

Seismic crustal structure surveys across the southern Kyushu-Palau Ridge in 13N (KPr40 and KPr41)

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We had conducted wide-angle seismic and multi-channel reflection experiments using S/V Shoyo and S/V Takuyo, Hydrographic and Oceanographic Department, JCG.

We report two survey lines carried out in 2008. The two lines are located in 2,500 km south from Honshu (Japan's Main Island). The one line named as KPr40 is crossing the Kyushu-Palau Ridge at 13.5N. Another line named as KPr41 is at 12.5N. Each line crosses the southern part of the Philippine Basin, the Kyushu-Palau Ridge, and the Parece Vela Basin. The length of each line was 300 km, and 60 Ocean Bottom Seismographs was deployed at every 5 km.

We used a non-tuned air-gun array for the controlled source of the refraction and reflection experiments. The total volume of the air-gun array is 6,000 inch³, and the firing interval is every 200 m (about 90 sec). For the reflection experiment, the total volume is 3,000 inch³ and firing interval is 50 m. 240 channel streamer cable was used as a receiver.

The result of the experiment is as the following. The southern part of the Philippine Basin has 5,500-6,000 m in depth. The topographic fabric is clearly in E-W direction, almost parallel to this survey lines. The sediment layer is 0.2 km, and the thin 4 km oceanic crust exists. The thickness of lower crust is 1.5-2.0 km and P-wave velocity is 6.8-7.1 km/s. The uppermost mantle velocity is 8.1-8.2 km/s.

The crust of under the Kyushu-Palau Ridge is thicker than a normal oceanic crust. Especially thickness of the line on KPr40 is a maximum of 15 km. The middle crust with P-wave velocity of 6.0-6.5 km/s is 5 km in thickness, and also the lower crust is more than 5 km thickness. The P-wave velocity of the uppermost mantle is 7.8-8.0 km/s, which are slower than the Parece Vela Basin's and the Philippine Basin's.

The depth on the line of the Parece Vela Basin area has 4,500-5,000 m with a steep high and low because the direction of experimental line is a perpendicular direction to the topographic fabric of the Parece Vera Basin. The crustal thickness is 5 km and the P-wave velocity is 8.1-8.3 km/s. Therefore the crust is a normal oceanic crust. The previous study carried out to the north to 15N shows a thin crust area between the Kyushu-Palau Ridge and the backarc basins to the east of the ridge (the Parece Vela Basin and the Shikoku Basin), however this experiments don't show such features.