Long-period ground motion in Kanto basin during the 1944 Tonankai and 1946 Nankai, Japan, earthquake

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Long period ground motions with predominant period of about 6 to over 12 s are often observed in Kanto (Tokyo) basin during large, nearby earthquakes. Understanding of generation and propagation characteristics of long period ground motions is an urgent matter since large M8 earthquakes will occur in Nankai Trough within 30 years.

Strong motion record during 1944 Tonankai and 1946 earthquakes were well stored in historical seismograph archive at ERI, Univ Tokyo, and we found good recording for the above two earthquakes at Togane stations in Chiba. Ground motions at Hongo (Tokyo) were completely clipped by resonance with long period ground shaking, and so we cannot use the recordings.

We reproduced ground motions from the observed record by removing instrumental response of strong motion seismometers and found that Chiba was suffered by large ground shaking at dominant period of about 12s and duration of over 500s. The strength of ground motion is about 2.4 times larger and longer than that observed during 2004 Kiihanto-nanto Oki earthquake with magnitude Mw7.6.

To compliment observations we also conducted numerical simulation of seismic wave propagation and ground motion using the source model of the 1944 Tonankai earthquake and structural model of western Japan. The simulation results agree the observation fairly well.