

Regional characterization of the crust in metropolitan area for prediction of strong ground motion

Naoshi Hirata[1], Hiroshi Sato[1], Kazuki Koketsu[2], Yasuhiro Umeda[3], Tomotaka Iwata[4], Keiji Kasahara[5]

[1] ERI, Univ. Tokyo, [2] Earthq. Res. Inst., Univ. Tokyo, [3] DPRI Kyoto Univ., [4] DPRI, Kyoto Univ., [5] N.I.E.D.

<http://www.eri.u-tokyo.ac.jp/daidai/index.html>

After the 1995 Kobe earthquake, the Japanese government increased its focus and funding of earthquake hazards evaluation, studies of man-made structures integrity, and emergency response planning in the major urban centers. A new agency, the Headquarters for Earthquake Research Promotion, was formed to oversee appropriate research in the earth sciences and civil engineering.

Projects include these topics: 1) Densification of seismic and GPS networks. 2) Paleoseismological investigation of major active faults. 3) Research on the geometry and physical properties of basins under the cities. 4) Probabilistic strong ground motion estimation. 5) Regional characterization of faults and physical parameters.

We have initiated a five-year research program titled as regional characterization of the crust in metropolitan areas for prediction of strong ground motion since 2002 as a part of the special project for earthquake disaster mitigation in urban areas.

The program includes 1) Deep Seismic Exploration 2) Deep Drilling 3) Characterization of Earthquake Faults and Crustal Structure. A long-term goal is to produce map of reliable estimations of strong ground motion. This requires accurate determination of: Source + Propagation path + Near surface = Ground motion response. The new program is aimed to characterize the source and propagation path in the Kanto (Tokyo) region and Kinki (Osaka) region. The proximity of the Pacific and Philippine Sea subducting plates requires study of the relationship between earthquakes and regional tectonics. This projects focuses on identification and geometry of: 1) Source faults, 2) Subducting plates and mega-thrust faults, 3) Crustal structure, 4) Seismogenic zone, 5) Sedimentary basins, 6) 3D velocity properties.

Reconstruction of source fault and velocity models allow for more realistic 3D EQ wave simulations. All of these information will be synthesized and provided to communities involved in probabilistic hazards analysis, risk assessment and societal response.

We have started to deploy seismic profiling lines in the Boso Peninsular (112km) and the Sagami Bay area (75 km) to image the subducting Philippine Sea plate under the program. One borehole has been started to be drilled in Boso area.