LSU-HAGEN
DHS Coastal Resilience Center
Research Project Work Plan Template
Years 4 - 5
[July 1, 2018 – June 30, 2019 / July 1, 2019 – June 30, 2020]

1. **Project Title**. Development of an optimized tide and hurricane storm surge model for the west coast of FL for use with the ADCIRC Surge Guidance System.
2. **Principal Investigator**. Scott C. Hagen, Professor - Louisiana State University, Department of Civil & Environmental Engineering / Center for Computation & Technology, Director - Center for Coastal Resiliency
3. **Other Research Participants/Partners**. Stephen C. Medeiros, Lecturer, University of Central Florida, Department of Civil, Environmental & Construction Engineering / Institute for Simulation and Training. Matthew Bilskie, Research Scientist, Louisiana State University, Center for Coastal Resiliency.
4. **Short Project Description**. This project will simplify an existing high-definition research-grade tide, wind-wave, and hurricane storm surge model of the west coast of Florida for use in the ADCIRC (Advanced Circulation) Surge Guidance System (ASGS). The goal is to enable the model to complete a 5-day simulation forecast in less than 1 hour, while retaining water surface elevations that are within 10-percent of the original research-grade model. Achieving this goal reduces model run times (from several hours to 1 hour) so that end-users will have model forecast guidance in a timelier fashion.
5. **Abstract**. Advanced terrain analysis and mesh de-refinement techniques will be used to optimize a research grade (i.e., high resolution) storm surge model of Florida's west coast previously used for FEMA floodplain mapping so that it can be run within reasonable real-time forecast time frames (e.g., ~1 hour). We will use a protocol based on digitally enhancing the representation of hydraulically significant embankments or valley features in order to maximize the efficiency of the unstructured finite element mesh. Since the purpose of ASGS is the provision of real-time hazard guidance, we will emphasize the accurate capture of the timing and magnitude of maximum water levels. This will be achieved by employing mesh development and de-refinement techniques such as: running preliminary simulations to define active floodplain and removing unnecessary elements; employing accelerated element relaxation moving outward from significant vertical features; and enforcing stricter criteria for vertical feature inclusion (especially for channels). The de-refinement techniques were developed under Years 1-3 and will be applied to a new region (west coast of Florida) for Years 4-5. Objective error metrics such as one-to- one plots of spatially distributed maximum water levels, correlation coefficients, and coefficients of determination will be used to assess model performance. The final outcome/deliverable will be two accurate, optimized, real-time (RT) hurricane storm surge models for the Northwestern (NWGOM_RT) and Northeastern and Eastern Gulf of Mexico (NEGOM_RT) running in ASGS and deploying results to the Coastal Risks Emergency Assessment (CERA), thus covering the coast from Louisiana to Key West.