



Tsunamis observed by offshore pressure gauges during the 2004 off Kii-peninsula, Japan, earthquakes

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Two moderate-to-large intra-plate earthquakes (M6.9 and M7.4) of 5 September 2004, took place off Kii-peninsula of central Japan with a time interval of 5 hours, both that generated tsunamis affected along the coast nearby. We could successfully obtain water pressure fluctuations during the series of the earthquakes by two pressure gauges deployed at deep ocean-bottom off Muroto, approximately 200 km west of the epicenters, and we could lead the tsunami signals obviously from the acquired dataset. It seems difficult to constrain that the seismic fault of the second event (the mainshock) dips either to southwest or to northeast by using the global seismic waveforms only (Yamanaka, 2004). In this study, we resolved that the fault geometry of the earthquake by using tsunami waveforms recorded by those unique instruments mentioned above. We computed pressure waveforms related to the tsunami at the point where pressure gauges have been deployed, by using two fault models, the southwest- and the northeast-dipping faults. The static coseismic deformation pattern of the mainshock is different between two models, while the deformed volume is same each other. As a result, the computed tsunami arrival time of the northeast-dipping fault is earlier than the southeast one, and similar to the observations. Our result implies that the fault geometry of the mainshock should strike northwest-to-southeast with southwest dipping. The probability of the next megathrust Tonankai or Nankai earthquake taking place in the coming 30 years have been estimated more than 50%. The last Tonankai and Nankai earthquakes about 60 years ago took place near the sources of the earthquakes in this study and inundated the southern coast of the South-Western Japan causing thousands of casualties. It is noteworthy that the offshore real-time monitoring system could catch the tsunami waveforms 20 minutes before the first tsunami arrival at

Muroto, the nearest coast line to the system. From a viewpoint of early tsunami forecasting and its warning strategies, the system at Muroto would surely have a potential use for future regional tsunami disaster mitigation.