Large shaking in the Kaoto Basin due to long period ground motions during the 2004 Niigata-ken Chuetsu earthquake

Takashi Furumura[1]; Hiroyuki Takeuchi[2]

[1] ERI, Univ. Tokyo; [2] Physical Sciences Faculty of Science and Engineering Ritsumeikan Univ

http://www.eri.u-tokyo.ac.jp/furumura/04Chuetsu/

Large ground shaking of over 5 cm/s and long duration of over 180 s were observed in Tokyo during the 2004 Niigata-ken Chuetsu earthquake (Mw6.6), though it is locating over 180 km from epicenter. Usually ground motions from d the earthquakes attenuates rapidly with increasing distance from the epicenter, but it was surprising to felt such long and large ground shaking from such distant earthquake.

Strong motion record from K-NET and KiK-net and intensity maters of city government offices (SK-net) demonstrating that such large ground shaking in Tokyo were the fundamental node Love wave generated at the northern edge of the Kanto basin induced by multiple SH wave reflections in thick sediments. Dominant period of the Love waves is about 7s. Such clear surface waves were not observed during the aftershock of the Chuetsu earthquake, probably because the lack of longer period signals over 6 s. Numerical 3D simulation seismic propagation using a detail structural model of the Kanto Basin reproduced the generation process and propagation characteristics of the Love wave from multiple S wave reflections between the free surface and slightly dipping sediment/basement interface. The simulation results also suggests that long-period Love wave is not generated during smaller earthquake less than about M6, because the predominant period of the incident wave is too short to resonate in the thick sediments of the Kanto Basin.