# Analysis of Wind & Storm Surge from Hurricane Florence Using ADCIRC


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COASTAL RESILIENCE CENTER
A U.S. Department of Homeland Security Center of Excellence

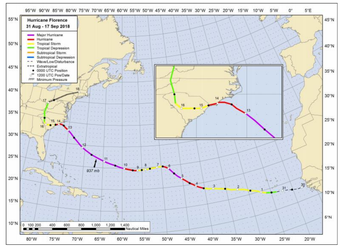

## Homeland Security Challenge

**By learning from past events, such as Hurricane Florence in 2018, we can become better prepared for future disasters.**

**$24 Billion in Damage**

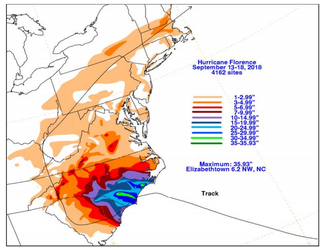
## Approach / Methodology

1



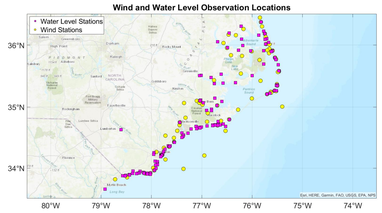

Hurricane Florence struck the coast of North Carolina early on September 14th, 2018 as a category 1 hurricane. Upon approach, the forward speed slowed to around 5 knots.

2



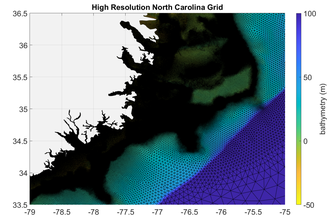

The slow forward speed and perpendicular angle of approach were uncommon. Record amounts of precipitation and water levels were experienced throughout the Coastal Plain.

3




Meteorological and water level data were collected at numerous locations along the coast to be used for validation with an ADCIRC hindcast study of the storm surge of Florence.

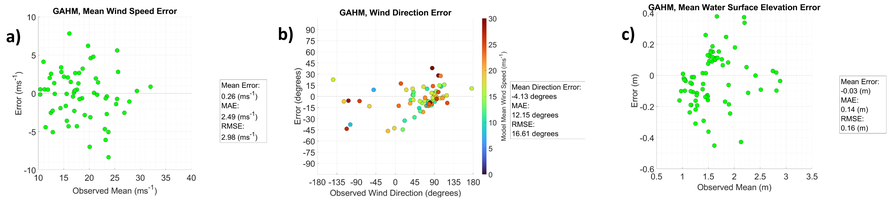
4



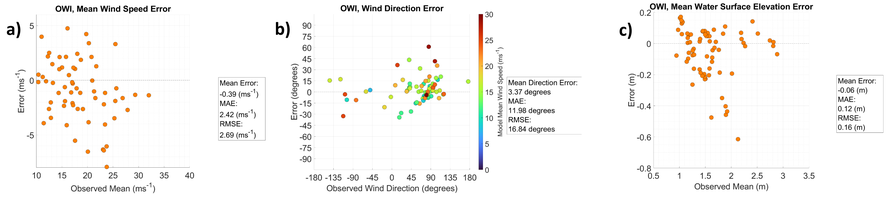

ADCIRC model simulations were forced with three different meteorological models on a high-resolution North Carolina grid. The modeled data was then compared with observations.

## Outcomes / Results

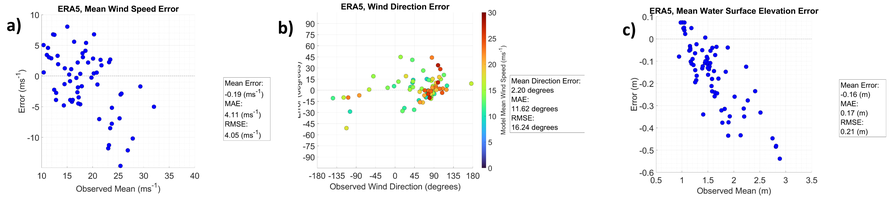
1) **GAHM**: Generalized Asymmetric Holland Model, forcing model internal to ADCIRC




2) **OWI**: High resolution (0.05° ) data-assimilated reanalysis product provided by Ocean Weather Inc.




3) **ERA5**: Global climate reanalysis product provided by European Centre for Medium-range Forecasts




## References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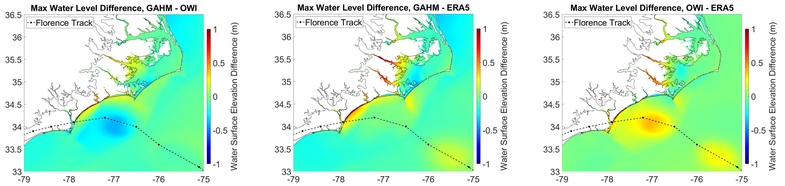
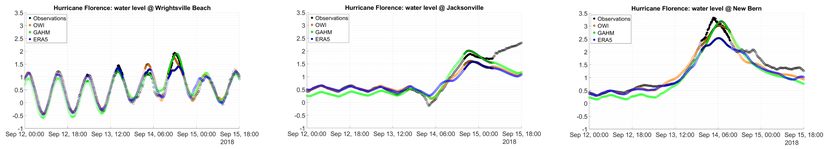
## Conclusions

**Maximum Water Level Differences Between Forcing Products**




**Water Level Time Series at Select Locations**




- ADCIRC can predict the storm surge from Hurricane Florence to within centimeters when given accurate meteorological forcing
- Although GAHM and OWI overall produce similar results, GAHM winds are slightly more accurate at the highest observed locations, where OWI is slightly low
- ERA5 wind speeds are not resolved enough and underpredict at the strongest wind speeds
- Wind direction errors are very similar between the 3 products
- GAHM water levels may be slightly high in some estuarine locations and OWI may be slightly low, while ERA5 predictably underpredicts the water levels, particularly at the highest observations
- The accuracy with which ADCIRC predicts the storm surge of this storm gives confidence in predicting future disaster events and in efforts to create an integrated coastal-hydrologic solution

## Acknowledgements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