An experimental cyclone-induced marine and river floods forecasting system for La Reunion Island: the SPICy project

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FLOODrisk 2016
3rd European Conference on Flood Risk Management
Innovation, Implementation, Integration
18 – 20 October 2016 - Lyon, France

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Keywords:
Cyclone, Flood, Forecasting, Crisis management, Réunion Island

Title:
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Abstract:

Forecasting cyclone-induced inundations in the French Overseas Territories raises specific issues, as most of them are steep volcanic islands with a complex orography and presenting (1) very dense water systems with numerous gullies and potential intense water flows (2) a lack of continental shelf that leads to an important exposure of the coast to high waves and overtopping despite the presence of fragmented barrier reefs (3) complex interactions between marine and river water supplies in river inlet environments. To date, there is no forecasting system taking into account all these specificities.

This presentation gives an overview of the research project SPICy that aims at tackling the issue of cyclone-induced marine and river floods forecast in the French Overseas Territories through the realization of a demonstrator for the pilot site of Réunion Island. To reach this objective, the project addresses various challenges, focusing on : (1) the assessment of meteorological forecast uncertainties with the development of ensemble tracks generation techniques (2) high resolution meteorological modelling taking into account orography and real-time data assimilation to improve local rainfall predictions (3) the extension of meteorological forecast information to marine and river floods through the development of dedicated modules, notably in urban areas (4) the consideration of marine/river interaction (5) the management of computation times and the investigation of optimization techniques including the use of meta-models (6) the development of users interfaces to provide relevant information to emergency managers.

The originality of the project is the interdisciplinary approach that enables to build a comprehensive strategy to holistically address cyclone-induced inundations forecast issues for this type of Territory. Beyond the development and combination of physical models, the novelty of SPICy also lies in the consideration of crisis operators' needs at an early stage of the project and the realization of crisis exercises.

This work is supported by the French National Research Agency (ANR – 14 – CE03 – 0013). More details on the project are available at http://spicy.brgm.fr.