

November 14, 2025

Harnessing Physical Models, Big Data, and AI/ML for Local-Scale Hurricane Multi-hazard Assessment

ABSTRACT: Tropical cyclones (TCs) are one of the most devastating natural hazards, causing on average \$28 billion in losses to the US each year. TC hazards (extreme winds, storm surges, and rainfall) frequently occur simultaneously or sequentially, causing compounding or cascading impacts to the built environment. Coastal communities must have reliable estimates of TC risk that account for combinations of various hazards and their associated variability under climate change. This talk presents a range of methodologies for integrating physical models with statistical methods, machine learning and big data to better characterize TC climatology and hazards from regional to local scales. First, we present a range of climatological frameworks that combine reduced-physics models with statistical/ML tools for estimating regional TC multi-hazards under evolving climate and socioeconomic conditions. These methodologies enable improved reconstruction of historical TCs, as well as robust estimation and projection of evolving TC wind, rainfall, and surge hazard. Then, we present a statistical approach that enables efficient delineation of TC flood hazard at the local scale by utilizing high fidelity physical flood modeling, optimal sampling methods, and historical observations. By combining physical models and data-driven tools at various scales, we generate robust compound hazard and risk projections that can inform planning and decision-making.



Avantika Gori

*Assistant Professor,
Rice University*

Seminar Details

*Friday, Nov 14, 2025
2:30pm – 4:00pm*

*UH Campus
Classroom & Business
Building
Room CBB 104*

*Online via Teams [https://
www.cive.uh.edu/
research/beyer-
distinguished-lecture](https://www.cive.uh.edu/research/beyer-distinguished-lecture)*

BIOGRAPHY: Dr. Avantika Gori is an Assistant Professor in the Department of Civil and Environmental Engineering at Rice University, a core faculty in the Consortium for Enhancing Resilience and Catastrophe Modeling (CERCAT), and an affiliated faculty in the Severe Storm Prediction, Education, and Evacuation from Disasters (SSPEED) Center. She holds BS (2016) and MS (2018) degrees in Civil and Environmental Engineering from Rice University and a PhD (2023) in Civil and Environmental Engineering from Princeton University. Dr. Gori's research focuses on combining physics-based and statistical methods for improved probabilistic multi-hazard assessment, with a focus on hurricanes and floods. She has received awards from the American Geophysical Union, is an active contributor to ASCE's Compound Flood Manual of Practice, and leads research funded by NASA and NSF.