



Characterization of the upper surface of the Philippine Sea plate beneath Kanto, central Japan, revealed by seismic reflection profiling

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Beneath metropolitan Tokyo, the Philippine Sea plate (PHS) has been subducted on the Pacific plate (PAC). Due to shallow subduction of Philippine Sea plate (PHS), intraslab earthquake of PHS can also produce significant damage of Tokyo metropolitan area. To construct source fault models, we have carried out seismic reflection profiling since 2002 and acquired seismic reflection data from 9 seismic lines, including 2009 Sagami trough and 2010 Kujukuri seismic survey. Due to strong impedance contrast of plate interface, the upper surface of PHS was imaged down to maximum 40 km in depth by seismic reflection profiling. The obtained seismic profiles portrayed the shallow geometry of the PHS. The combined seismic section from Izu peninsula to Tokyo (2009 Sagami trough and 2003 Tokyo bay seismic sections) shows strong reflectivity in the deeper part (17 to 27 km) and also shallower part (5 to 10 km). Base on the co-seismic displacement of the 1923 Kanto earthquake (M7.9) and slip-deficit rate determined by GPS observations, the asperity zone is clearly identified along the combined seismic line. By comparison, the zone of asperity is marked by the area of low reflectivity, relatively flat geometry and $V_p > 6$ km/sec.

The subducted PHS slab beneath Kanto consists of fore-arc and volcanic-arc of young geologic age. Together with the buoyant subduction and collision of the Izu-Bonin arc, the upper surface of PHS-slab obtained by seismic reflection shows complicated geometry. Three seismic lines across the north to northwestern part of the Izu collision zone demonstrate the ridge shaped antiform of the PHS slab, which made the western boundary of the ruptured area of 1923 Kanto earthquake. Judging from overall geometry of PHS slab beneath Kanto, the deformation of the slab probably produced by the northward subduction of PHS (> 1 Ma) and interaction with underlying cold and thick PAC-slab.

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