Coastal Ocean Forecasts

Real-Time Forecasts of Physical State of Water Level, 3-D Currents, Temperature, Salinity for U.S. East Coast

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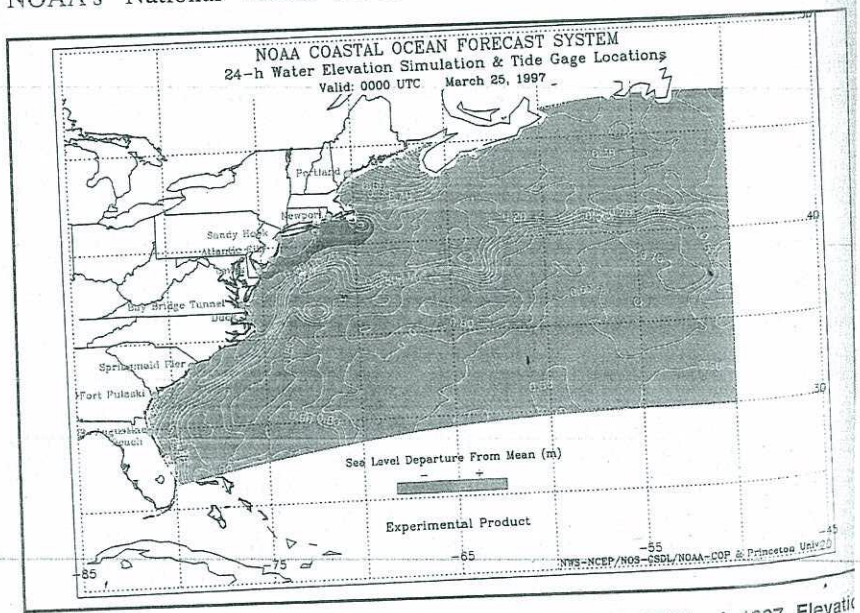
Major strides have been made in weather prediction over the past 30 years, yet equal advances in the prediction of the state of the coastal ocean have not occurred. The coastal zone in the United States is under ever increasing stress because of the mounting pressures brought about by the migration of population to coastal areas. Protection of life and property, environmentally sensible and productive use of coastal resources, and maintenance of economic activities such as marine commerce demand major advances in our understanding of the coastal ocean and in our ability to observe this environment and to predict its changes. Major storms, with the attendant storm surges and high waves, can inflict enormous economic loss and human suffering; hazardous material spills can have severe impacts on the local ecology and human health; and disruptions in local sea traffic due to bad weather, high seas, and fog can have a major impact on the transportation industry. Thus, information on the present and future state of the coastal ocean is of critical importance to the residents, industries, and businesses in the nation's coastal zone, and to the management of coastal resources.

The Coastal Ocean Forecast System (COFS) has been developed by the National Oceanic & Atmospheric Administration (NOAA) to address this problem. COFS takes advantage of the state of the art in numerical hydrodynamic modeling and the availability of remotely sensed and *in situ* observations to produce real-time forecasts of coastal water levels and three-dimensional currents, temperature, and salinity. COFS is the result of the cooperative development between NOAA's National Ocean Service (NOS), National Weather Service [NWS's National Centers for Environmental Prediction (NCEP)] and Coastal Ocean Program, the U.S. Navy, and Princeton University.

System Description

COFS has been producing experimental 24-hour simulations since August 1993 for waters along the East Coast of the United States[1]. The system consists of the Princeton Ocean Model (POM)[2], forced at the surface by forecast surface fluxes of momentum, heat, and moisture derived from a high-resolution atmospheric forecast model. The POM uses a bottom-following sigma-coordinate vertical grid, a coastal-following curvilinear orthogonal horizontal grid, and includes a turbulence submodel to determine vertical mixing[3]. The prognostic vari-



Example of a COFS 24-hour surface elevation simulation for 25 March 1997. Elevati contours are expressed in meters (0.1-meter interval). The locations of 10 NOS coas water level gauges are indicated.