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.)