

Crustal structure across the Shikoku Basin from wide-angle seismic and multi-channel reflection data

Kentaro Kaneda[1]; Azusa Nishizawa[2]; Mitsuhiro Oikawa[3]; Junzo Kasahara[4]; Ryuji Kubota[5]

[1] HODJ; [2] Hydrogr. & Oceanogr. Dep., JCG; [3] Hydrographic and Oceanographic Dept. of Japan; [4] JCSS; [5] Kawasaki Geological Engineering

The Shikoku Basin is a typical back-arc basin lying between the Kyushu-Palau Basin and Izu-Ogasawara Arc behind the Izu-Ogasawara Trench. From paleomagnetic studies, it was revealed that the seafloor extending in the Shikoku Basin started at about 26 Ma and ceased at about 15 Ma. Immediately after that, the Kinan Seamount chain was formed.

Japan Coast Guard conducted a wide-angle seismic experiment and a multi-channel seismic reflection experiment on the east-west survey line cutting across the Shikoku Basin through Koza Seamount belonging to the Kinan Seamount chain. Total 100 ocean bottom seismographs were deployed on the 500 km survey line at a 5 km spacing. As a seismic source, a tuned airgun array composed of 36 guns (total 131.8 liter; 8040 cubic inch) was shot every 200 m firing in the refraction experiment and every 50 m firing in the reflection experiment. Length of multi-channel streamer cable is 6000 m with 240 channels.

First arrival travel times of P wave were picked up from the filtered record sections and applied to a two-dimensional tomographic inversion and a two-dimensional forward modeling using graph theory to construct a structure model, taking into consideration the shallow structure revealed from the reflection experiment. Later phase of P refraction waves and PmPs are also referred to estimate the seismic velocity in lower crust and the seismic Moho depth.

Characteristic features of the structure model are listed below.

- 1) Crustal thickness of Koza Seamount is about 10 km
- 2) Uppermost mantle velocity under Koza Seamount is 7.8 km/s, lower than that under other area in the Shikoku Basin.
- 3) At the hollow 50 km west to the Koza Seamount, crustal thickness suddenly decreases to 4 km.
- 4) Crustal thickness of the Shikoku Basin decreases from the center toward west.
- 5) Crustal thickness of the Kyushu-Palau Ridge is about 10 km and the ridge has a lower crust with 7.2 km/s seismic velocity.
- 6) The Amami Sankaku Basin has thicker crust (8 km) compare to that of the Shikoku Basin (5-6 km).