A Review of the U.S. IOOS Coastal and Ocean Modeling Testbed's Inter-Model Evaluation of Tides, Waves, and Hurricane Surge in the Gulf of Mexico

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The Southeastern Universities Research Association (SURA), in collaboration with the U.S. Integrated Ocean Observing System program at the National Oceanic and Atmospheric Administration (NOAA) and other federal partners, developed a testbed to help accelerate the transition of scientific and technical advances from the coastal and ocean modeling research community to improve identified operational ocean products and services . This testbed facilitates cyber-based sharing of data and tools, archival of observation data, and the development of cross-platform tools to efficiently access, visualize, skill assess, and evaluate model results. In addition, this COMT enables the modeling community to quantitatively assess the behavior (e.g., skill, robustness, execution speed) and implementation requirements (e.g. resolution, parameterization, computer capacity) that characterize the suitability and performance of selected models from both federal operational and science perspectives.

This presentation focuses on the tropical coastal inundation component of the COMT and compares a variety of model platforms as well as grids in simulating tides and the wave/surge environments for two extremely well documented historical hurricanes, Hurricanes Rita (2005) and Ike (2008). Model platforms included are ADCIRC, FVCOM, SELFE, SLOSH, SWAN, and WWMII. Skill assessments were performed on simulation results using numerous station observation data in the form of decomposed harmonic constituents, water level high water marks and water level & wave data hydrographs. In addition to validating tidal and hurricane hindcasts, the COMT also evaluated model execution speed and explored resolution and parameterization sensitivities for use by the National Hurricane Center (NHC). Overall, this testbed was a highly successful multi-collaborative NOAA and inter-agency/institution effort that featured technological and scientific advancements, such as the addition of alternative wind forcing to SLOSH, the operational forecast model of the NHC; and energized growth for more accurate, efficient, robust and dependable coastal inundation, surge, and wave models for operational forecasting.