

Tsunami waveform analysis for the 2007 Niigataken-chuetsu-oki earthquake using various fault models

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A large earthquake (M_{jma} 6.8) occurred off the coast of Niigata prefecture, Japan, at 10:13 a.m. (JST) 16th July, 2007. The tsunami was generated and observed at tide gauges located along the coast of Japan Sea. The source process of this earthquake has been studied well using various data. Nishimura et al. (2008) estimated the fault model using the various crustal deformation data including GSP data, leveling data, and InSAR data. Aoki et al. (2008) also estimated the fault model using GPS data and InSAR data. Aoi et al. (2008) and Hikima and Koketsu (2007) estimated the slip distribution of the earthquake using strong motion data assuming both northwest and southeast fault planes. Hikima and Koketsu (2008) also estimated the slip distribution on the southeast dipping fault plane using the GPS data, teleseismic body wave data, and strong motion data. In this paper, we numerically computed tsunami waveforms using the various fault models explained in the above. Then, the observed and computed tsunami waveforms are compared to know which fault model can explain the observed tsunami waveforms well.

We used tsunami waveforms observed at 12 tide gauges located at Awashima, Nezugaseki, Ryotsu, Iwafune, Ogi, Teradomari, Kariwa, Banjin, Kujiranami, Naoetsu, Naoetsu-offshore, and Himekawa. Tsunamis from various fault models were computed by solving the nonlinear shallow water equations on the staggered grid system. The result shows that the computed tsunami from the fault model estimated by Nishimura et al. (2008) generally well explained the observed tsunami waveforms although the observed tsunami arrival time at Banjin and Iwafune were still not explained well. The computed tsunamis from the slip distributions on the southeast dipping fault plane estimated by Hikima and Koketsu (2007) and Hikima and Koketsu (2008) also generally explained well enough the observed tsunami waveforms except the tsunami observed at Banjin and Iwafune. The other fault models are not as good as the above three fault models in order to explain the observed tsunami waveforms.

References

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