

Seafloor deformation due to the Niigataken Chuetsu-oki Earthquake in 2007 estimated by inversion of tsunami waveforms

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A large earthquake occurred off the coast of Niigata prefecture, the Japan Sea coast of the central Japan, at 10:13 a.m. (JST) on 16th July, 2007. The Japan Meteorology Agency (JMA) named it the Niigataken Chuetsu-oki Earthquake in 2007 and assigned magnitude of 6.8. It accompanied by tsunami, which was recorded at several tide gauge stations on the Japan Sea coast. The maximum height (single amplitude) of about 1 m was observed at a tide gauge station at Banjin, Kashiwazaki city, near the source region. Because some tide gauge stations have tide well with intake pipes, in situ measurement of tide well response was carried out and the observed tsunami waveforms were corrected using the measured response by Tanioka et al. (2008 JGU, this meeting).

We estimated the vertical seafloor deformation caused by this earthquake by inversion of tsunami waveforms recorded at tide gauge stations and corrected for the measured responses. The source region was divided into 53 squares with the size of 4 km x 4 km. Tsunami waveforms, or Green functions, at the tide gauge stations were calculated by using linear long wave equations assuming that sea surface of each square has uplifted for a unit amount. The actual uplift or subsidence amount was estimated by the tsunami waveform inversion method. The results are summarized as follows.

1. In the northern half of the source, the northwestern region was subsided. This indicates that the fault plane is either dipping southeast with high angle, or dipping northwest with low angle. In either case, the fault must be shallow.

2. In the southern half, the entire region was uplifted. This indicates that the fault plane is deeper, the dip angle is lower, or the width is wider than those of northern part.

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