Modeling Combined Coastal and Inland Impacts from Extreme Storms
University of Rhode Island Project funded by DHS Coastal Resilience Center of Excellence

Summary

Building upon existing models, partnerships, and expertise, this project advances model capabilities and develops a real-time hazard and impact prediction system for hurricanes and nor'easters in Southern New England. The system includes an assessment of cascading consequences of extreme weather impacting critical infrastructure (e.g., waste water treatment facilities, sewer systems, airports, and seaports). This project has received initial funding from the US Department of Homeland Security, through the Coastal Resilience Center of Excellence.

Goals:

- Comprehensively investigate hazards and impacts in the Southern New England using the most advanced storm prediction models, coastal storm surge, wave, and hydrological models.

- Transition new modeling capabilities to the *real-time* storm modeling used by DHS: ADCIRC-Surge Guidance System (ASGS) and Coastal Emergency Risks Assessment (CERA).

- Integrate enduser concerns as model outputs. Qualitative and quantitative concerns will be collected directly from endusers of the models, making model outputs directly relevant. Impact data will be collected directly from endusers of the models using a methodology that allows critical facility managers expertise about impacts to be integrated in the same way that "damage functions" are traditionally utilized to model potential structural damages.

Figure 1 - Example of model outputs from Westerly, RI. Image: P. Stempel

- Develop visualization tools that use geographic points representing specific pieces of infrastructure which can be indexed directly into storm models. Detailed 3D visualizations of structures and objects such as buildings and bridges, will allow for rapid assessment by the user. For example, the combined storm hazard and impact modeling system will be able to not only predict that roads are blocked, but where, when, and how they are blocked (e.g., coastal or inland flooding, or wind damage) as a storm unfolds. This is especially evident in multi-day events with overlapping response and damage mechanisms.
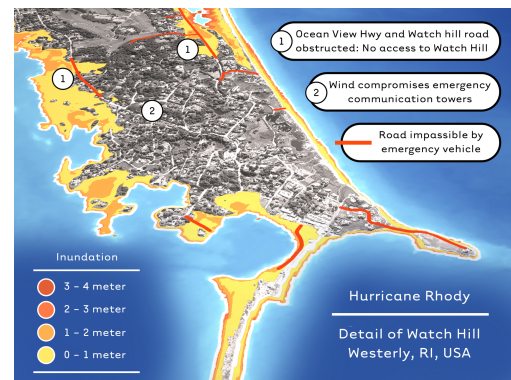
End-user Focus

The project engages key users of information in the development and dissemination of the tools to make them more relevant, and useable as a planning and response tool.

- Federal partners - FEMA Region 1, NOAA National Weather Service (NWS) Northeast, Department of Homeland Security Science and Technology.

- State and municipal partners – Emergency responders, facility managers and other critical decision makers can support development a "concern thresholds database" that includes quantifiable thresholds of critical infrastructure failures and tie these concerns back to the hazard prediction models.

URI Project Team

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