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Storm Surge Modelling of Super Typhoon Haiyan Event in Tacloban City, Leyte using MIKE 21 Model

Flor Angel Prelligera (1), Carl Vincent Caro (1), Christine Ladiero (1), Alfredo Mahar Francisco Lagmay (1,2), John Phillip Lapidez (1), Vicente Malano (3), Rojelee Agaton (1), Joy Santiago (1,2), and John Kenneth Suarez (1)

(1) Nationwide Operational Assessment of Hazards, Philippines, (2) University of the Philippines-Diliman, Philippines, (3) Philippine Atmospheric, Geophysical and Astronomical Services Administration, Philippines

Super Typhoon Haiyan hit the Philippines on 08 November 2013 causing massive destruction to the central part of the country. Arguably the strongest tropical cyclone to make landfall in recorded history, Haiyan caused 6,201 deaths and damages amounting to PhP 36,690,882,497.27 (USD 824,390,091.77). The typhoon also brought about destructive storm surges reaching up to 7 meters in height. A better understanding of storm surge is essential to the development of mechanisms to mitigate the effects of similar events. Thus, a computer simulation of Haiyan with the resulting wave heights and storm surge levels was made using MIKE 21 model – a software used for many different coastal and marine engineering projects worldwide. Simulations were made using the Hydrodynamic Flexible Mesh (HD FM) model coupled with the Spectral Wave (SW) model of the software. This coupled approach allows accurate calculations of both surge water levels and wave crest heights for overtopping of coastal structures. The maximum mesh flexibility of MIKE 21 allows mesh refinement for the coastal areas of Tacloban City within coarser mesh elements resulting to higher grid accuracy. Input parameters for the simulations of the coastline of Tacloban City, a densely populated coastal community heaviest hit by the storm surges of Haiyan, were obtained from the Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA) and Japan Meteorological Agency (JMA). Atmospheric conditions such as wind and pressure values were input to a set of regional and local hydrodynamic and spectral wave models. Simulation results were compared with available tidal gauge records and the comparison showed good correlation. Coastal regional inundation maps were then created from the results of the storm surge simulations. These maps or its equivalent should be used to develop and further improve disaster risk management plans for future surge events. These plans include, but are not limited to, coastal infrastructure plans, evacuation plans, land use planning, and disaster response and preparedness solutions.