**A Combined Physical-Statistical Approach for Estimating Storm Surge Risk**

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**Abstract**

Storm surge is an abnormal rise of seawater caused by a storm. According to the National Hurricane Center, storm surge is often the most damaging part of a hurricane. It poses the most severe threat to property and life in a coastal region. Thus, it is crucially important to assess the storm surge risk, typically summarized by r-year surge return level with return period r ranging from 10, 50, 100, or even much longer along a coastline. However, it is challenging to reliably estimate this quantity due to the limited storm surge observations in space and time. This talk presents an approach to integrate physical and statistical models to estimate extreme storm surge. Specifically, A physically-based hydrodynamics model is used to provide the needed interpolation in space and extrapolation in both time and atmospheric conditions. Statistical modeling is needed to 1) estimate the input distribution for running the computer model, 2) develop a statistical emulator in place of the computer simulator, and 3) estimate uncertainty due to input distribution, statistical emulator, missing/unresolved physics.

