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# Woods Hole Sea Grant: 3D Visualization of Sea Level Rise

## Illustrating the Potential to Exacerbate Storm Damage in Falmouth, MA


» View Beta Interactive Climate Change can mean many things to different people. One aspect of climate change, which has immediate concerns among low-lying communities on Cape Cod, is a rising sea level. Predicting and mapping the effects of coastal storms and sea-level rise are important because of the high vulnerability and potentially high costs associated with these effects in developed coastal areas. With each flood event, our communities stand to lose valuable real estate, critical public infrastructure, and natural resources. At the core of this project is communicating the science - getting the message across in a format that works.

Inundation (flooding) events are among the most expensive and deadly coastal hazards that can impact coastal communities. With increasing property values, development, and population growth in coastal and other flood prone areas, flood induced losses will be increasing, and determining ways to address or mitigate floods is vital. Future risks may be intensified by changes in climate (i.e. sea level rise), which makes understanding coastal inundation essential for coastal managers and stakeholders.

**Related Multimedia**

Sea Level Rise with Storm Surge

*Courtesy Woods Hole Sea Grant*
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Sea Level Rise without Storm Surge

*Courtesy Woods Hole Sea Grant*
» View Video (Media Player)

By mapping the flood zones of storms with inundation analysis tools and flood modeling services, forecasters, emergency management officials, engineers, insurers, and property owners can easily assess the potential impacts associated with flooding events, and learn how to reduce vulnerability.

Woods Hole Sea Grant worked with Applied Science Associates to generate three dimensional simulations of sea level rise and flood event inundation in an effort to enhance hazard mitigation planning, emergency response, and public awareness. It is our hope to use these visualizations to encourage the community to discuss and develop strategies that could help mitigate future negative impacts. Specifically, this project visualizes various levels of sea level rise and/or storm surge flooding, in Falmouth on Cape Cod.

The Geographic Information Systems (GIS) based flooding simulations incorporate the highest currently available MassGIS (DEM), local LIDAR datasets, and 3D measurements. The team utilized sophisticated inundation analysis and modeling tools as well as knowledge and expertise in mapping and analyzing flood potential from storms and sea level rise. Storm surge level was extracted from the National Hurricane Center's SLOSH (Sea, Lake and Overland Surges from Hurricanes) model. The MOM (Maximum of Maximum Envelope of Water) results were used for the chosen hurricane category. Using the MOM results ensures that the worst case storm surge at every location along the coastline is being considered. The SLOSH model outputs provide a spatially varying depiction of storm surge flooding along the coast. The team made use of a custom processing tool to propagate these variable results inland onto the elevation data.

The images represent multiple sea level changes both with and without storm surge (Category 2 Hurricane) flooding and allow users to leverage the Google Earth framework for navigation to areas of interest. These maps allow users to identify familiar locations and observe a relative susceptibility to the event being simulated. While the SLR elevation buttons are fixed, it is up to the user to determine what timeframe the change in sea level elevation means to them. The modeling can be used to forecast short-term flooding events as well as long term or permanent flooding events such as the effects of sea level rise.

### Disclaimer

A word of caution to those interested in this visualization as it relates to a particular property, the data is not intended for parcel scale analysis. This tool is a visualization and is not intended to override or replace site-specific analyses. Also this is a BETA version, we have only limited ground-truthing and have not yet quantified the accuracy of the elevation data. Furthermore, we are currently waiting for the Northeast LIDAR (NELIDAR) project to finish collection of this area so we can update our elevation data with data that is more recent, higher resolution (1m resolution and 9.25 cm vertical accuracy), and complete coverage. The elevation data that are currently being used do not fully support all of the SLR scenarios being modeled. To confirm the upcoming NELIDAR dataset's accuracy a statistical analysis will be performed on the differences between surveys and the LIDAR elevations. Additionally, the physical/biological processes that help determine the future environment are not represented in the flooded DEM. This "fill the bathtub" type model can be useful in locations of developed urban and stabilized/armored shores like downtown Woods Hole, and less so in more natural settings (i.e. barrier beach migration not accounted for) . Also, at this time, we are not attempting to predict the uncertainty of the human response (ex. At what point

will people stop re-building?).

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Mail: Woods Hole Oceanographic Institution, 266 Woods Hole Road, Woods Hole, MA 02543, USA.
E-Contact: info@whoi.edu; press relations: media@whoi.edu, tel. (508) 457-2000
Problems or questions about the site, please contact webdev@whoi.edu