Geophysical Research Abstracts
Vol. 16, EGU2014-15213-1, 2014
EGU General Assembly 2014

Assessment of Storm Surge Forecasting Methods Used During Typhoon Haiyan

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On 8 November 2013, Super Typhoon Haiyan made landfall in the central part of the Philippines. Considered one of the most powerful typhoons ever to make landfall in recorded history with 315 kph one-minute maximum sustained winds according to the Joint Typhoon Warning Center (JTWC), Haiyan brought widespread devastation in its path. Strong winds, heavy rainfall, and storm surges caused massive loss of lives and extensive damage to property. Storm surges were primarily responsible for the 6,201 dead, 1,785 missing and 28,626 injured in Haiyan's aftermath. This study documents the Haiyan storm surge simulations which were used as basis for the warnings provided to the public. The storm tide – storm surge added to astronomical tide levels – forecasts were made using the Japan Meteorological Agency's (JMA) Storm Surge Model and WXTide software. Storm surge maps for the entire Philippines and time series plots for observation points in areas along the path of the typhoon were produced. Storm tide heights between one and five meters were also predicted for 68 coastal areas two days prior to Haiyan's landfall. A storm surge inundation map showing the extent of coastal flooding for Tacloban City, Leyte, one of the most severely affected areas by the typhoon, was generated using FLO-2D software. This was validated using field data such as high water marks, eyewitness accounts from locals, and information from media coverage. This map can be used as reference to determine danger zones and safe evacuation sites during similar events. Typhoon Haiyan generated one of the biggest and most devastating storm surge events in several decades, exacting a high death toll despite its early prediction. Lessons learned from this calamity and information contained in this work may serve as useful reference to mitigate the heavy impact of future storm surge events in the Philippines and elsewhere.