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Coastal hazard assessment for Miami and its surrounding areas in Florida

Quang Nguyen

University of Mississippi, USA

Coastal areas are prone to many natural hazards such as extreme rainfall floods, sea level rise (SLR), and tsunami. Miami is known as the most vulnerable areas to weather related natural disaster in the United States due to its low elevation and being surrounded by ocean. The primary objective of this presentation was to present the Hydrologic Engineering Center's River Analysis System (HEC-RAS) floodplain modeling, Center for Advanced Infrastructure Technology (CAIT) SLR simulation, and CAIT tsunami simulation using high resolution laser-based digital elevation model data of the terrain and Landsat-8 imagery to evaluate the impact of extreme rainfall floods, SLR, and tsunami on Miami and its surrounding areas. The CAIT tsunami simulation methodology was motivated from the 9m tsunami wave peak height (WPH) that hit the Kesenuma Bay in Japan on March 11, 2011. The key results of the HEC-RAS floodplain modeling indicate that 409.64km², or 56.76% of the land area is inundated by floodwater. The affected population due to an extreme rainfall flood is around 1.42 million. The results of the SLR simulation show that the submerged land due to 2m SLR is 411.96km² (57.08% of the land area). The affected population from a 2m SLR is 1.43 million. Results of the tsunami simulation show that 703.05km², or 97.41% of the land area is submerged by the 9m tsunami WPH. The affected population from the 9m tsunami WPH is 2.40 million. This study indicates that floods caused by rainfall or tsunami in a short period of time affect a larger inundation area than the submerged area caused by SLR simulation for year 2100 gradual sea level rise. A resilience management plan was also recommended to protect people, infrastructure from the coastal hazards.

Biography

Quang Nguyen has completed his PhD degree in Engineering Science from the University of Mississippi in the United States and his MS degree from Hiroshima University in Japan. He has 13 years of experience in both academia and industry in the field of environmental science and engineering, emphasis in climate change, coastal hazards, and coastal floods. He has worked for 13 projects funded by prestigious sources such as the US Department of Transportation, World Bank, Asian Development Bank, and MacArthur Foundation. He has published numerous papers in journals and international conferences.

quangmda@gmail.com

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