

Special Project for Reducing Vulnerability for Urban Mega Earthquake Disasters: Hazard and Risk in metropolitan Tokyo

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We have implemented a dense seismic network, MeSO-net (Metropolitan Seismic Observation network), since 2007 in the greater Tokyo urban region under the Special Project for Earthquake Disaster Mitigation in Tokyo Metropolitan Area (FY2007-FY2011) and Special Project for Reducing Vulnerability for Urban Mega Earthquake Disasters (FY2012-FY2016; Hirata et al., 2009). So far we have acquired more than 150TB continuous seismic data from MeSO-net, which consists of about 300 seismic stations. Using the MeSO-net data, we obtained clear P- and S- wave velocity tomograms (Nakagawa et al., 2010) and Qp, Qs tomograms (Panayotopoulos et al., 2014), which show a clear image of the Philippine Sea Plate (PSP) and the Pacific Plate (PAP). Our results showed that the depth to the top of PSP beneath the northern part of Tokyo bay is roughly 20 to 30 km, which is approximately 10 km shallower than previous estimates based on distribution of seismicity (Ishida, 1992).

We are developing a method to estimate the seismic intensity distribution by an earthquake of arbitrary location and magnitude. This will enable us to correlate it to historically recorded seismic intensity distribution and estimate the hypocenter and magnitude of past major earthquakes in the Kanto region.

In addition, the change of seismicity rate after the 2011 Tohoku-oki earthquake suggests a change of the stressing rate in the greater Tokyo area. Quantitative analysis of MeSO-net data shows a significant increase of the rate of earthquakes that have a fault orientation favorable to increasing Coulomb stress after the Tohoku-oki event.

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