



REGIONAL CHARACTERIZATION OF SEISMIC HAZARD IN TOKYO METROPOLITAN AREA USING A HIGHLY-DENSE SEISMIC NETWORK (MESO-NET)

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ABSTRACT:

We have developed 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 120TB continuous seismic data from MeSO-net which consists of about 300 seismic stations. Using MeSO-net data, we obtain clear *P*- and *S*- wave velocity tomograms (Nakagawa *et al.*, 2010) and *Q_p*, *Q_s* tomograms (Panayotopoulos *et al.*, 2014) which show a clear image of Philippine Sea Plate (PSP) and Pacific Plate (PAP). A depth to the top of PSP, 20 to 30 km beneath northern part of Tokyo bay, is about 10 km shallower than previous estimates based on the distribution of seismicity (Ishida, 1992). This shallower plate geometry changes estimations of strong ground motion for seismic hazards analysis within the Tokyo region. Based on elastic wave velocities of rocks and minerals, we interpreted the tomographic images as petrologic images. Tomographic images revealed the presence of two stepwise velocity increase of the top layer of the subducting PSP slab. Because strength of the *serpentinized peridotite* is not large enough for brittle fracture, if the area is smaller than previously estimated, a possible area of the large thrust fault on the upper surface of PSP can be larger than previously thought. Change of seismicity rate after the 2011 Tohoku-oki earthquake suggests change of stressing rate in greater Tokyo. Quantitative analysis of MeSO-net data shows significant increase of rate of earthquakes that have a fault orientation favorable to increasing Coulomb stress after the Tohoku-oki event.

KEYWORDS:

Tokyo, Seismic hazard, MeSO-net, Philippine Sea Plate, *serpentinized peridotite*

