

Evaluating Ground Motion Scenarios for the Nankai Trough Megathrust Earthquake based on the Dynamic Rupture Simulation

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The Nankai Trough, where repeated large historical earthquakes have occurred, is supposed to generate the next megathrust earthquake in the future, and it might bring a tremendous amount of damage to Japanese society. Furthermore, this earthquake is supposed to generate dangerous long-period ground motions that might have a big impact on high-rise buildings. Thus, building an earthquake scenario for this Nankai Trough Earthquake is very critical for hazard mitigation. However, historical records reveal that the ruptured segment of the Nankai Trough is different for each event, suggesting that modeling the whole area of the Nankai Trough without any segmentation is necessary to construct a physically plausible scenario. We constructed a physically plausible earthquake scenario for the Nankai Trough megathrust earthquake by considering a realistic plate boundary structure around Nankai Trough (Iwasaki, 2015), as well as the experimental results using fault material (Tsuda and Hirano, 2024, in revision). Furthermore, we have incorporated the stress rate based on the analysis of GNSS data (Noda et al., 2021) into initial stress conditions for the simulation with the assumption of the hypocenter location close to the latest Nankai Trough historical earthquake (1946 Nankai Earthquake). Even the resultant simulated results were compatible with-slip distributions from geodetic inversion, such as that by Sagiya et al. (1999), we have investigated further scenario of Nankai Trough megathrust earthquake for the different hypocenter location, such as the area close to 1944 Tonanakai Earthquake, historical Tokai Earthquake or Hyuga-nada earthquake, and for different assumption for stress drop (inter-seismic period). We also have simulated long-period ground motions and considering the results of ground motion prediction based on such scenario can provide more realistic scenarios of long-period ground motion for future Nankai Trough megathrust earthquake, especially to the urban area.