# Crustal Structure of Northernmost part of Okinawa Trough by Ocean Bottom Seismographic Observation

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From the previous geophysical and geological studies, the Okinawa Trough is considered to be in an early stage of back-arc spreading. However there is no deep seismic survey using Ocean Bottom Seismometers (OBSs) in the northernmost part of the Okinawa Trough.

The distribution of the P-wave velocity and the thickness of the crust indicated that the crust of the northernmost part of Okinawa Trough is similar to that of an island arc than to that of an ocean. It is suggested from the obtained seismic structure that the northernmost part of the Okinawa Trough is in the incipient stage of the back-arc rifting.

The Okinawa Trough is placed between the Ryukyu Island arc and the China mainland as the back-arc region of the Ryukyu arc. From the previous geophysical and geological studies, the Okinawa Trough is considered to be in an early stage of back-arc spreading. Many seismic experiments have been performed in the Okinawa Trough region, however there is no deep seismic survey using Ocean Bottom Seismometers (OBSs) in the northernmost part of the Okinawa Trough. It is important for understanding tectonics of back-arc spreading to obtain a seismic structure beneath the area of East China, west of Kyushu, which is considered as the northernmost part of the Okinawa Trough. In addition, a seismic structure beneath the area is useful for consideration of tectonics of the Kyushu Island.

A seismic survey with OBSs was carried out in west of Kyushu in fall of 1999. The profile is 300 km long and 20 OBS were deployed at an interval of 15 km. We used airguns and explosives as controlled sources. During shooting of the airguns, reflection waves were recorded by 24-ch hydrophone streamer towed from the shooting ship.

The obtained seismic reflection profile shows large lateral heterogeneities in the upper crustal structure in spite of the smooth seafloor topography of the surveyed area. On the distance-time sections of OBSs, apparent velocities of first arrivals vary due to the heterogeneities. A seismic velocity model for the shallow structure at each of the OBS locations is derived by using a tau-p inversion of the indivisual OBS record. A deep structure beneath the profile was estimated by a forward modeling using a two-dimensional ray tracing.

The sedimentary section consists of two layers. The upper sedimentary layer has a thickness of 200-500m with P-wave velocity of 1.7 - 1.9 km/s. A vertical velocity gradient of the upper layer is small. The lower sedimentary layer has P-wave velocity of 2.0 - 3.5 km/s with relatively large vertical velocity gradient. The thickness of the lower layer has large variety from 800 m to 3500 m. The upper crust is large lateral heterogeneity and is also divided into two layers. Velocity at the top of the upper crust vary from 3.0 - 4.9 km/s. The lower layer of the upper crust has velocity of 5.6 - 6.0 km/s. The thickness of the upper crust changes from 3 km to 9 km. The boundary between the upper crust and lower crust is about 10 km deep below the sea surface. The lower crust has velocity of 6.5 - 6.7km/s. Compared with the upper crust, the lower crust is relatively homogeneous. A thickness of the lower crust is about 15 km. The crust has a thickness of about 25 km in total and the Pn velocity is estimated to be 7.7 -7.8 km/s.

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