The Port of New York/New Jersey Operational Forecast System

On February 10, 2003 NOAA's National Ocean Service (NOS) inaugurated the Port of **N**ew **Y**ork and New Jersey **O**perational **F**orecast **S**ystem (NYOFS). This operational system provides mariners, port managers and spill response teams with nowcast (present conditions) and forecast (future conditions) hydrodynamic model-based water levels and currents. NYOFS products include time series, plots and animations of water levels and currents that are disseminated through an NOS web site (http://co-ops.nos.noaa.gov/nyports/nyports.html). NYOFS nowcast and forecast products allow port managers and shippers to make sound decisions regarding maximizing tonnage (based on available bottom clearances) and limiting passage times, without compromising safety. Providing reliable information on water levels and currents is an important component of NOAA's mission for promoting safe and efficient navigation in our Nation's waterways.
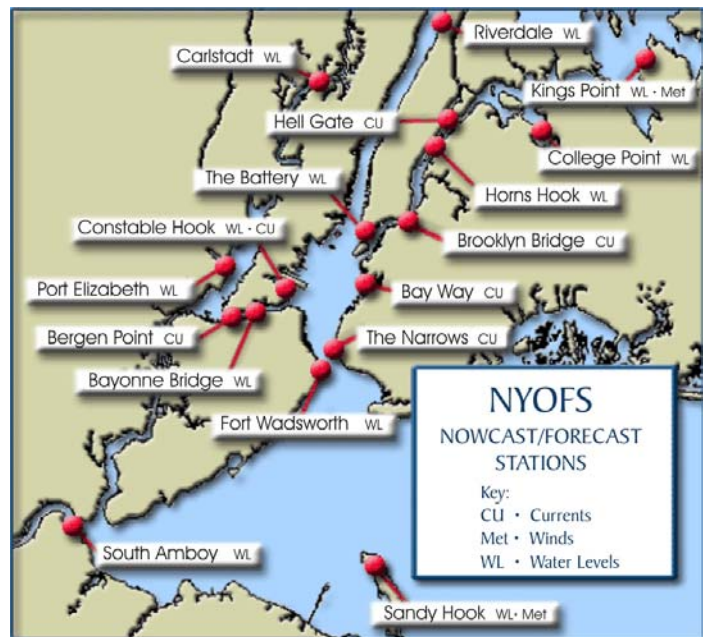
The cornerstone of NYOFS is an advanced three dimensional hydrodynamic model that uses real-time water level and wind data and other inputs to predict the water levels and currents at thousands of locations throughout the harbor. Based upon feedback received from local mariners, specialized time series graphics are produced at the important locations shown in Figure 1. The model system is an important complement to NOAA's Physical Oceanographic Real-Time System (PORTS®) now operating in the harbor. PORTS® provides accurate real-time oceanographic and meteorologic data from 7 stations to local users.

Figure 1

An example time series graphic of the model nowcast and forecast, tidal predictions and PORTS® observations at Bayonne Bridge is provided in Figure 2. In addition, the model graphics provide predictions of water levels (Figure 3) and currents (Figure 4) across the entire harbor.

The nowcast/forecast model system was developed in NOS's Coast Survey Development Laboratory (CSDL) and is maintained by NOS's Center for Operational Oceanographic Products and Services (CO-OPS). A key component of the CO-OPS operational monitoring is the continuous (24 hours a day, 7 days a week) quality assurance and control of the NYOFS inputs, procedures and products.

The system is run in both nowcast and forecast modes. The nowcast mode is driven by real-time water levels and winds from the New York/New Jersey PORTS® and is updated hourly. The forecast mode performs 30 hour forecasts four times a day. Primary inputs for this mode include information from the nowcast model, tidal harmonics and forecasts of subtidal water levels and winds obtained from operational NOAA National Weather Service numerical models.

Historically, mariners in the United States only had NOAA's Tide Tables to depend on for the best estimate of expected water levels and currents. These Tables provide accurate predictions of the astronomic tides and currents due to the gravitational effects of the moon and sun combined with the rotation of the earth. However, they cannot predict changes due to wind, atmospheric pressure and river flow, which are often significant. Furthermore, in most water bodies, predictions are available at only a few locations. New technology such as NYOFS and PORTS®, combined with the Tide Tables, provide the Nation's mariners with the best available information for making critical decisions. Model fields are also made available to NOAA's Office of Response and Restoration for improved hazardous materials response. In addition to NYOFS, NOS also developed and maintains the Chesapeake Bay Operational Forecast System (CBOFS).
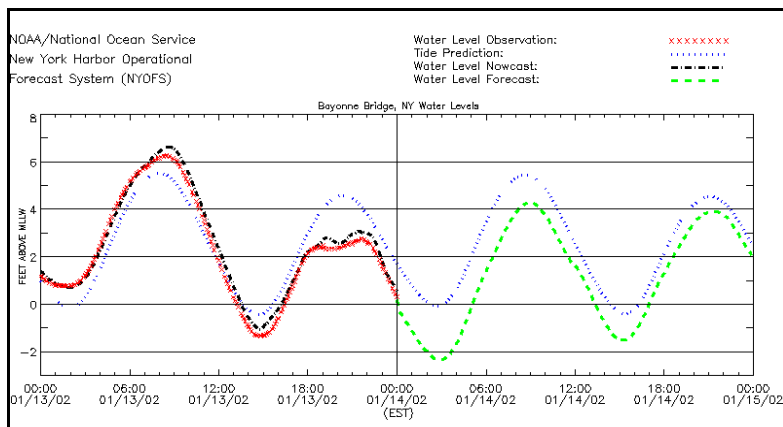

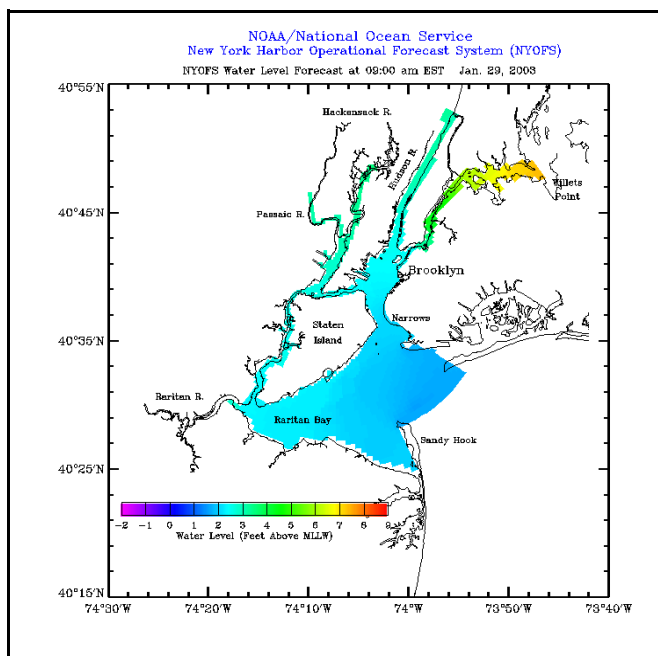Figure 2. Example of Water Level Nowcast and Forecast, Tidal Prediction and Observations at Bayonne Bridge

Figure 3. Example of the Forecast Water Levels in New York Harbor
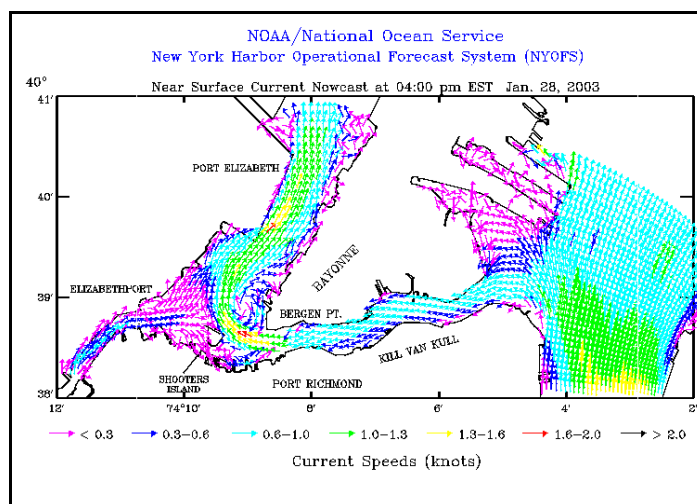

Figure 4. Example of the Nowcast Current Velocities in Kill Van Kull and Newark Bay (from the nested fine grid model)

January 30, 2003