# The S-wave velocity structure of oceanic crust using PS converted waves

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S-wave velocity structure is very important in seismic survey, because Vp/Vs which is derived from P- and S-wave velocity structure, has a potential to constrain the water content or porosity in the crust. Refraction seismic surveys using Ocean Bottom Seismographs (OBSs) often use air guns. Since the elastic waves shoot by air gun are P-waves, P-wave velocity structure have been estimated well. But S-wave velocity structure can be estimated using PS converted waves, which is often generated at boundary of the soft sediments and the basement under the sediments. In this study, we estimated S-wave velocity structure of oceanic crust using PS converted waves.

We used the data of OGr13 survey line which was obtained by Hydrographic and Oceanographic Department, Japan Coast Guard (JHOD) in Continental Shelf Survey. The survey line is 505km in length, and the line starts from 50km east of Haha-jima in Bonin Island to the northwest Pacific basin across Haha-jima sea mount and Ogasawara Plateau. 100 OBSs were deployed at 5km intervals along the survey, and 94 OBSs were recovered. Air guns were shoot with 200m intervals. Multichannel seismic reflection (MCS) data also were acquired.

We made the data analyses as following procedures; picking of arrival times of PS converted wave, presuming of PS converting interface, update of P-wave velocity structure model estimated by JHOD, estimation of S-wave velocity structure, and calculation of Vp/Vs. PS converted waves were visible at 200-505km (54 OBSs) of horizontal distance from the northwest end of the line. Therefore we estimated S-wave velocity structure at 200-505km of the line. We use the modeling and inversion approaches using ray tracing method employing graph theory for the update of P-wave velocity structure model and the estimation of S-wave velocity structure.

In the estimated S-wave velocity structure model, the upper crust gets thinner at 340km of the line. This area corresponds with the boundary of Ogasawara plateau and the northwest Pacific basin, which have different features in bathymetry and the estimated P-wave velocity structure model. The calculated Vp/Vs model showed a difference between the northwest and the southeast sides with a boundary of 320km of the line. The Vp/Vs of 1.8 to 1.95 were showed at 200-310km of the line (Ogasawara plateau). On the other hand, the Vp/Vs of 1.5-1.75 were showed at 330-505km of the line (northwest Pacific basin). This difference in Vp/Vs of the upper crust suggests the difference in porosity with different water content.