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Geometry of the Philippine Sea Slab beneath the Kanto Mts.: insight from deep seismic profiling

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The subducted Philippine Sea slab beneath Kanto is important as seismic sources of damaging earthquake for Tokyo metropolitan area. The geometry and fractures in the PHS slab provides significant information for better understanding the mechanisms slab-slab interaction and construction of source fault models. The geometry of upper surface of PHS north of the Izu collision zone has been revealed by seismic profiling (Sato et al., 2005; 2006; Arai et al., 2009). The upper surface of PHS is identified as north dipping reflectors at 30-40 km in depth beneath the Misaka Mountains. By seismic survey along the eastern part of the Kanto Mountain in 2003, the upper surface of PHS is marked by northward dipping reflections at 25 km in depth. The depth change suggests the westward dipping of the upper surface of PHS or existence of a fault, which generated the change in depth. To examine the existence of faults, earthquake observation by very dense array was carried out along ENE-trending seismic line connected the two seismic lines. A PS-converted plane, which corresponds to the PHS slab, beneath the Misaka Mountains extends to the border between Yamanashi Prefecture and the metropolis of Tokyo and its eastward extension is terminated. This discontinuous feature suggests the existence of fracture in the PHS slab and it is significant for the understanding driving force of the movement of the slab, possible source faults in the slab and slab interaction beneath Kanto. To reveal precise geometry of the PHS slab beneath the Kanto Mountains, we carried out deep seismic profiling along 60-km seismic line trending ENE to WSW from Hanno to Fuefuki via Daibosatsu Mts. The receiver interval was 50 m. We deployed 5-km-long cable-type recorder system and off-line recorders (MS 2000, JGI). Seismic sources were explosives of 100-300kg TNT at seven sites and stationary sweeps (ca. 250) by four vibroseis trucks (IVI Hemi) at three sites. The obtained low-fold stack seismic section portrays convex-shaped reflectors at 8.5-12 sec (TWT) in the western half of the section and at 6-7 sec (TWT) in the eastern half of the section. These reflectors correspond to the PHS slab in the 2005 Odawara-Yamanashi seismic line and the 2003 eastern Kanto Mountains seismic line, respectively. The both groups of reflectors shows vertical gap at the border between Yamanashi Prefecture and the metropolis of Tokyo. Together with the discontinuity of the PS-converted plane, it is highly probable that the PHS slab has a NS-trending fracture zone in the central part of the seismic line.