

The mantle discontinuity depths in the stagnant Pacific slab beneath the Philippine Sea from 2005-2007 BBOBS data

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We determined depths of the mantle discontinuities (the 410-km and 660-km discontinuities) in the Pacific slab stagnant in the mantle transition zone beneath the Philippine Sea using data from a broadband ocean bottom seismograph (BBOBS) network. As a part of the Stagnant Slab Project (2004-2008), sixteen BBOBSs were deployed on the seafloor in the northern Philippine Sea. We analyzed two years long data recovered by two cruises: KR06-14 with the JAMSTEC research vessel KAIREI in 2006 and one with a chartered boat 'Asean-maru' in 2007). We employed the Velocity Spectrum Stacking of receiver functions (Gurrola et al., 1994) to determine the mantle discontinuity depths beneath the northern Philippine Sea and westernmost Pacific. We stacked receiver functions at three stations located above the stagnant Pacific slab imaged by a seismic tomography to determine the discontinuity depths in and around the stagnant slab.

The 410-km and 660-km discontinuity depths in the stagnant slab are estimated to be 390-400 km and 685-695 km, respectively, assuming a global S-velocity model RT20S (Ritsema and Heijst, 2000) for a velocity correction. In the immediately south to the stagnant slab, we found the 410-km discontinuity depth to be shallower than 410 km and the 660-km discontinuity depth close to 660 km. The transition from the deep 660 in the stagnant slab to the normal 660 depth to its south is rather abrupt. As a comparison, we estimated the discontinuity depths beneath a normal Pacific region from three BBOBS stations in the westernmost Pacific Ocean, giving 392 km and 651 km for the 410-km and 660-km discontinuity depths.