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Delft3D Storm Surge Simulation of Typhoon Haiyan for Projection of Coastal Inundation in the Visayas Islands, Philippines

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The Philippines is geographically prone to tropical cyclones with an annual average of 20 typhoons entering the country's area of responsibility. Majority of these typhoons pass through the central part of the archipelago in the Visayas Region. On 08 November 2013, a Category 5 Typhoon Haiyan with maximum ten-minute sustained wind speed of 230 kph hit the Visayas region causing damage amounting to two billion US dollars with 6,300 reported casualties. The adverse impacts of future storm surge events in the Philippine archipelago, specifically in the Visayan region, can be mitigated if a storm surge model that will include the inundation of coastal areas is generated. The hydrodynamic modeling software, Delft3D, was used in creating hydrodynamic models for areas in the Visayas Islands. High resolution hydrodynamic models of the hardly stricken areas with 10-m per pixel resolution Digital Elevation Model and General Bathymetric Chart of the Oceans bathymetry were nested to an overall model of Visayas with a coarse grid cell size. Due to the lack of observed water level data during the onslaught of Typhoon Haiyan, the overall Visayas model was calibrated by creating hydrodynamic models for the same Haiyan-affected areas using previous typhoons with recorded data acquired from tide stations as wind forcing. Several simulations were carried out to generate the farthest possible inland incursion of storm surges. This was done by translating the actual typhoon track vertically and horizontally with a specified increment. The output of the study is a storm surge inundation map showing the worst case scenario of inundation for a Category 5 typhoon. This storm surge inundation map can be used to determine safe zones for development of infrastructure near coastal areas. The storm surge inundation map can also be used as basis for disaster preparedness plans of coastal communities threatened by approaching typhoons.