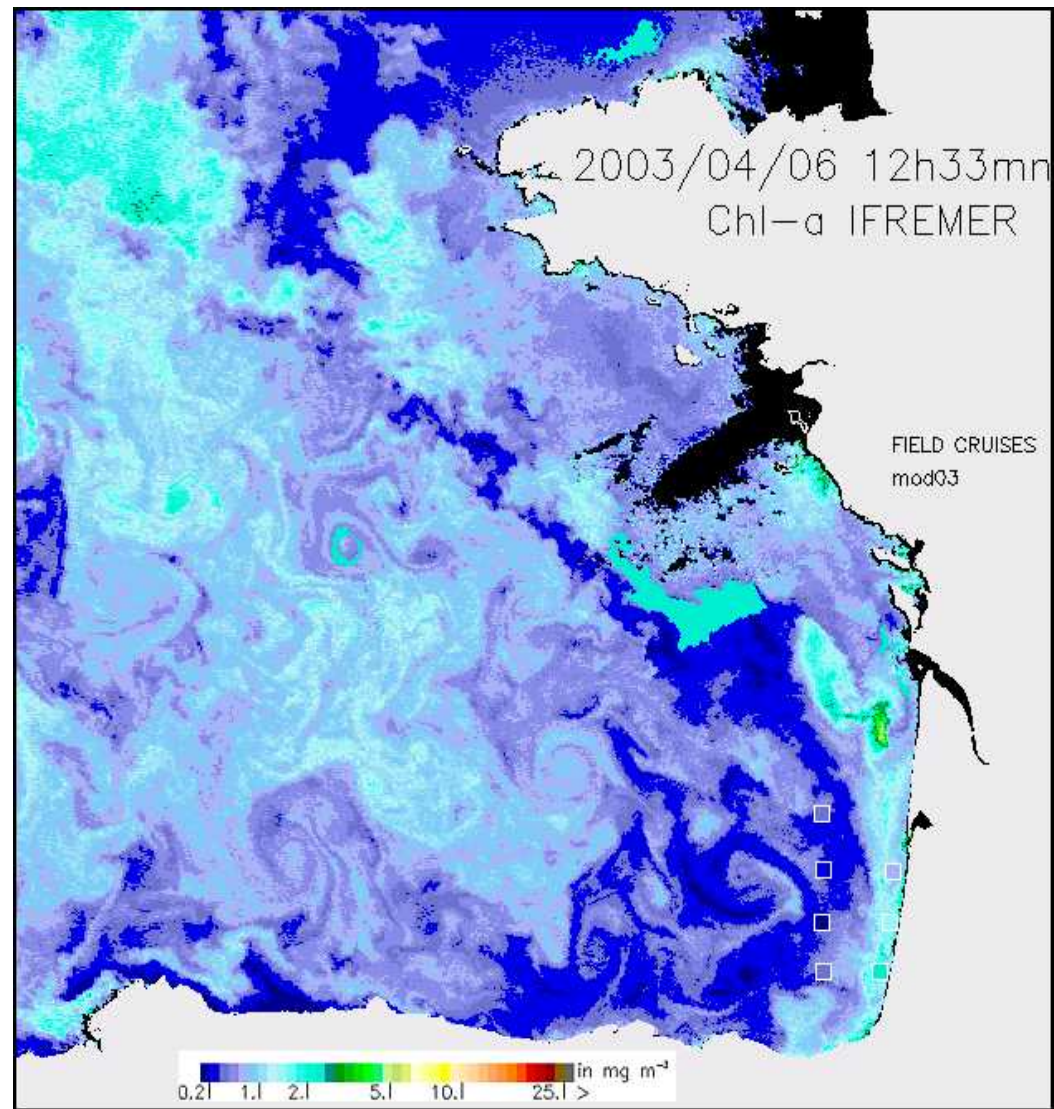
Nested South Atlantic Bight Finite Element Model

UNC-SAB modeling system sequence that nests the regional-scale QUODDY implementation (middle) within the 1/12° near real-time HYCOM-GODAE model (left). The limited-area QUODDY implementation (right) includes the estuary and tidal inlets along the Georgia/South Carolina coast and extends to the shelf-break.

Blanton et al. (UNC)

US West Coast HYCOM with Biology Nested in 1/12° Global HYCOM Basin

Kindle et al. (NRL)

HYCOM Bay of Biscay Modeling

2003/04/06 12h33mn
Chl-a IFREMER

FIELD CRUISES
mod03

in mg. m⁻³
0.2| 1.| 2.| 5.| 10.| 25.| >

1 km grid spacing

After 14 days of « spin up »

HYCOM Bay of Biscay Modeling

HYCOM
HYbrid
Coordinate
Ocean Model

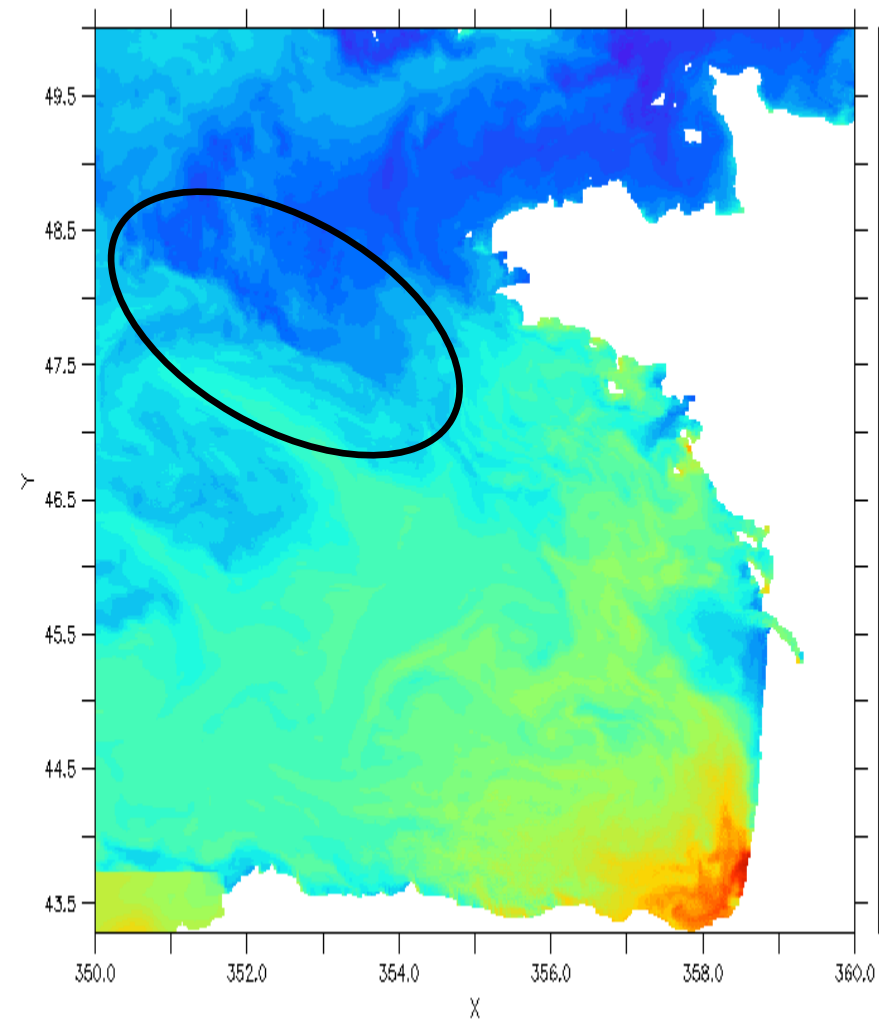**SST**
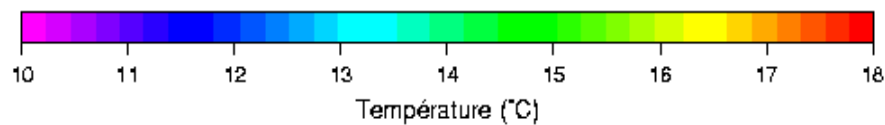**June 2004**

Tidal forcing

MERCATOR BCs

**Surface forcing
from ARPEGE**

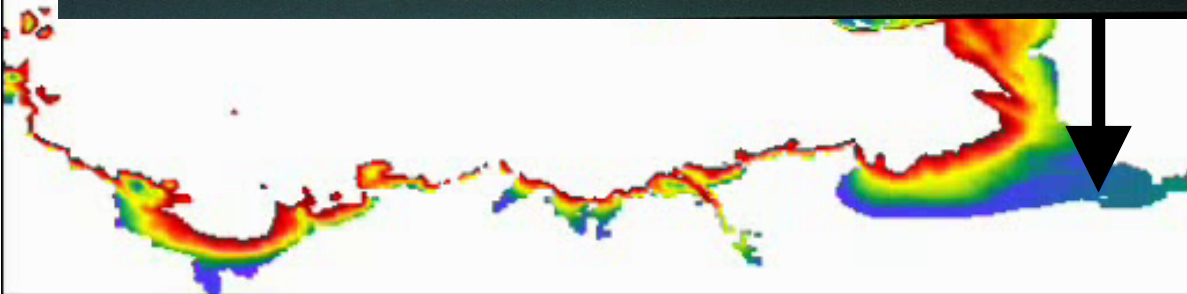**Baraille et
al. (SHOM)**
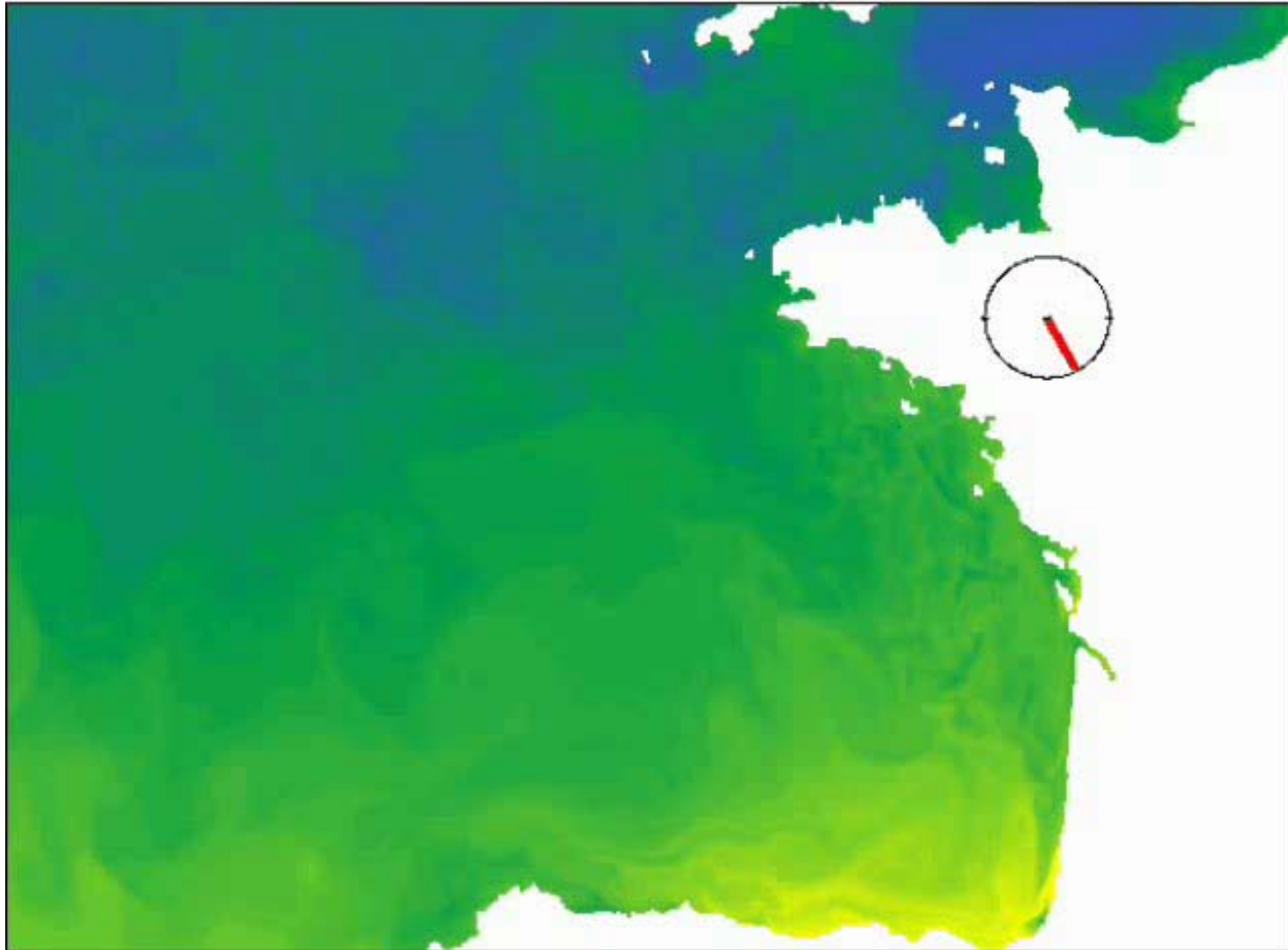
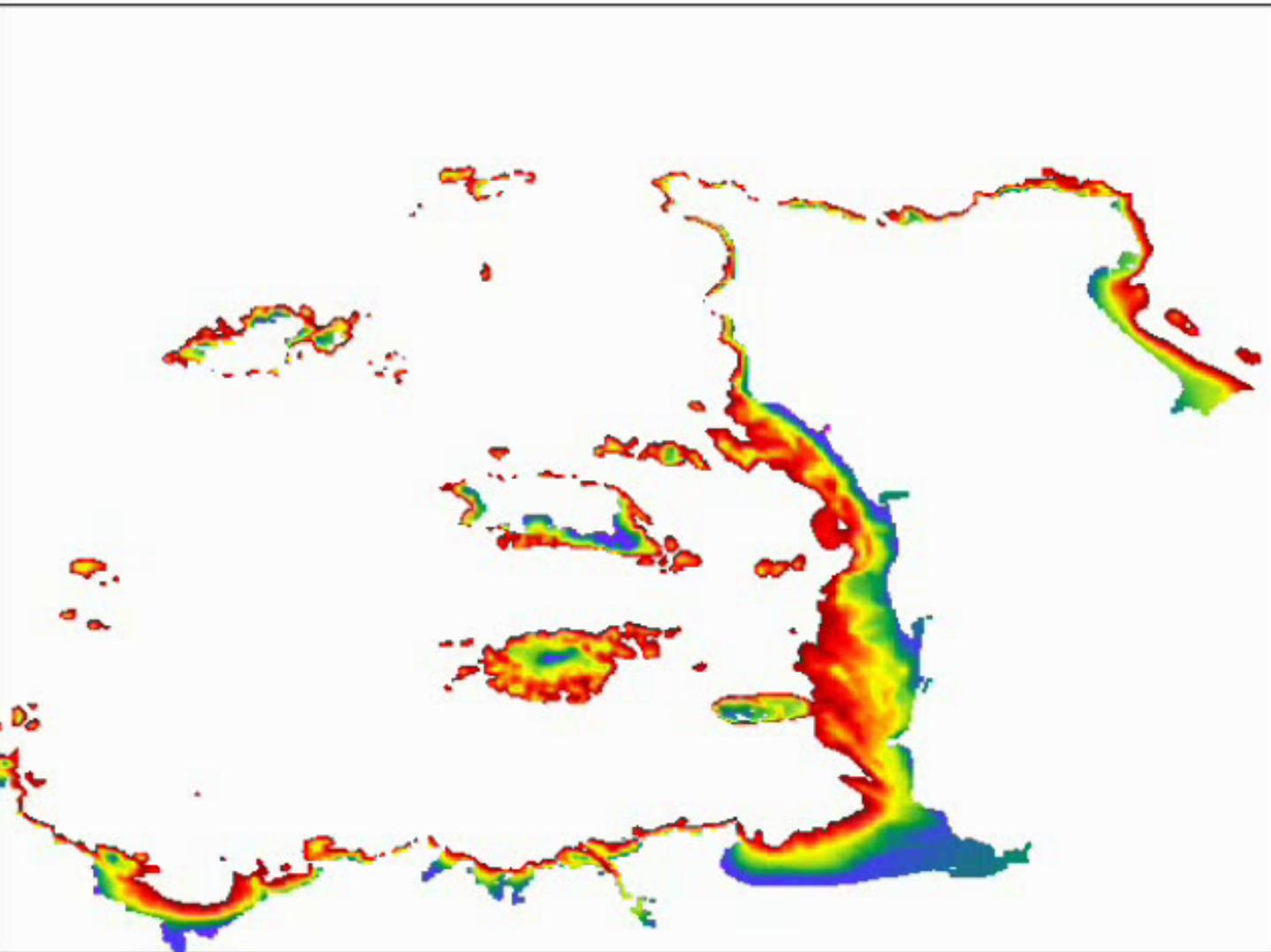# SST in HYCOM and Observations on June 24, 2004
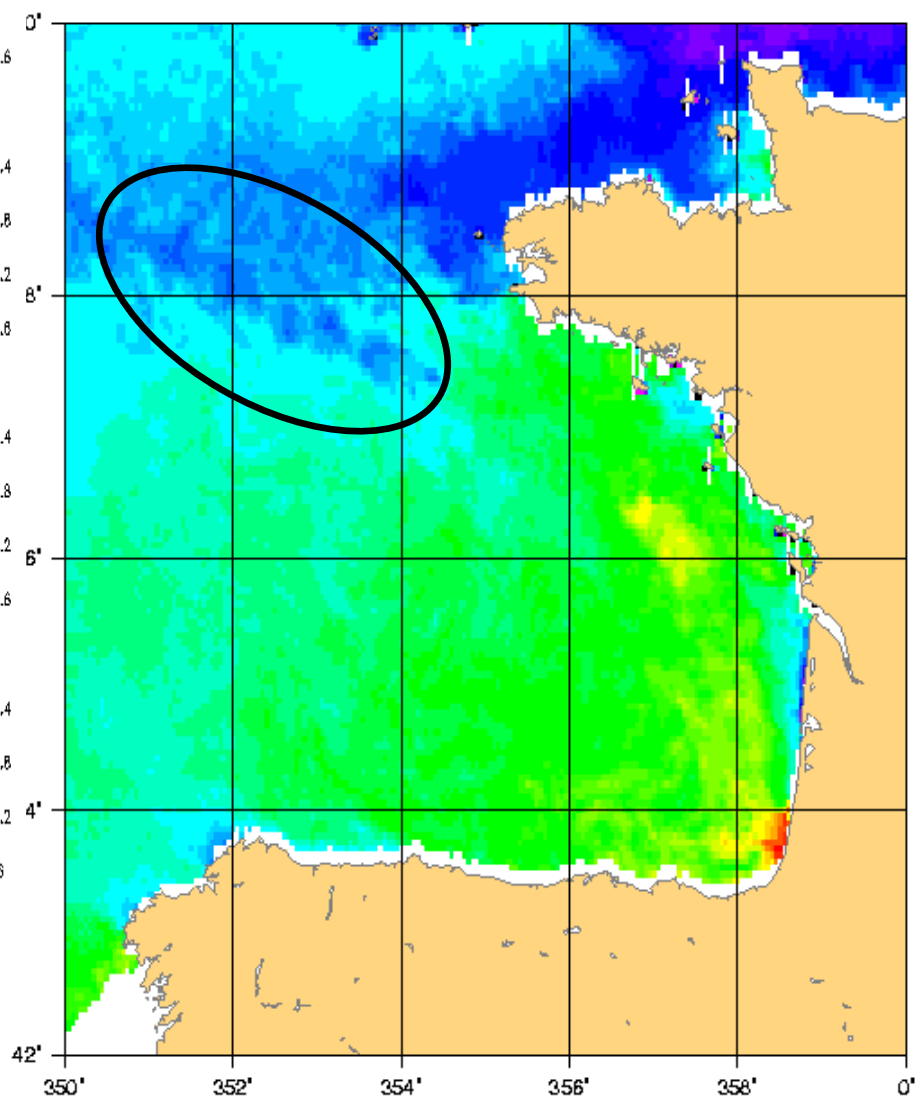
Mont
St Michel

Wetting and Drying in HYCOM

Baraille et al. (SHOM)

0 meter layer thickness

Agenda

http://www.coaps.fsu.edu/HYCOM/agenda.php