Topics

1. IOOS on the US East Coast

   National Federation of Regional Associations
   http://usnfra.org

   - NERACOOS
   - MACOORA

2. Regional Physical & Ecosystem Modeling Efforts

Northeast Regional Association of Coastal Ocean Observing Systems (NERACOOS)

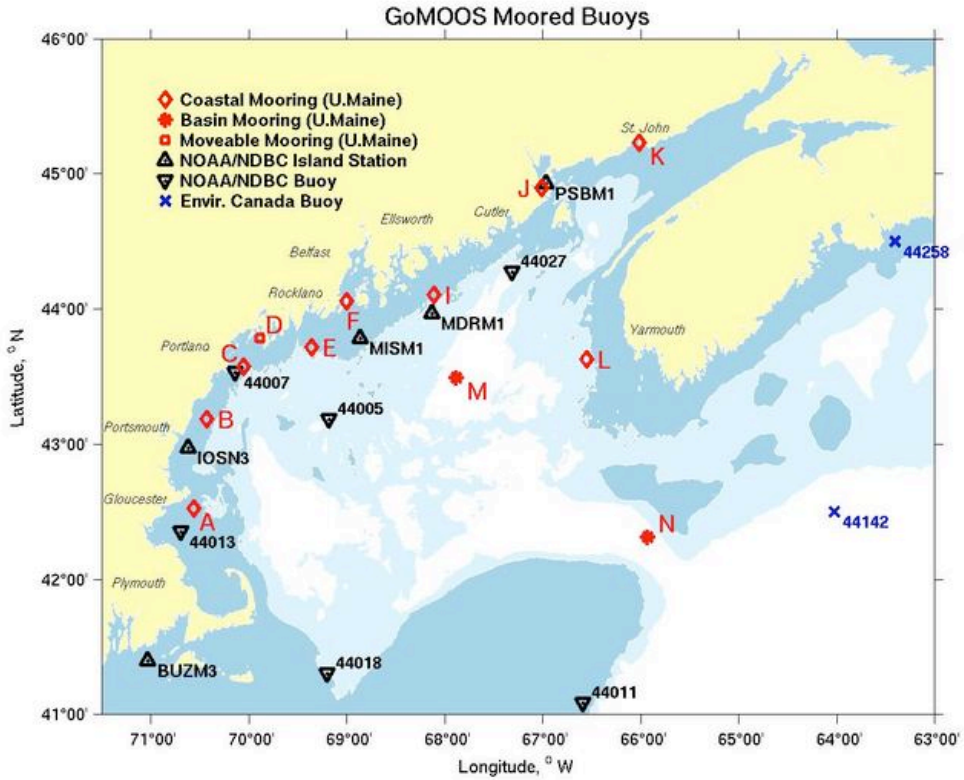
www.neracoos.org

Primary Components:

1. **GOMOOS** - Gulf of Maine Ocean Observing System (P. Bogden) http://www.gomoos.org
2. **COOA** - UNH Coastal Ocean Observing Center – Coastal Ocean Observations and Analysis (COOA) (J. Campbell) http://www.cooa.uhnh.edu

   Planning meeting – Nov 7-8 (?)

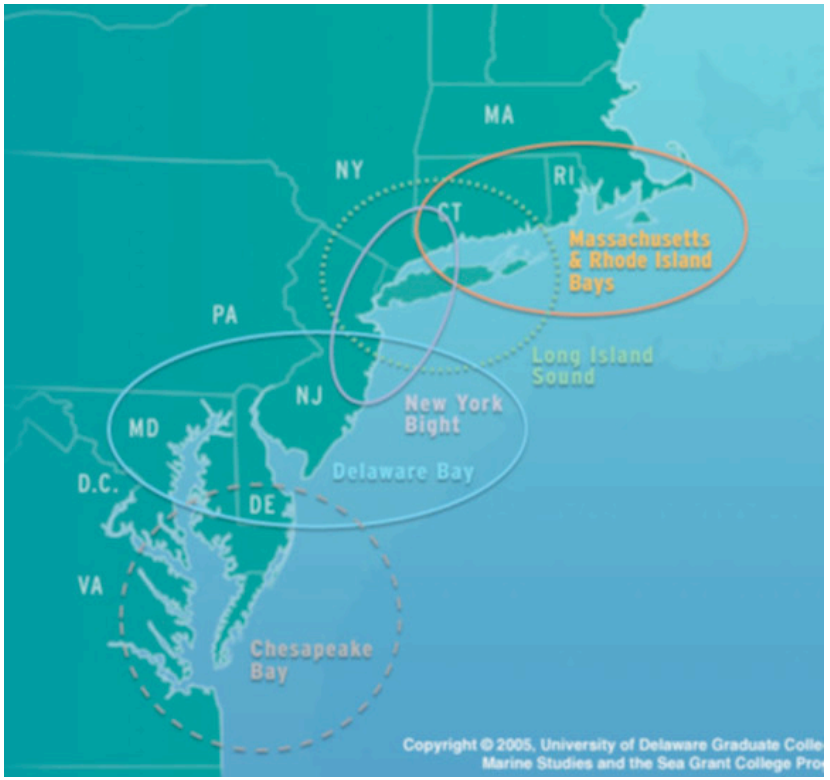
1. **MVCO** - Martha's Vineyard Coastal Observatory (J. Trowbridge) http://mvcodata.whoi.edu/



NERACOOS: Co-PI: J. Trowbridge

Mid-Atlantic Coastal Ocean Observing Regional Association (MCOORA)

http://www.macoora.org/



Co-PIs and Sub-regional Coordinators:

1. **Mass and Rhode Island Bays** – W. Brown, B. Boicourt*
1. **Long Island Sound** – J. O'Donnell, L. Swanson
2. **New York Bight** –S. Glenn*, M. Bruno
3. **Delaware Bay** – C. Thoroughgood*, S. Glenn
4. **Chesapeake Bay** – B. Boicourt*, L. Atkinson

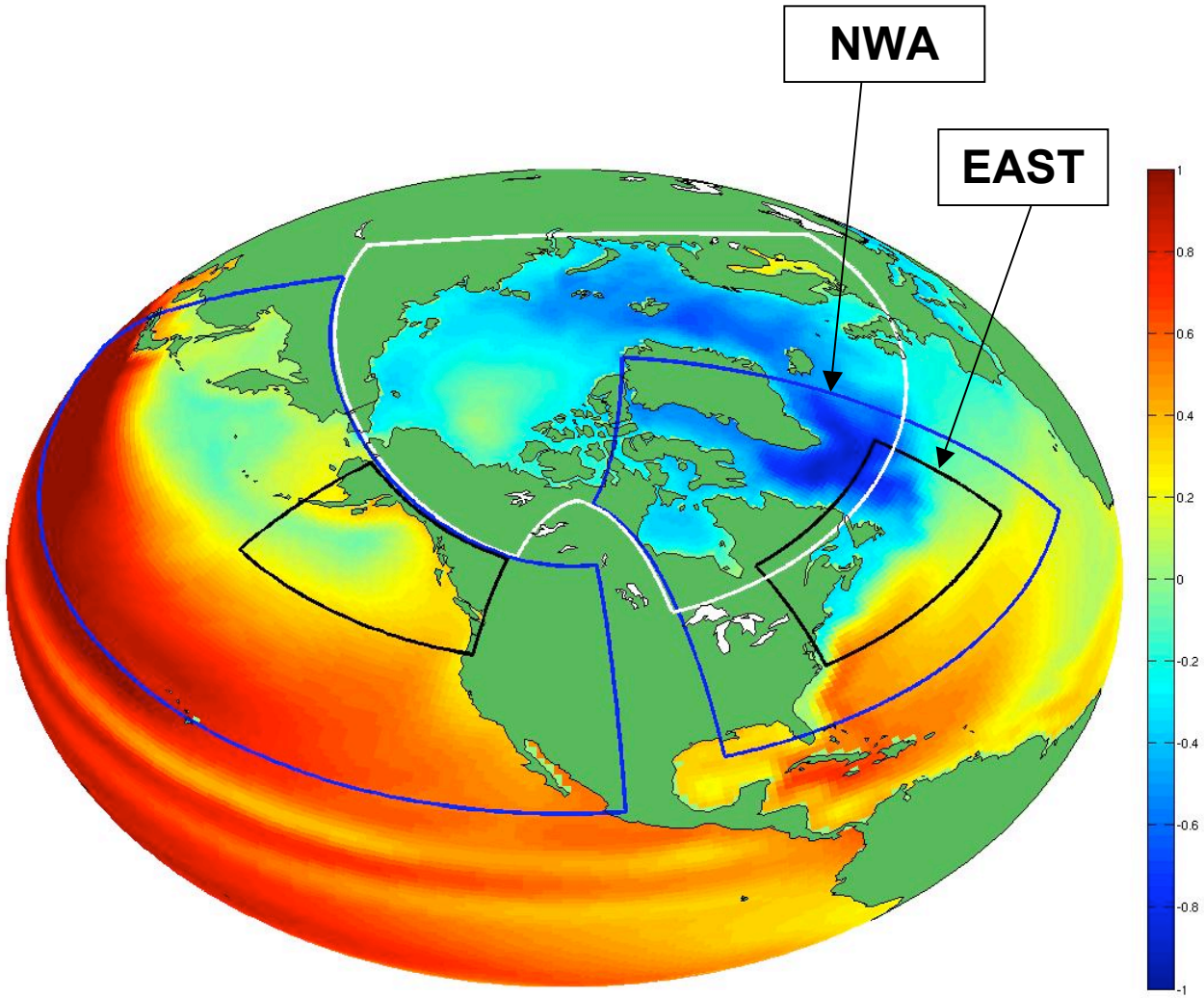
Recent Activities

1. Massachusetts and Rhode Island Coastal Ocean Observing System Coastal Inundation Module Design Workshop - Sept 14-15, UMassD
2. Annual Meeting Oct 30-31- Gawarkiewicz

NE Regional Physical & Ecosystem Modeling Efforts

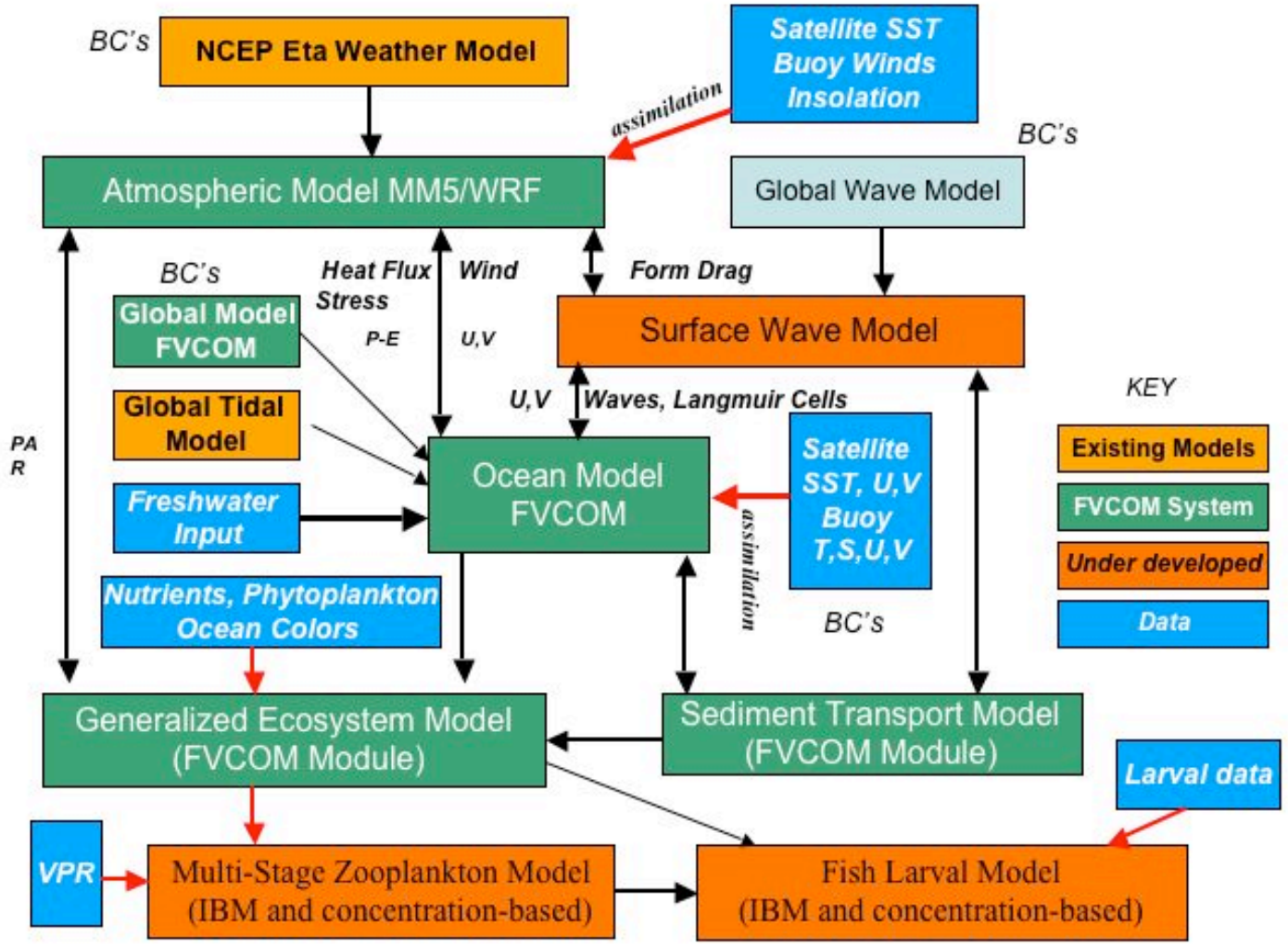
1. **BIO –** operational coupled atmosphere-ocean modeling efforts, including Scotian Shelf/GOM circulation, storm surge and wave models. (OPA/Mercator, ROMS, SWAN)
2. **GOMOOS –** regional ocean circulation (POM/ROMS) and wave (BIO) forecasts
3. **COOA** – regional coupled atmosphere-ocean modeling (MM5, FVCOM) *[just starting]*
4. **UMass-Dartmouth/WHOI** – regional-small scale coupled atmosphere-ocean modeling (MM5,FVCOM)

BIO Operational Oceanography Projects

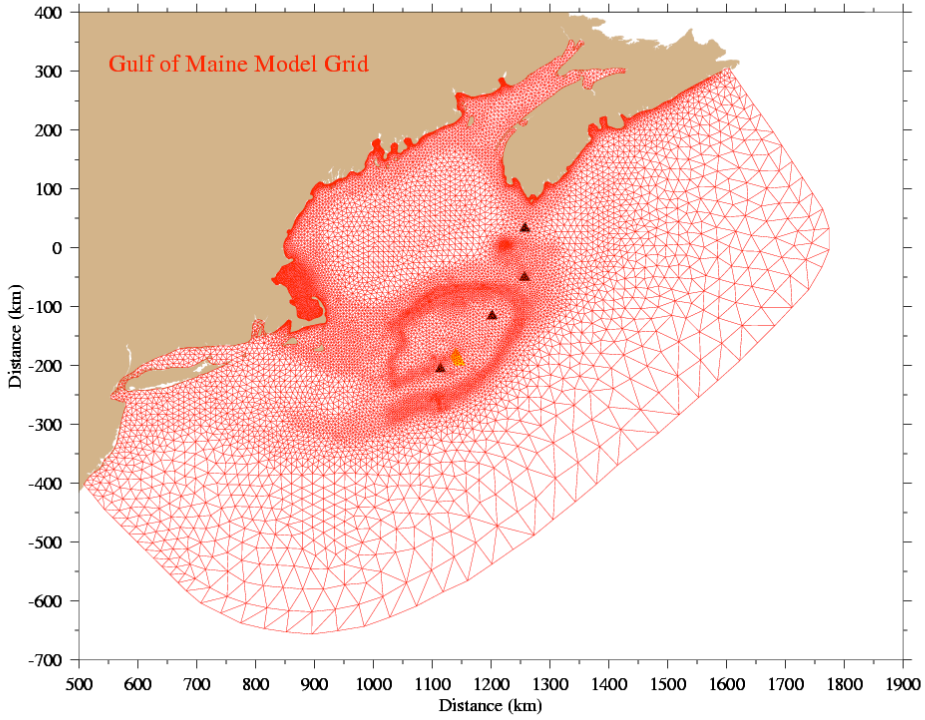


FVCOM Model System

Developed by C. Chen (UMass-Dartmouth) and co-workers



First Generation

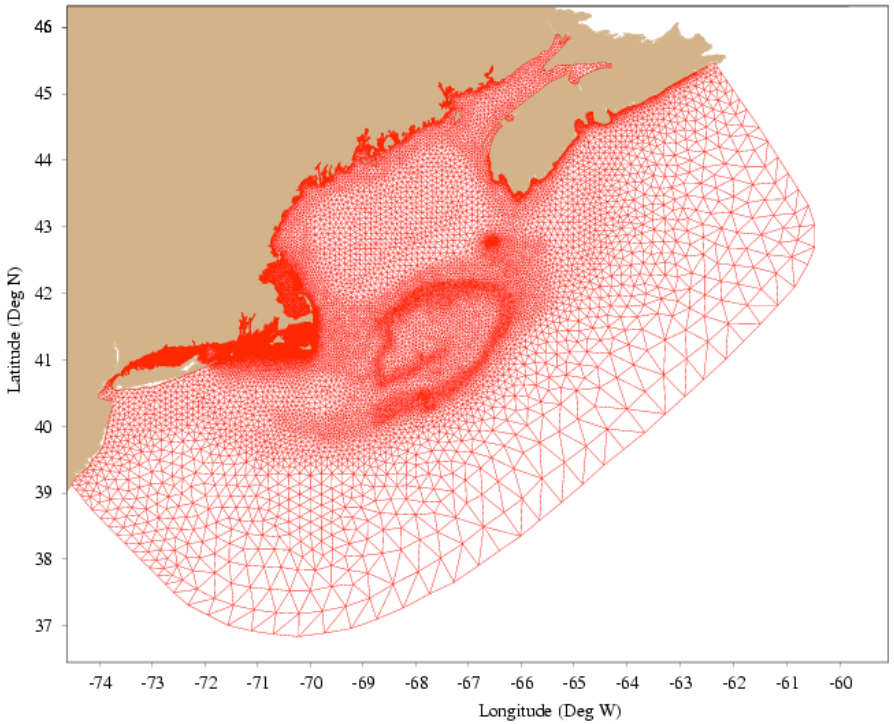


Horizontal Resolution:

0.5-1.0 km in the coastal region

31-sigma levels in the vertical

Second Generation

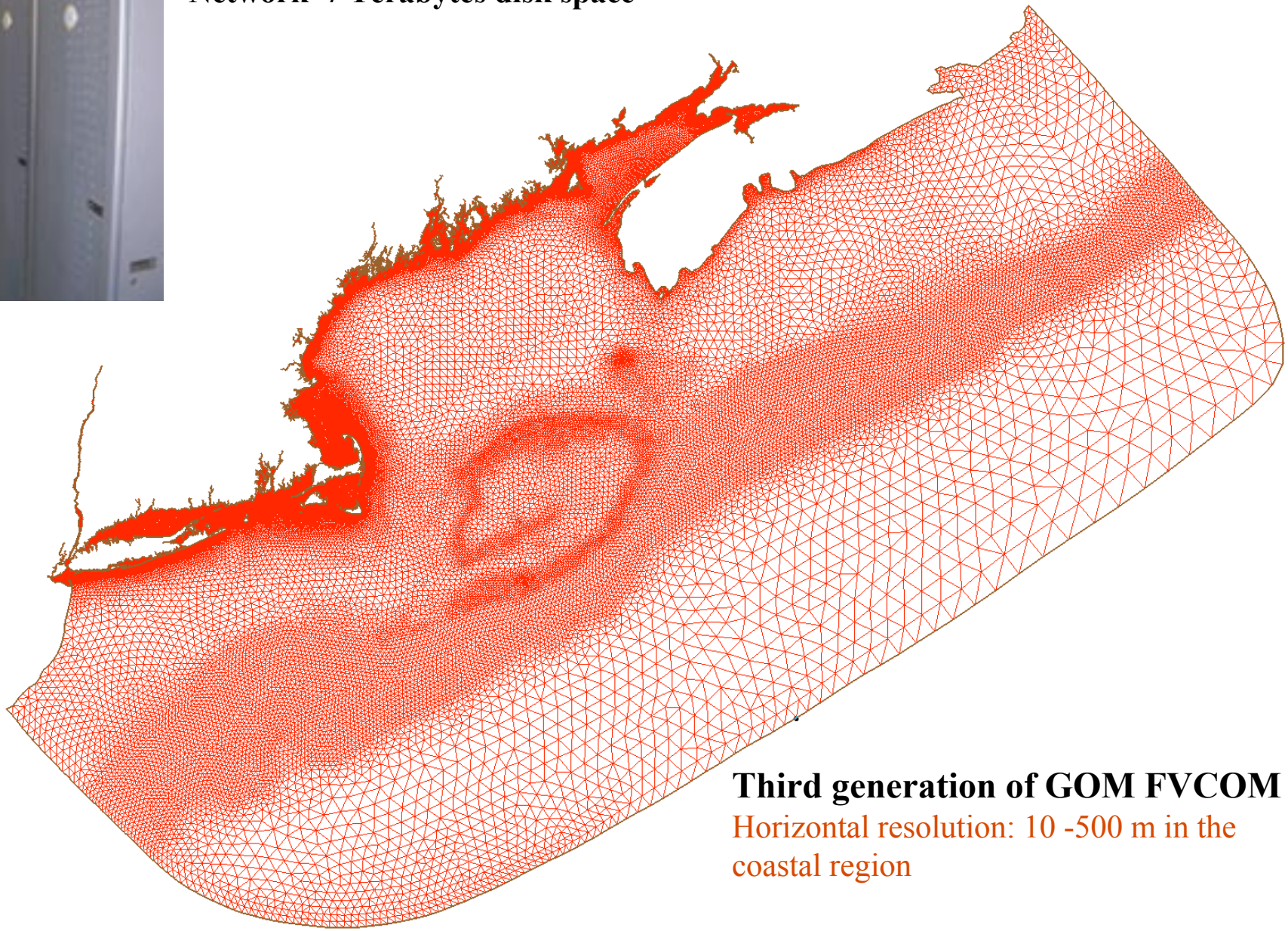


Horizontal Resolution:

0.3-1.0 km in the coastal region

31-sigma levels in the vertical

256 Processors (Intel 3.4 GHz Pentium 4)
256 Gigabytes RAM, Infiniband High Speed Network 7 Terabytes disk space



Third generation of GOM FVCOM

Horizontal resolution: 10 -500 m in the coastal region

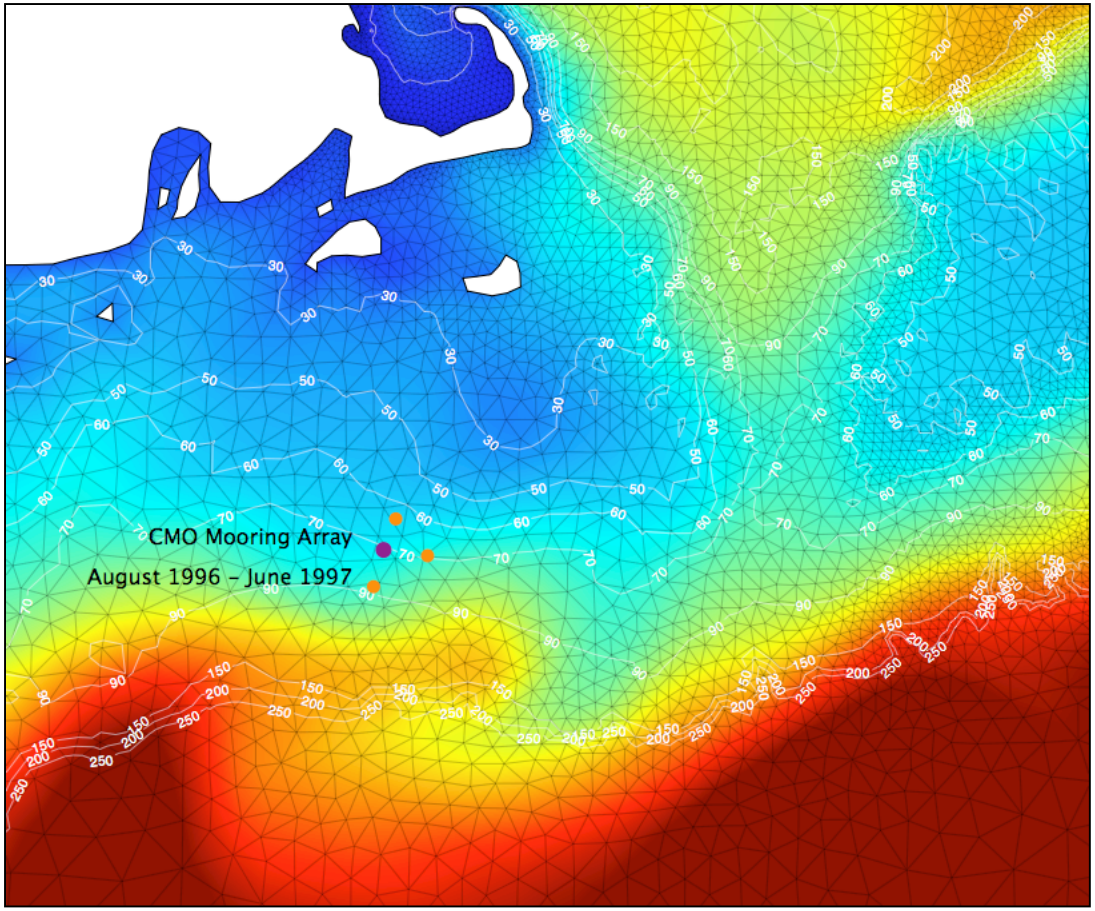
Work done to date or *in progress*:

1. MM5 10-km surface forcing fields 1994 – 2005
2. Constructing upstream Scotian Shelf inflow conditions 1994 – 1999, *continuation to present*
3. FVCOM (grid 1) fields 1994 – 1999 (GB GLOBEC), *continuation to present*
4. FVCOM (grids 2 and 3) fields 1994-1999, *continuation to present*
5. *Incorporation of finite-volume SWAN, non-hydrostatic FVCOM, Kalman filter data assimilation methods*

http://fvcom.smast.umassd.edu/research_projects/GB/index.html

Opportunity to use existing UMass-Dartmouth/WHOI modeling development and scientific application effort as initial core for regional->small scale coupled atmosphere-ocean-sediment-ecosystem modeling effort.

FVCOM Model Validation: Comparison with CMO Observations

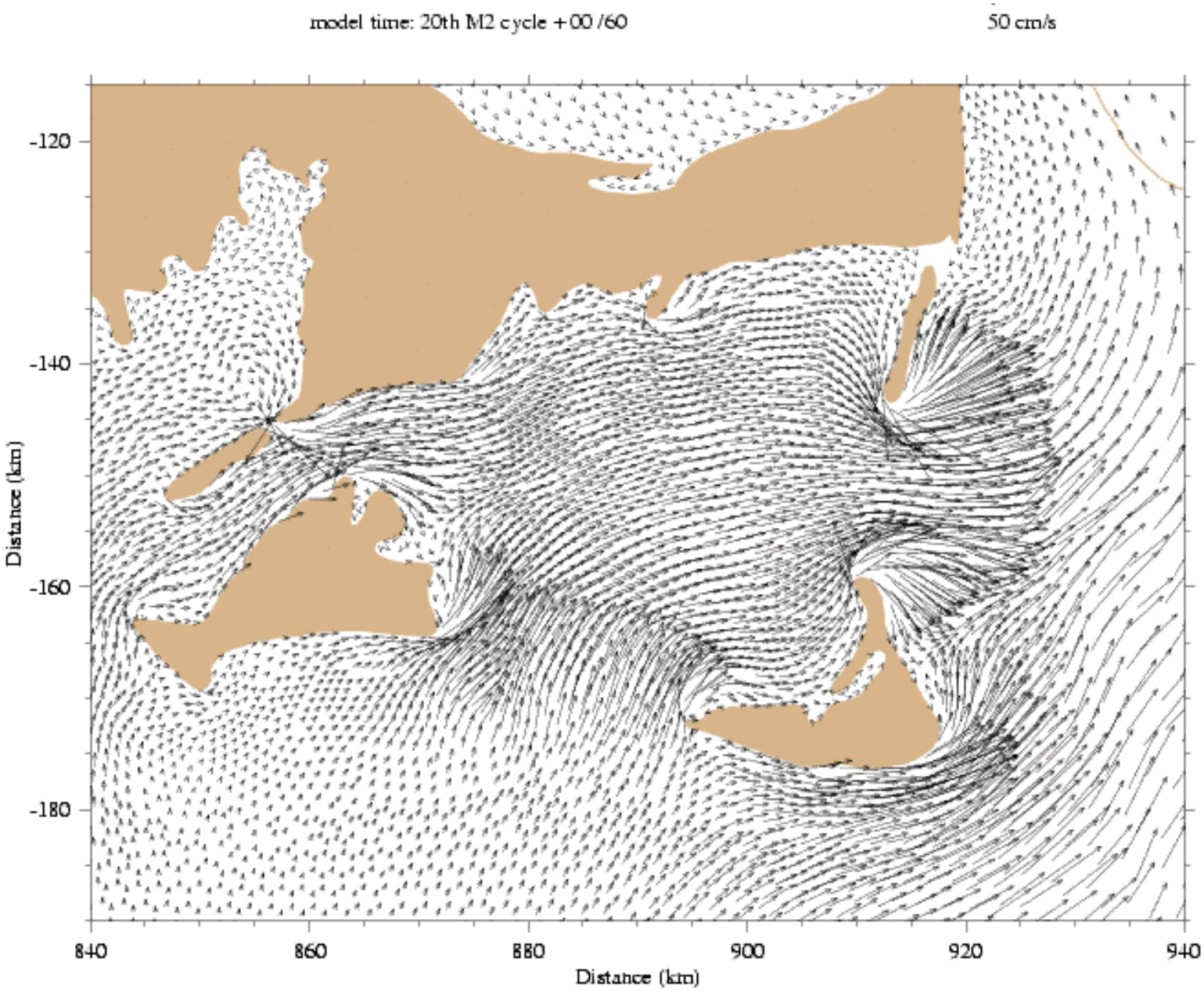


Time Frame: Aug 1996 to Jun 1997

Location: New England Shelf, SW of Nantucket
Moorings: 4 (Central, Alongshore, Inshore, Offshore)
Oceanic Variables: velocity, temp, conductivity, bottom pressure, bottom stress.
Atmospheric Variables: wind stress, heat flux, buoyancy flux.

Steve Lentz's data

Cowles and Lentz's work


model time: 20th M2 cycle +00 /60
50 cm/s
-120
-140
-160
-180
Distance (km)
840
860
880
900
920
940
Distance (km)

Georges Bank

http://fvcom.smast.umassd.edu/research_projects/GB/index.html

Google

LaCie – Hard...nd FireWire HCDN CD-ROM Data USB Hard Dri...lash Drives HCDN statio...D CREEK AK

MEDM Marine Ecosystem Dynamics Modeling

http://fvcom.smast.umassd.edu/research_projects/GB/index.html

NAVIGATION

- Main Page
- Model System
- Meteorology Model (MM5)
- FVCOM GoM/GB
- Model Domain
- Tidal Simulation
- Climatologic Mean
- 1995-2006 Simulation/Assimilation
- 1999 Dye Experiments
- 3-D Lagrangian Experiments
- Biological-Physical Interaction:
- NPZ Model
- NPZD Model

Regional Modeling Activities in the Gulf of Maine/Georges Bank

The Gulf of Maine (GoM), located on the North American continental shelf between Cape Code and Nova Scotia, is a semi-enclosed basin opening to the North Atlantic Ocean (Fig. 1). The geometry of the GoM is characterized by several deep basins and shallow submarine banks. On the seaward flank of the GoM is Georges Bank (GB), which is separated from the Nantucket Shoals to the west by the Great South Channel (GSC) and from the Scotian Shelf to the east by the Northeast Channel. The bank is roughly elliptical in plane view with a length of about 200 km along the major axis and a width of about 150 km along the minor axis. The cross-bank bottom topography rises steeply with a slope of about 0.01 from 1000 m on the slope to 100 m at the shelf break, increases slowly with a slope of 0.0004 to 40 m over a distance of about 150 km on the top of the Bank, and then decreases rapidly with a slope of about 0.03 to a depth of 300 m in the deep basin just north of GB. GSC runs approximately north-south, with a sill depth of about 50 m located near 40 degree and 45' to separate the mid and outer continental shelf to the south from the deeper GoM to the north with depths in exceed of 150 m. The deep connection between the GoM and the open ocean is mainly through Northeast Channel where the sill depth is about 230 m.

The first systematic study of the general circulation in the GoM can be traced back to Bigelow (1927). Based on a large number of surface drifters and hydrographic observations, he suggested that the summertime (stratified season) surface circulation in the GoM is dominated by two relatively large-scale gyres: a cyclonic circulation around Jordan Basin and an anticyclonic circulation around Georges Bank (Fig. 1). This circulation pattern has been demonstrated by long-term direct Eulerian and Lagrangian current measurements since 1970.

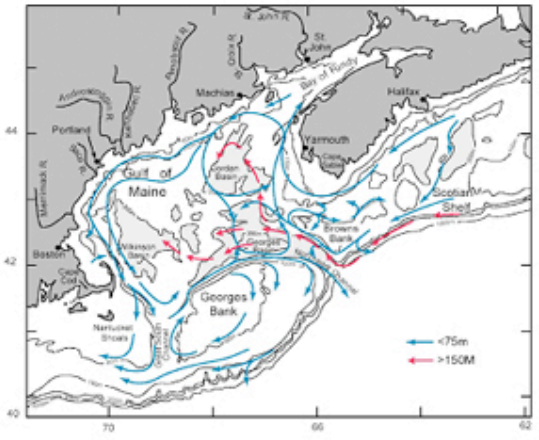
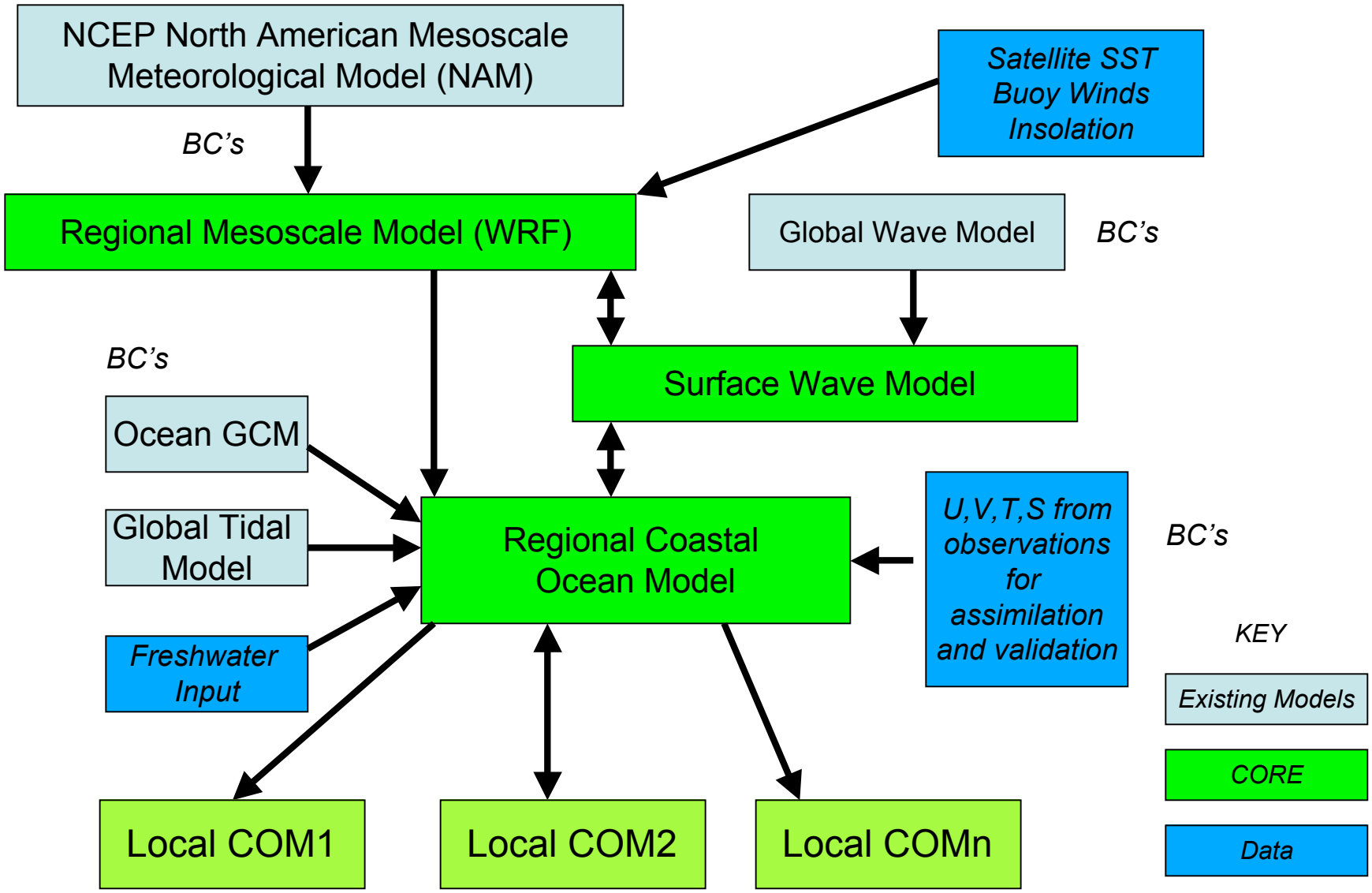


Fig. 1: Bathymetry of the Gulf of Maine/Georges Bank

Our current understanding of the general circulation in the GoM is mainly based on synthetic analysis results of field measurements summarized in Fig. 1. The near surface circulation is controlled by wind stress, tidal rectification,

Schematic of Regional NE Model System



1. **Global Model** - (Wright, Lu): *OPA model, with non-eddy resolving (~ 2 deg) resolution, currently using climatology forcing, soon to start realistic forcing. Plan is to simulate global ocean circulation of past 50 years with data assimilation. Model to provide boundary forcing for basin models*.

2. **North Atlantic Basin Model** – (Wright, Thompson): *OPA model, ¼ deg resolution, with realistic forcing and data assimilation for past 10-20 years. Model to provide boundary forcing for regional models.*

3. **EAST (shelf) Regional Model** – (Hannah, Davidson) – *OPA model, 1/12 deg resolution, designed to run in operational mode (embedded within the NWA model or quasi-stand-alone model (using BC's from NA Basin Model). Will run for hindcast/nowcast/forecast mode and in a ecosystem mode for seasonal and longer time scales. Ultimately 1/36th deg zoom.*

4. **Northwest Atlantic Regional Model** – (Davidson, Hannah) *OPA (existing model basis - POM) model, with ¼ deg resolution and focus on operational forecasting development. Ultimately 1/12th deg resolution.*

MERCATOR OPA Model: (lat,lon,z), hydrostatic, nonlinear primitive equation model, with rigid lid (free-surface being added). North Atlantic resolution ~ 1/3 deg, 43 levels in vertical, assimilation of SSA, SST and profile data.