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Determining the Return Period of Storm Surge Events in the Philippines

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The devastating damages generated by the Tropical Cyclone Haiyan storm surges in Eastern Samar, Philippines prompted the Department of Science and Technology-Project NOAH (Nationwide Operational Assessment of Hazards) to calculate the return period and storm surge exceedance probability of these events. The recurrence interval or the period of return of a storm surge event is the estimated likelihood that that event would occur again. Return periods are measured through historical data denoting the interval of recurrence in average over a period of time. The exceedance probability however, is a graphical representation that describes the probability that some various levels of loss will be exceeded over a future time period or will be surpassed over a given time.

DOST-Project NOAH simulates storm surge height time series using JMA storm surge model which is a numerical model based on shallow water equations. To determine the period of recurrence of storm surges with this type of intensity, the agency intends to compute the estimation of storm surge heights generated by tropical cyclones for 2-year, 5-year, 10-year, 25-year, 50-year and 100-year return periods for the Philippine coast.

The storm surge time series generated from JMA combined with WXTide simulation, a software containing archives/catalogues of world-wide astronomical tides, and 5-meter resolution DEM were used as input parameters for the inundation model, which shows probable extent of flooding at a specific storm surge return period. Flo-2D two-dimensional flood routing model, a GIS integrated software tool that facilitates the creation of the flood model grid system, was used for flood hazard model. It is a simple volume conservation model composed of processor program that facilitate graphical editing and mapping of flooding details which uses continuity equation and the dynamic wave momentum equations.

The measurements of storm surge return period and probable extent of coastal flooding in the Philippine coasts would give us an approximation on affected areas when a tropical cyclone hit the country. This information would be beneficial to local government agencies that intends to develop evacuation planning for these types of calamities, as well as to assess the area's vulnerability are to storm surges.