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チラチャップ（インドネシア）での想定巨大地震による津波数値計算と津波災害リスク評価
Tsunami simulations for expected great earthquakes and risk evaluation of tsunami disaster at Cilacap in Indonesia

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As a part of the JST-JICA project,”Multi-disciplinary Hazard Reduction from Earthquake and Volcanoes in Indonesia”, tsunamis from expected great earthquakes are computed and a risk of disaster from those tsunamis at populated areas along the coast are planned to be evaluated.

Cilacap is one of the most populated towns in the Indian coast of Java. Recently, the 2006 West Java earthquake (Mw7.7) occurred as a tsunami earthquake and generated large tsunamis and caused the severe tsunami disasters at Pangandaran. Fortunately, the tsunami at the city of Cilacap was small, about 2m, because Nusa Kambangan Island protected the city of Cilacap from the large tsunami came from southwest. In this paper, the tsunami inundation heights and areas estimated at the city of Cilacap from several expected underthrust earthquake models along the Java subduction zone are presented.

For this research, available bathymetry data (such as ETOPO1, navigation charts and detailed survey data) and topography data (such as SRTM data and topography data from Bakosurtanal) were first collected for the detailed tsunami computation. To get more detailed bathymetry data and topography data, including building classification, near the populated areas at Pangandaran and Cilacap, the field surveys were conducted in 2010. The depths were continuously recorded by an echo sounder with GPS system installed in rented small boat. The navigation speed of boat was less than 10 km/h. At Pangandaran, we have collected the bathymetry data in the west coast area (3 km x 2 km) along almost 8 track lines. Each track line is about 2 km long and the direction is north-south perpendicular to the coast line. At Cilacap, we have collected the bathymetry data in the east coast area (4 km x 3 km) along 7 track lines. Each track line is about 4 km long and the direction is east-west perpendicular to the east coast.
The non-linear shallow water equations were numerically solved on a staggered grid system using a finite difference method applying a moving boundary condition. Nested grids were also used for the tsunami computation. To make a realistic source model, we first study tsunami generated by the 2006 West Java earthquake. We estimate the best source model which explains the inundation heights along the coast of Pangandaran Based on the source model of the 2006 West Java earthquake, several fault models off Cilacap along the Java subduction zone are assumed.

Preliminary tsunami numerical computation using the assumed fault model off Cilacap with a moment magnitude of 8.5 indicates that many houses in the city of Cilacap are flooded by the tsunami.

Keywords: Cilachap, Tsunami numerical simulation, Tsunami disaster, Large earthquake