

Integrated Risk Assessment of Storm Surge and Climate Change for the Coastal Infrastructure

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Abstract : Coastal communities are presently facing increased vulnerabilities due to rising sea levels and shifts in global climate patterns, a trend expected to escalate in the long run. To address the needs of government entities, the public sector, and private enterprises, there is an urgent need to thoroughly investigate, assess, and manage the present and projected risks associated with coastal flooding, including storm surges, sea level rise, and nuisance flooding. In response to these challenges, a practical approach to evaluating storm surge inundation risks has been developed. This methodology offers an integrated assessment of potential flood risk in targeted coastal areas. The physical modeling framework involves simulating synthetic storms and utilizing hydrodynamic models that align with projected future climate and ocean conditions. Both publicly available and site-specific data form the basis for a risk assessment methodology designed to translate inundation model outputs into statistically significant projections of expected financial and operational consequences. This integrated approach produces measurable indicators of impacts stemming from floods, encompassing economic and other dimensions. By establishing connections between the frequency of modeled flood events and their consequences across a spectrum of potential future climate conditions, our methodology generates probabilistic risk assessments. These assessments not only account for future uncertainty but also yield comparable metrics, such as expected annual losses for each inundation event. These metrics furnish stakeholders with a dependable dataset to guide strategic planning and inform investments in mitigation. Importantly, the model's adaptability ensures its relevance across diverse coastal environments, even in instances where site-specific data for analysis may be limited.

Keywords : climate, coastal, surge, risk

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