Conference Paper, Published Version

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RESOLVING THE INTRACOASTAL WATERWAY IN A STORM SURGE MODEL APPLIED FOR FLOODPLAIN MAPPING FOR NORTHEAST FLORIDA

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The paper will focus on resolving the Intracoastal Waterway in a finite element mesh used to simulate hurricane-driven storm surge inundation along the northeast Florida coast (Fig. 1) for the purpose of floodplain mapping analysis for northeast Florida and Georgia (Federal Emergency Management Agency 2012). The Intracoastal Waterway, which runs continuously along Florida's east coast, is dredged to depths of at least 3.5 m throughout its length and becomes as narrow as only 100 m wide. Because the Intracoastal Waterway is highly channelized and constricted, it presents a non-trivial challenge to incorporate into an overland/floodplain finite element mesh. More importantly, the Intracoastal Waterway can potentially impact local floodplains from becoming inundated or not. This modeling challenge is critical since the simulation products are used to generate statistical flooding maps, e.g., the 100-year floodplain. Yet, no guidelines are established towards how to incorporate the Intracoastal Waterway into an overland/floodplain finite element mesh. This work focuses on establishing such meshing guidelines.

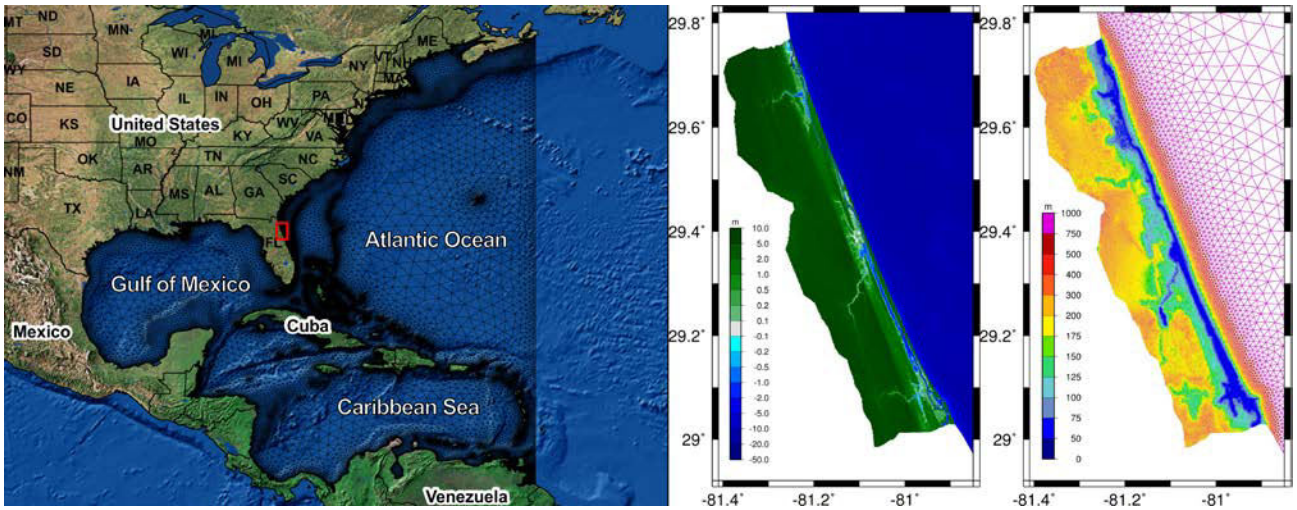

Figure 1 Finite element mesh and bathymetry and topography with insets of northeast Florida.

Storm surge simulations will be performed with Hurricane Dora (1964) using various finite element mesh representations of the Intracoastal Waterway to examine the influence of mesh

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resolution on the areal extent of maximum envelope of water (MEOW—National Hurricane Center 2012) (Fig. 2). Variables to be considered in addition to MEOWs will be flooding residence times and hydrographs at locations along the Intracoastal Waterway. Interpretations of how these variables are influenced by varying resolutions of the Intracoastal Waterway will be formulated into meshing requirements with respect to incorporating the Intracoastal Waterway into a finite element mesh designed for floodplain analysis.

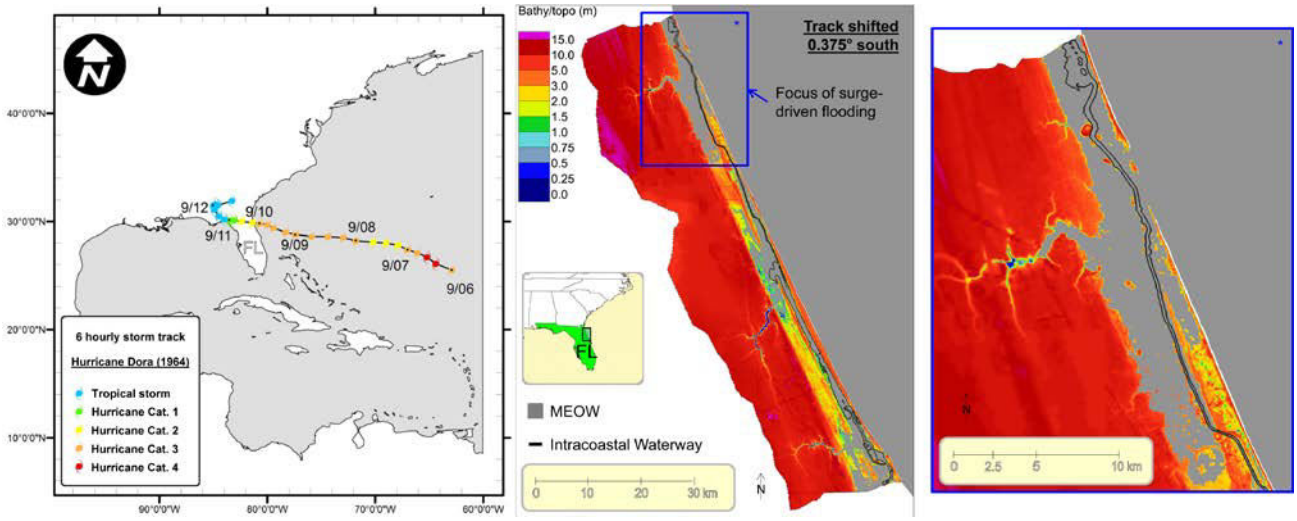

Figure 2 Hurricane Dora and maximum envelope of water (MEOW) with insets of northeast Florida.

The following questions will also be examined: i) is there a frictional component to the Intracoastal Waterway, i.e., does the overall storm surge feel any impact from the Intracoastal Waterway as it's propagating into the floodplain; and ii) how does resolving the Intracoastal Waterway in the finite element mesh affect simulated storm surge conveyance along the Intracoastal Waterway and thereby transmission of storm surge to adjacent water bodies?

REFERENCES

Federal Emergency Management Agency. (2012). "Region IV coastal analysis and modeling project – northeast Florida and Georgia." <http://www.southeastcoastalmaps.com/Pages/default.aspx>.

National Hurricane Center. (2012). "Storm surge maximum envelope of water." <http://www.nhc.noaa.gov/ssurge/ssurge_meowOverview.shtml>.