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Seismic structure in the Northwest Pacific basin sortheast of the Ogasawara Plateau

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In the Northwest Pacific basin southeast of the Ogasawara Plateau, many Ocean Bottom Seismographs (OBSs) have showed that the P-wave phase refracted in the lower crust (Pg phase) is attenuated significantly and the signal-to-noise ratio becomes less than 1. High attenuation in the lower crust suggests low velocity zone (LVZ). The traveltime modeling has been estimated the P-wave velocity (V_P) of 6.4-6.6 km/s for the LVZ (Oikawa *et al*., 2008). In this study, we estimated the surface of the LVZ and the upper limit of the V_P in the LVZ by combining traveltime forward modeling (rayinvr, Zelt *et al*., 1992) and waveform simulation (E3D, Larsen and Schultz, 1995). We use the data of a seismic survey lines (OGr15) which lies SW-NE direction at the Northwest Pacific basin southeast of the Ogasawara Plateau. The survey is operated by Hydrographic and Oceanographic Department, Japan Coast Guard, and seismic refraction data using four component (vertical, two horizontal, and hydrophone) OBSs and Multichannel Seismic (MCS) reflection data were obtained. Many OBSs in the profile shows high attenuation of the Pg phase. As a result of the estimation using traveltime forward modeling and waveform simulation, the surface of the LVZ was estimated about 3.5-4.8 km under the seafloor, and the upper limit of the V_P in the LVZ was estimated 6.7 km/s. Estimated V_P structure in this profile under their conditions shows the V_P of 6.5-6.7 km/s in the LVZ, and it is consistent with Oikawa *et al*. (2008).

In the seismic refraction survey using OBSs and airgun system, S-wave velocity (V_S) structure in the oceanic crust or uppermost mantle could be estimated by using PS converted wave which is converted at a layer boundary such as an interface between sediments and basement. In this study, we estimated the ratio of P-wave and S-wave velocity (V_P/V_S) structure of the uppermost mantle in the Northwest Pacific basin southeast of the Ogasawara Plateau, and we calculated V_S anisotropy. We use the data of the OGr15 and the another seismic survey line which is almost orthogonally-crossed with the OGr15 at about 270 km southeast of the Ogasawara Plateau in the Northwest Pacific basin. The OBSs on the OGr15 shows that S-wave phase refracted in the uppermost mantle (Sn phase) is split into large and small apparent velocity phases. The amplitude of the large and small apparent velocity phases are larger on the parallel and orthogonal direction with shot line of the airgun, respectively. No Sn phase splitting is identified on the OGr13. MCS reflection records are indicate that the interface between sediments and basement is southeastward-dipping on the NW-SE (OGr13) direction and flat on the SW-NE (OGr15) direction. Since interface where PS conversion occur is southeastward-dipping, only SV (vibrate vertically) wave may be generated on the OGr13, and both SV and SH (vibrate horizontally) wave may be generated on the OGr15 (Xia *et al*., 2002). We estimated two V_P/V_S ratio structures for the OGr15 using large and small apparent velocity phase, respectively. The calculated V_S anisotropies from estimated V_P/V_S structures are less than 1% between the OGr13 and the OGr15 with large velocity structure, and up to about 9% between the OGr13 and the OGr15 with small velocity structure. The direction of larger velocity is consistent with OGr13 and is perpendicular to the paleomagnetic lineation. The relationship between the estimated magnitude of V_S anisotropy and the spreading rate in this study area supports the suggestion of Oikawa *et al*. (2010) that the uppermost mantle in the area where spreading rate is high may has larger magnitude of anisotropy.

Keywords: PS converted wave, Vp/Vs, seismic anisotropy, ocean bottom seismograph, low velocity zone