A predictive model for ocean and coastal acidification thresholds from Long Island Sound to the Nova Scotian Shelf

J. Ruairidh Morrison (NERACOOS), Changsheng Chen (UMassD), Joseph Salisbury (UNH), Jennifer Brewer (UNH), Aaron Strong (Formerly UMaine; Currently Hamilton College), Jason Goldstein (Wells NERR), Erik Chapman (NH Sea Grant), Meredith White (Mook Sea Farm), Riley Young-Morse (GMRI), Jackie Motyka (NERACOOS), and Parker Gasset (UMaine)

Scope of Project

➔A regional ocean and coastal acidification (OCA) forecast model that can provide outputs as *actionable guidance to managers*.

➔Expand the Northeast Coastal Ocean Forecast System (NECOFS) to include carbonate parameters.

➔Seek input from three key decision areas to help define threshold detection and warning capabilities.

- Water quality management and monitoring,
- Estuarine oyster aquaculture, and
- Wild harvest shellfisheries.

➔Development of a Management Transition Plan that utilizes NECOFS to ensure salient and legitimate decision-making support.

Modeling Details

➔A marine biogeochemical and ecosystem model (named "ERSEM"- the European Regional Sea Ecosystem Model, see Figure 2) will be integrated into the NECOFS framework over the GOM5 domain.

- Implements lower trophic level food web processes
- Carbonate parameters: dissolved inorganic carbon (DIC), partial pressure of CO_2 (pCO_2), pH, aragonite saturation state (**Ω**), and total alkalinity (TA)
- Nutrient parameters: nitrogen, phosphate, silicate, and iron
- Organic state variables: phytoplankton (4 classes), microbes (bacteria), zooplankton (3 classes), dissolved and particulate organic matter (DOM & POM)
- Physical drivers: FVCOM, solar irradiance, net precipitation-evaporation winds at the surface, river discharges and tides from lateral boundaries.

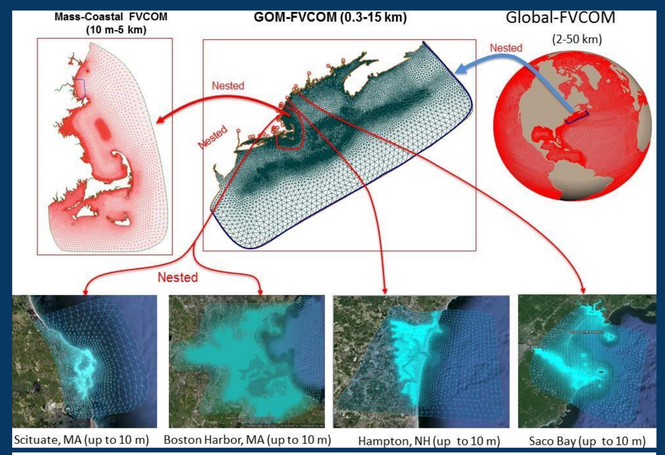

Figure 1: Unstructured grids of newsted GOM3/GOM4/GOM5-FVCOM system.

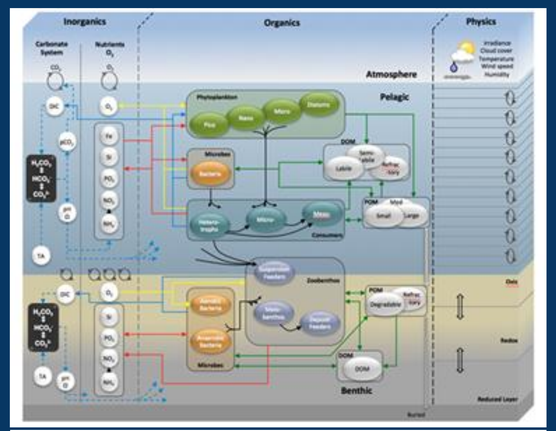

Figure 2: Flow chart of ERSEM. The figure was provided by R. Torres at PML/UK.

NCCOS | NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE

OAP NOAA OCEAN ACIDIFICATION PROGRAM

Seeking Input!

We want to hear from you about how this information can be utilized for making decisions.

What type of information would be most helpful and impactful for your work?

How would you like to receive this information?

(insert QR Code and other info about providing feedback)

More Information Available at www.neracoos.org/OCAThresholds

NERACOOS Northeastern Regional Association of Coastal Ocean Observing Systems | University of New Hampshire | UMass | Dartmouth | The University of Maine | Mook Sea Farm | NROC Northeast Regional Ocean Council | Gulf of Maine Research Institute Science. Education. Community. | Sea Grant New Hampshire | wellsreserve at laudholm Wells National Estuarine Research Reserve