

## Real-time tsunami simulation and visualization system using rapid CMT solutions in Southeast Asia

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Southeast Asia, especially Indonesia and Philippines, is one of the most seismically active region in the world. NIED carries out real-time estimation of moment tensors of earthquakes and maintains a CMT catalogue in this region using the SWIFT system (Nakano et al. 2008), as well as waveform data from dense broadband regional seismic networks in Indonesia and Philippines, under a cooperative research with BMKG (Indonesia), PHIVOLCS (Philippines), and GFZ (Germany). Developing a rapid forecast/hindcast system of the tsunami is also necessary in particular for the tsunamigenic earthquakes.

We have been constructing an automated system for the tsunami simulation (Inazu et al. 2013 SSJ meeting). The current version of the system conducts simulations and visualizations of the followings procedures (1-4). The tsunami simulation is numerically carried out with a finite difference scheme from an initial condition given by a rectangular fault model.

- 1) Estimate a CMT solution by the SWIFT system.
- 2) Calculate the width, length, and slip amount of the rectangular fault model from  $M_w$  using an empirical scaling law. We here employ two scaling laws for the sake of evaluation of the uncertainties among the tsunami simulation results. Two parameters with small/large slip amount (or large/small rupture area) are then obtained for an estimated  $M_w$ .
- 3) Two fault mechanisms are obtained based on the double couple solutions, and then we expect four scenarios of the initial tsunami conditions. The seafloor deformation or initial tsunami condition are calculated by the Okada's (1985) theory for each scenario.
- 4) Carry out numerical simulations for the respective scenarios. We visualize the regional tsunami height distribution and the time series of the tsunami height at selected sites around the epicenter. The visualization is carried out in parallel to the simulation for an integral time interval. The maximum tsunami heights are displayed on a regional map and on coastal areas as well in parallel to the simulation.

We will present typical graphical outputs produced by the above procedures for several tsunami events.

Keywords: CMT, Tsunami, Rapid analysis