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Seismic hazard in Tokyo area and the Metropolitan Seismic Observation network (MeSO-net)

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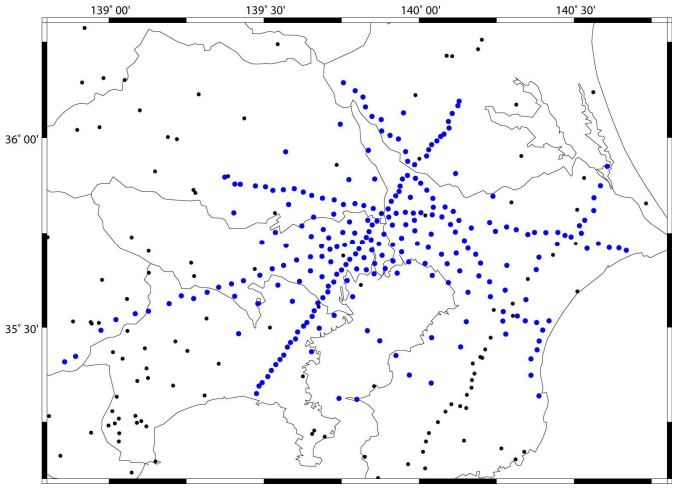
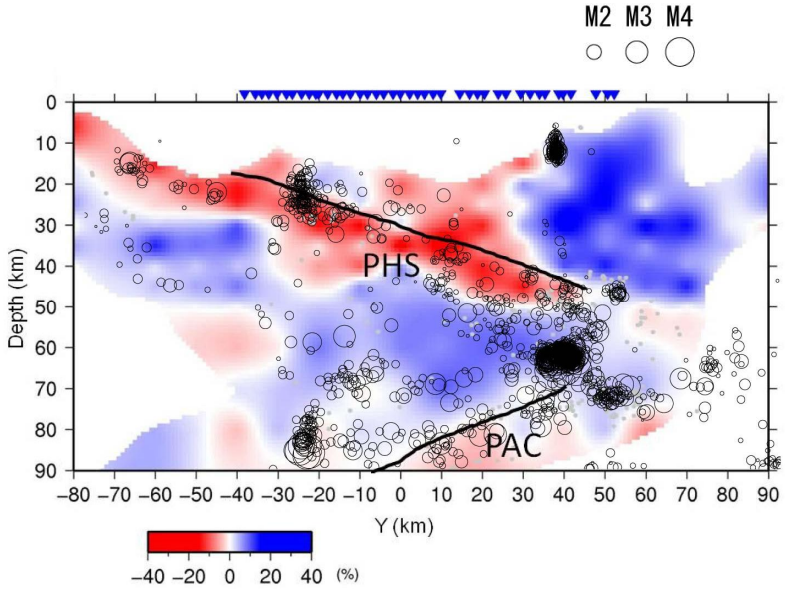
Seismic disaster risk mitigation in urban areas constitutes a challenge through collaboration of scientific, engineering, and social-science fields. Examples of collaborative efforts include research on detailed plate structure with identification of all significant faults, developing dense seismic networks; strong ground motion prediction, which uses information on near-surface seismic site effects and fault models; earthquake resistant and proof structures; and cross-discipline infrastructure for effective risk mitigation just after catastrophic events. Risk mitigation strategy for the next greater earthquake caused by the Philippine Sea plate (PSP) subducting beneath the Tokyo metropolitan area is of major concern because it caused past mega-thrust earthquakes, such as the 1703 Genroku earthquake (M8.0) and the 1923 Kanto earthquake (M7.9) which had 105,000 fatalities. An M7 or greater (M7+) earthquake in this area at present has high potential to produce devastating loss of life and property with even greater global economic repercussions. The Central Disaster Management Council of Japan estimates that the M7+ earthquake will cause 11,000 fatalities and 112 trillion yen (about 1 trillion US$) economic loss. The M7+ earthquake is evaluated to occur with a probability of 70% in 30 years by the Earthquake Research Committee of Japan. In order to mitigate disaster for greater Tokyo, the Special Project for Earthquake Disaster Mitigation in the Tokyo Metropolitan Area (2007-2011) was launched in collaboration with scientists, engineers, and social-scientists in nationwide institutions. The results that are obtained in the respective fields will be integrated until project termination to improve information on the strategy assessment for seismic risk mitigation in the Tokyo metropolitan area.





In order to image seismic structure beneath the Metropolitan Tokyo area we have developed Metropolitan Seismic Observation network (MeSO-net; Hirata et al., 2009). So far we have installed 249 seismic stations (Fig.1). We have developed seismic tomography of P- and S- wave structure (Nakagawa et al., 2010) , seismic interferometry for shallow structure (Yoshimoto et al., 2010), and so on using the dense MeSO-net data. An example of the tomogram developed is shown in Fig.2. We can image the oceanic crust of Philippine Sea plate (PHS) as low velocity zone and heterogeneity near a plate boundary between PHS and Pacific plate (PAC). We will evaluate potential zones of the M+ earthquake on the plate boundary and within the PHS slab.

Reference

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