

A Physical-Biogeochemical Model of the Gulf of Maine: Near-Real Time Simulation of Ecosystem Dynamics

Fei Chai, Huijie Xue, Guimei Liu, Andrew Thomas, and Ryan Weatherbee

School of Marine Sciences
University of Maine

With recent advancing in ocean observations and improving in coastal circulation modeling, ecosystem dynamics and its response to change of physical conditions can be investigated by conducting near-real time physical-biological model simulations. A multiple nutrient and plankton ecosystem model has been implemented into a circulation nowcast/forecast system for the Gulf of Maine, which is an integral component of the Gulf of Maine Ocean Observing System (GoMOOS, gomoos.org). The nowcast/forecast system, which is based upon the Princeton Ocean Model (POM), has produced daily short-term forecasts of the circulation and hydrographic properties in the Gulf of Maine. The physical-biogeochemical model has been used to reproduce daily nutrients and chlorophyll fields for the period of January 2002 to June 2005. The model performance is evaluated with both the SeaWiFS and GoMOOS in situ chlorophyll observations at several key locations in the Gulf. The spring phytoplankton blooms for the past four years (2002 to 2005) have shown strong interannual variability from the SeaWiFS derived chlorophyll concentration, but the model tends to produce weaker year-to-year spring bloom. The potential factors that might cause such difference will be discussed.