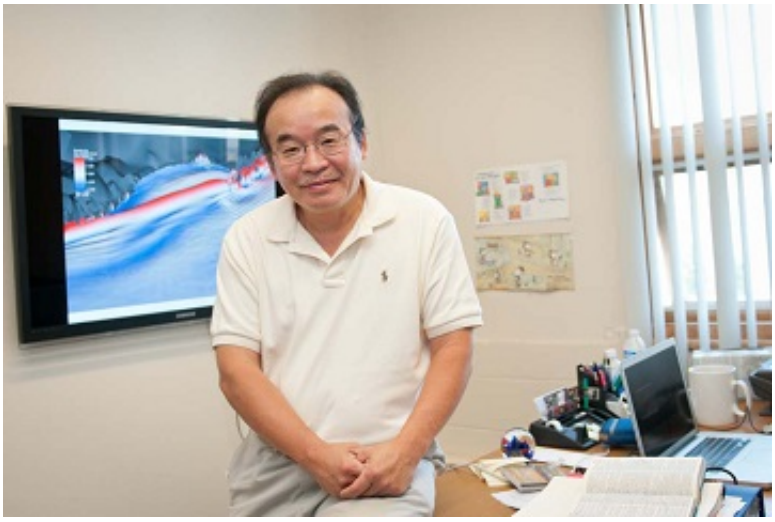
Research team helps develop new forecast systems for northern Gulf of Mexico

September 30 2014, by Joseph Sullivan



UMass Dartmouth School for Marine Science & Technology (SMAST) researchers, led by Dr. Changsheng Chen, have helped develop two new operational forecast systems that will significantly benefit a range of maritime activities including search and rescue, commercial and recreational boating, fishing and sailing, shipment and vessel transit planning, storm tides, and hazardous material tracking. The new systems for the Northwest and Northeast Gulf of Mexico will produce more accurate, current forecast guidance for users within the navigation community.

The systems were implemented on the National Oceanic Atmospheric Administration's (NOAA) High-Performance Computing System—Weather and Climate Operational Supercomputing System (WCOSS), becoming operational this month. The Northwest and Northeast systems have been integrated with an already existing northern model so that users can seamlessly and easily access their web products in one location. The two new systems provide higher resolution forecast information for the northern Gulf of Mexico and cover seven critical ports: Matagorda Bay, Galveston Bay, Sabine Neches, Lake Charles, Gulfport, Pascagoula Bay and Mobile Bay.

The new system was achieved through successful collaboration between the Center for Operational Oceanographic Products and Services (CO-OPS) PORTS, NOAA's Office of Coast Survey/Coast Survey Development Laboratory, National Centers for Environmental Prediction, and Dr. Cheng and his team through an innovative unstructured grid, finite-volume coastal ocean model (FVCOM) for the ocean community.

FVCOM has been utilized most prominently during the Fukushima radionuclide spreading following the 2011 Tōhoku earthquake and tsunami in Japan and in 2009 following the Air France AF447 disappearance in the Equatorial Atlantic Ocean en route from Rio de Janeiro, Brazil to Paris, France. For the new Northern Gulf of Mexico Operational Forecast System (NGOFS), the FVCOM team developed new features specifically for improved modeling to account for jetties and dikes near port entrances. NOAA has approved $250,000 over the next five years to continue the agency's support of the FVCOM development team at SMAST.

FVCOM is a prognostic, unstructured-grid, finite-volume, free-surface, 3-D primitive equation coastal ocean circulation model developed by UMass Dartmouth and Woods Hole Oceanographic Institution (WHOI)

joint efforts. The model consists of momentum, continuity, temperature, salinity and density equations and is closed physically and mathematically using turbulence closure submodels. The ability of FVCOM to accurately solve scalar conservation equations in addition to the topological flexibility provided by unstructured meshes and the simplicity of the coding structure has make FVCOM ideally suited for many coastal and interdisciplinary scientific applications. FVCOM was originally developed for the estuarine flooding/drying process in estuaries and the tidal-, buoyancy- and wind-driven circulation in the coastal region featured with complex irregular geometry and steep bottom topography. This model has been upgraded to the spherical coordinate system for basin and global applications.

Provided by University of Massachusetts Dartmouth