NCAR | CLIMATE & GLOBAL DYNAMICS

CGD Seminar Series

Climate change impacts on hurricane storm surge risk

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Date: Tuesday, 21 September 2021

Time: 11am – 12pm

For Zoom information, please contact Tracy Baker tbaker@ucar.edu

For live stream information, visit the CGD Seminar Webpage

ABSTRACT

It is widely accepted that climate change will cause global mean sea level rise and increase coastal flood risk in many places. However, climate change also has significant implications for tropical cyclone climatology. Specifically, hurricane intensity, size, and translation speed are all expected to intensify in the future, and each of these influences storm surge generation and propagation. In this seminar, I'll discuss two numerical modeling approaches we've taken to understanding what this means for storm surge risk.

In the first approach, we use a statistical/deterministic hurricane model with the hydrodynamic model, SLOSH, to simulate synthetic storm surges for coastal communities along the U.S. North Atlantic. We use extreme value analysis to determine probability distributions of storm tide, and integrate probability distributions of local sea level rise to understand the present day flood risk and how it will change over the next century. We find that for most of the observed regions flood risk can be expected to increase by a factor of 10. In the second approach, we use the convection permitting regional climate model, WRF, and the high fidelity storm surge model, ADCIRC, to simulate historical storm surges that impacted the Gulf of Mexico and Atlantic Coasts of the continental United States from 2000-2013. We then simulate the same storm surges under projected end of century climate conditions to assess the impact of climate change on storm surge inundation. We find that the volume of inundation increases for over half of the simulated storms and the average change for all storms is +36%, with notable increases in inundation occur near Texas, Mississippi, the Gulf Coast of Florida, the Carolinas, Virginia, and New York.