Perspective Matters: Three–Dimensionally Visualizing Projected Sea Level Rise for Charleston, SC

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The Charleston region of South Carolina is home to more than 500,000 residents and continues to be one of the fastest–growing metropolitan areas in the country. Charleston's economy is strong and diverse, with concentrations in tourism, shipping, education and an emerging technology sector. Residents are drawn to the coastal landscape; however, as population has increased, so has the risk of exposure to coastal hazards. Since the landfall of Hurricane Hugo (1989), disaster and resiliency planning has been a major focus for the region. In the past several years, episodic hazards have challenged Charleston's ability to safeguard citizens and vital infrastructure. Over the past two years, storm events co–occurring with sea level rise (SLR) and tidal maxima have led to shutdowns of downtown Charleston; this major episodic flooding threatens the overall economy and development of the region. The region also faces regularly occurring nuisance flooding (33 days in 2014), which is increasing in frequency.

This study is a first attempt at creating an interactive visualization tool using three–dimensional GIS data derived from multipoint LIDAR to help planners and emergency managers determine the potential impacts of flooding to a range of infrastructure on the main portion of the Charleston Peninsula. By examining areas potentially impacted by flooding at various SLR scenarios, users will be better able to plan mitigation projects across the peninsula. Renderings of potential water levels have been developed at the parcel and building level using NOAA's National Hurricane Center's SLOSH (Sea, Lake, and Overland Surges from Hurricanes) model; the heights from this model have also been correlated with the old Saffir–Simpson hurricane categories. This pilot study will provide the scope of potential flooding impacts to the Peninsula's infrastructure, ultimately benefiting those who help to ensure the safety of Charleston's citizens and manage hazard mitigation.