T223-008 **Room: 301B** **Time: May 19 9:30-9:45**

Serpentinized mantle in the Philippine Sea slab beneath Kanto, Japan: Ongoing deformation and fracture along its western boundary

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The Kanto district in Japan is located behind a TTT triple junction with two obliquely subducting plates, the Philippine Sea and Pacific plates, and is known as one of the unique regions in the world in terms of plate tectonics. The Philippine Sea plate subducts along the Sagami and Nankai troughs with a subduction rate of 3 to 5 cm/yr, and the Pacific plate subducts below it along the Japan and Izu-Bonin trenches with a subduction rate of ~8 cm/yr. Subduction of the two oceanic plates has resulted in the contact of the bottom of the Philippine Sea slab with the upper surface of the Pacific slab and formed an area of slab-slab contact underneath the Tokyo metropolitan area (Wu et al., 2007; Nakajima et al., 2009; Uchida et al., 2009). This study carries out high-resolution travel-time tomography beneath the Kanto district to reveal detailed heterogeneous structures in the Philippine Sea slab and its relationship to earthquake generation.

We used double-difference tomography method (Zhang and Thurber, 2003) to reveal detailed seismic velocity structures within the Philippine Sea slab. Grid intervals were set at 10 km in the horizontal direction and 5-10 km in the vertical direction. The total number of earthquakes thus selected is 15,042. Arrival-time data recorded at 102 stations are 303,625 for P waves and 232,032 for S waves. The distance between earthquake pairs was limited to 10 km, which yields 1,790,531 (P wave) and 1,183,971 (S wave) differential travel-time data. The 1D velocity structure of the JMA2001 was adopted as an initial velocity model. The final results were obtained after 12 iterations, which reduces travel-time residuals from 0.25 s to 0.11 s for P wave and from 0.44 s to 0.17 s for S wave.

Obtained results show the existence of prominent low-velocity zones in the mantle of the Philippine Sea slab beneath the eastern part of the study area. The observed velocities of less than 6.5 km/s in P waves and less than 3.5 km/s in S waves are comparable to those of partially serpentinized peridotite. Since temperatures in the Philippine Sea slab is expected to be lower than 600C and hence serpentine can be stable there, we interpret that the low-velocity anomalies are due to serpentinization of mantle peridotite. We find four interesting seismic activities along the western boundary of the serpentinized mantle: (1) the occurrence of aftershocks of the 1987 off Chiba earthquake (M6.7) along it (Okada and Kasahara, 1990), (2) one of the fault plane of the mainshock of the 1921 Ryugasaki earthquake (M7.0) parallel to it (Ishibashi, 1975), (3) the occurrence of aftershocks of the 1921 earthquake along it (Ishibashi, 1973), and (4) the occurrence of microearthquakes in the Philippine Sea slab along it. These observations strongly suggest that deformation has been concentrated along the western boundary of the serpentinized mantle and the serpentinized portion has been left behind relative to the western portion of the Philippine Sea slab. We also find other characteristic seismicities related to the serpentinization: (1) The absence of interplate earthquakes between the Philippine Sea and Pacific slabs below the serpentinized mantle, and (2) the occurrence of few earthquakes in the serpentinized mantle.