



Probabilistic Storm Surge Hazard Assessment in Martinique

Yann Krien, Bernard Dudon, Eliot Sansorgne, Jean Roger, Narcisse Zahibo, and Stevie Roquelaure
University of the French West Indies and Guiana, France (ykrien@gmail.com)

Located at the center of the Lesser Antilles, Martinique is under the threat of hurricanes formed over the warm tropical waters of the Atlantic Ocean and Caribbean Sea. These events can be extremely costly in terms of human, property, and economic losses. Storm surge hazard studies are hence required to provide guidance to emergency managers and decision-makers.

A few studies have been conducted so far in the French Lesser Antilles, but they mainly rely on scarce historical data of extreme sea levels or numerical models with coarse resolutions. Recent progress in statistical techniques for generating large number of synthetic hurricanes as well as availability of high-resolution topographic and bathymetric data (LIDAR) and improved numerical models enables us today to conduct storm surge hazard assessment studies with much more accuracy.

Here we present a methodology to assess cyclonic surge hazard in Martinique both at regional and local scales. We first simulate the storm surges that would be induced by a large set of potential events generated by the statistical/deterministic models of Emanuel et al. [2006]. We use the ADCIRC-SWAN coupled models (Dietrich et al 2012) to simulate inundation inland with grid resolutions of up to 50-100m in the coastal area for the whole island. These models are validated against observations during past events such as hurricane Dean in 2007. The outputs can then be used in some specific sites to force higher resolution models for crisis management and local risk assessment studies.

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