

Thrust 2: Predicting Ecosystem Response through Integration



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- A model is:
 - A collection of physical, chemical, biological, & societal rules collected together in a code that can be run on a computer.
- A forecast is:
 - An expert opinion on what is to come, which involves multiple models, observations, and models that are initialized to match the most recent observations.
- A hindcast is:
 - Like a forecast, but for a past event where the outcome is known. Thus, it can provide context to observations collected, or be used to assess model skill
- A projection is:
 - An outlook for the future, which is less specific than a forecast, e.g., generally saltier instead of 24 parts per thousand salt in the East Passage at high tide on Jan 1, 2020.
- A scenario is:
 - Like a projection, but featuring different societal choices, e.g., what happens if we upgrade wastewater treatment? What happens if we dredge or dam a river?



Ocean State Ocean Model.....what is it?

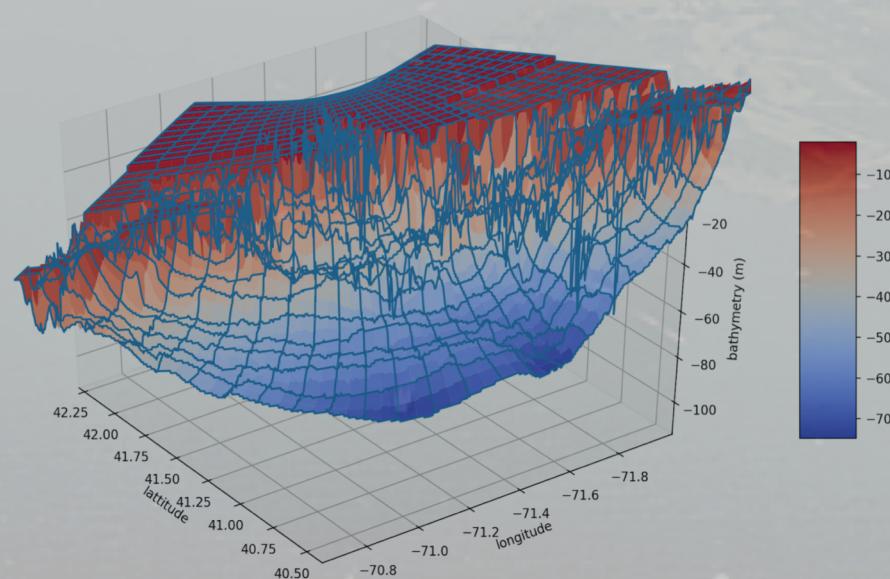
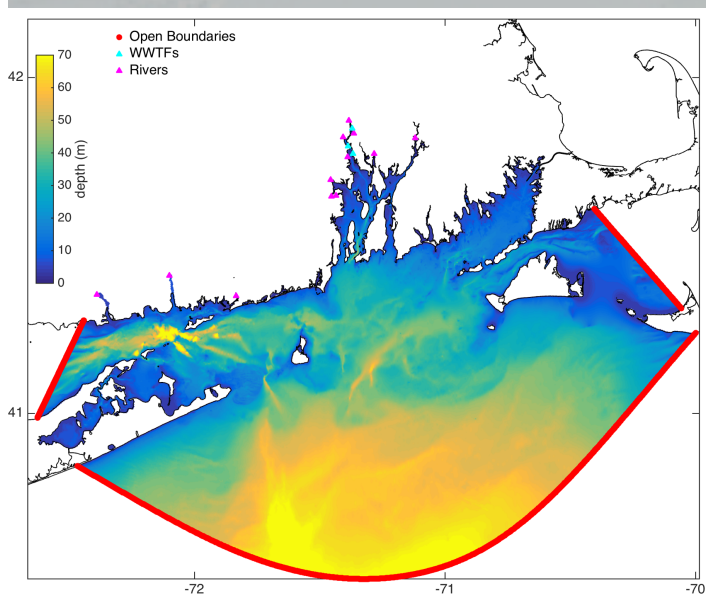
OSOM is:

A collection of physical, chemical, biological rules collected together on a computer.

Forced by winds, tides, rivers, sun, nutrients, wastewater, etc. from observations and weather/climate models.

Predicts: sea level, temperature, salinity, velocity, nitrogen, silicate, carbon, phytoplankton, zooplankton, sediments

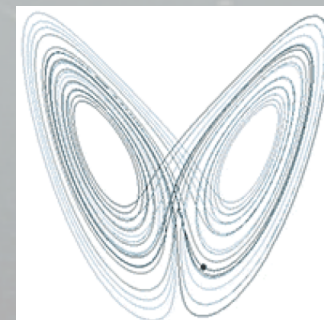
Takes 1 computing day to make a 10 day prediction





Benefits of Prediction using OSOM

- OSOM is not yet *operational*, we are running in hindcast mode, evaluating model skill, and adding capabilities
- Once OSOM is evaluated and operational, it will be linked to:
 - Societal and fisheries models
 - Climate change projections
 - Management scenarios
 - Hazards prediction (hypoxia, harmful algal blooms, flood risk, etc.)
- Building toward forecast capability, e.g.:
 - Which beaches will be open this weekend?
 - Will water quality be safe for shellfishing this week?
 - Prediction of currents & waves for boating, sailing, rescue.
 - Where will pollution, spills, viruses be carried?



Public Access to Predictions and Observations



- The [data discovery center](#) is a place online for experts and the public to find out what is going on, and will go on, in the Bay.
- Right now, [historical data](#) is being transferred, formatted, and visualization tools are being developed.
- Soon, [models and up-to-date observations](#) will be available, and ultimately forecasts and scenarios will be there, too.

RI Data Discovery Center

Building an online database dedicated to Narragansett Bay

RIdatadiscoverycenter.org





Limits to Prediction: Chaos!

- Like a weather forecast, **forecasts** of the Bay “weather” (currents, blooms, etc.) will be limited in how far forward they can go
 - probably a few days to 1 month
- Beyond this window, we can make **projections** of the “climate” of the Bay, with general expectations about wetter/drier, fresher/saltier, colder/warmer, hypoxic/oxygenated, productive/threatened:
 - Climate change projections
 - Management scenarios
 - Hazards projection (hypoxia, harmful algal blooms, flood risk, etc.)

A LORENZ SYSTEM

