

Analysis of tsunami characteristics in accordance with fault models of the 2011 off the Pacific coast of Tohoku earthquake

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Simulating tsunamis generated by earthquakes requires precise fault modelling, and hence accurate fault models which consider the time history of the rupture process must be considered. Here, we compare results using a finite fault model and a uniform model. We select three finite fault models, USGS model (Hayes, 2011), UCSB I and UCSBIII (Shao et al., 2011) for the 2011 Tohoku earthquake, and we make three uniform fault models based on the finite fault models. CLAWPACK (Conservation LAWS PACKage), developed by Randall J. LeVeque, is used for tsunami simulations. The regional setting for the simulations is longitude 125°E ~ 160°E, latitude 25°N ~ 50°N. We utilize the ETOPO1 database of 4 minutes grid for bathymetry data, and accuracy is verified by comparing synthetic results with observations from DART (Deep-ocean Assessment and Reporting of Tsunamis) buoys offered by NOAA(National Oceanic and Atmospheric Administration). We calculate RMS values from the results of finite fault models and uniform models to compare their accuracy between them. Among the finite fault models, the synthetic result using UCSBIII fit best. Synthetic tsunami data derived using uniform models does not compare well to observations, whereas finite fault model derived synthetic data fit the observations well.

References

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