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Developing an early warning system for storm surge inundation in the Philippines

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A storm surge is the sudden rise of sea water generated by an approaching storm, over and above the astronomical tides. This event imposes a major threat in the Philippine coastal areas, as manifested by Typhoon Haiyan on 08 November 2013 where more than 6,000 people lost their lives. It has become evident that the need to develop an early warning system for storm surges is of utmost importance. To provide forecasts of the possible storm surge heights of an approaching typhoon, the Nationwide Operational Assessment of Hazards under the Department of Science and Technology (DOST-Project NOAH) simulated historical tropical cyclones that entered the Philippine Area of Responsibility. Bathymetric data, storm track, central atmospheric pressure, and maximum wind speed were used as parameters for the Japan Meteorological Agency (JMA) Storm Surge Model. The researchers calculated the frequency distribution of maximum storm surge heights of all typhoons under a specific Public Storm Warning Signal (PSWS) that passed through a particular coastal area. This determines the storm surge height corresponding to a given probability of occurrence. The storm surge heights from the model were added to the maximum astronomical tide data from WXTide software. The team then created maps of probable area inundation and flood levels of storm surges along coastal areas for a specific PSWS using the results of the frequency distribution. These maps were developed from the time series data of the storm tide at 10-minute intervals of all observation points in the Philippines. This information will be beneficial in developing early warnings systems, static maps, disaster mitigation and preparedness plans, vulnerability assessments, risk-sensitive land use plans, shoreline defense efforts, and coastal protection measures. Moreover, these will support the local government units' mandate to raise public awareness, disseminate information about storm surge hazards, and implement appropriate counter-measures for a given PSWS.