

A Simulated Hurricane Database for New Modes of Analysis and Prediction

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Hurricanes and tropical storms present a major threat to life and property in Louisiana and other coastal areas. Dynamic storm surge forecasting is starting to be used operationally to predict the effect of hurricanes to minimize the loss of life and property. More accurate and timely predictions will assist decision makers in implementing appropriate evacuation plans necessary for the well-being of citizens. Further, the dynamic and multi-physics nature of this problem presents new challenges for research in coastal sciences, computer science, high performance computing, and integrated end-to-end systems for dynamic data driven applications.

This poster describes our proposed procedure to develop a Simulated Hurricane Database hosted on Petashare containing data produced from accurate runs of the ADCIRC code. The initial phase of the project will populate this database by deploying ADCIRC runs for hindcasts of hurricanes and tropical storms that have occurred in the Gulf of Mexico over the past 50 years. A second phase will supplement the database with additional simulation data representing hypothetical storm events.

Managing the many necessary ADCIRC simulations on several different LONI clusters simultaneously is not an easy task. Part of the complexity comes from the fact that each machine has its own file space, and we cannot yet use PetaShare directly to store source code, scratch files, and simulation results. To make this task simpler, we will use and extend the Simulation Factory, a tool developed by Dr. Erik Schnetter for simplifying the accessing of remote supercomputers, managing and building source code trees there, and managing simulations and their results. The Simulation Factory is currently being successfully used to set up and perform simulations in numerical relativity using the Cactus Framework. We will then provide interfaces to the simulated hurricane database to allow easy analysis of the data to investigate the effects of different storms, compare the effects of different resolution grids, predict storm surges from hurricane advisories, etc.