

PROTOTYPE DATABASE FOR TSUNAMI EARLY WARNING SYSTEM WITH DATA ASSIMILATION IN MALAYSIA

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ABSTRACT

In order to create a prototype of tsunami database for tsunami early warning system with data assimilation in Malaysia, we located 16 source points in total around the Andaman Sea with 4 magnitudes (M_w 6.5, 7.0, 7.5 and 8.0) and 4 depths (0, 10, 20 and 30 km). The coastal and forecast points are located along the Malaysian coastal area at 1 m and 30, 40, 50 and 60 m of bathymetric contour depth with random interval distance, respectively. In numerical simulation, TUNAMI-N2 (Tohoku University's Numerical Analysis Model for Investigation of Near-field tsunamis, No.2) is used to calculate the tsunami waveforms at the output points. Tsunami arrival times at the coastal points are calculated using inverse tsunami travel time by TTT (Tsunami Travel Time). Tsunami database was constructed by using MySQL database which contains of 256 scenario earthquakes that cover historically most active subduction zone around the Andaman Sea. The nearest surrounding data points of a determined hypocenter can be retrieved from database by interpolation, extrapolation and two maximum risk methods. In tsunami data assimilation, TUNAMI-F1 (Tohoku University's Numerical Analysis Model for Investigation of Far-field tsunamis, No.1) is used to calculate the tsunami waveforms at the buoy station of Malaysia. Green's functions, which are calculated tsunami waveforms from faults assigned 1.0 m of slip, are prepared for 16 model sources. In two inversion tests, the initial conditions are precisely resolved by non-negative least squares method. For inversions of two real cases, the slip is almost resolved at the nearest fault and has shown instability in slip distributions for whose epicenter is located closer and slightly out from model sources, respectively.

Keywords: Numerical Simulation, Tsunami Database, Tsunami Data Assimilation.

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