

STORM SURGE MODELING AND SEA LEVEL RISE ANALYSIS ON A SMALL ESTUARINE TRIBUTARY, ST. JOHNS COUNTY, FLORIDA

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Storm surge modeling, including the statistical prediction of surge for varying return period storms, has significant financial and logistical implications for coastal communities. These issues are exacerbated by the combined effects of global sea level rise (SLR) and coastal development. FEMA models are used to develop base flood elevations under present water level conditions. FEMA is not currently running their full simulation models with SLR included. Typically, studies of future SLR effects on flooding simply add static SLR increases to FEMA extreme water level estimates, potentially missing critical local wind set-up or other non-linear effects. As part of a study to evaluate future flooding risks on the San Sebastian River, a tidal tributary near St. Augustine, Florida, the FEMA ADCIRC model for the Northeast Florida and Georgia area, was utilized under future SLR scenarios to assess potential flooding risks. The study included 23 storm simulations based on storms that directly impacted the area. The ADCIRC simulations were performed under 25-, 50- and 100-year SLR scenarios. Detailed assessment of the simulations identified two significant deficiencies in the existing FEMA predictions for the San Sebastian River. First, the resolution in the existing FEMA model was insufficient to resolve the channel geometry and two critical causeway structures that impact the progression of surge upstream. Second, examination of the FEMA stillwater flood elevation for the river indicated that the model results were not used upstream of the first structure, missing nearly two-thirds of the system, and not accounting for the impacts of surge flow through the small causeway openings. The simulations also identified the significance of the storm track and the timing of offshore surge coupled with local wind set-up. The study's end product was a more robust assessment of the risks of surge in the tidal tributary.

PRESENTER BIO: Dr. So specializes in storm surge, sediment transport, and water quality modeling; statistical and time-series analysis; and field data collection in estuarine, coastal and marine environments. He utilizes his background to understand potential impacts and risk assessment on coastal habitats.