

Seismic observation and active-source seismic surveys on southern Ryukyu arc

TAKAHASHI, Tsutomu^{1*}; KAIHO, Yuka¹; ISHIHARA, Yasushi¹; YAMAMOTO, Yojiro¹; NAKANISHI, Ayako¹; OBANA, Koichiro¹; KODAIRA, Shuichi¹; KANEDA, Yoshiyuki¹

¹JAMSTEC

The Ryukyu arc is an island arc located on southeast of the Eurasian plate. The Philippine Sea plate is subducting north-westward at Ryukyu trench. Many large earthquakes ($M7\sim 8$) occurred on this arc, and some of them generated tsunamis. The 1771 Yaeyama earthquake ($M7.4$) caused a large tsunami of which a maximal height is 30m. For detailed examinations of fault rupture zones and mechanisms of large earthquakes in this arc, it is important to know the seismicity, lithospheric structures and plate geometry. In 2013, Japan Agency for Marine-Earth Science and Technology (JAMSTEC) launched a series of seismic observations and active-source seismic surveys at the Ryukyu arc as a part of research project funded by Ministry of Education, Culture, Sports, Science and Technology, Japan. In FY2013, we conducted refraction and reflection wide-angle seismic surveys and seismic observation on southern Ryukyu arc.

Active source seismic data were acquired on two survey lines. The one is a 480km-long line across the island arc from the south of Ryukyu trench to Okinawa trough. The other is a 100km-long line in Okinawa trough at northwest of Iriomote island. We conducted a refraction survey on the former survey line with 60 ocean bottom seismographs (OBS), and multichannel seismic reflection (MCS) surveys on both lines. Retrieved data shows clear wave trains propagating in the Philippine Sea plate and island arc. Normal faults in Okinawa trough were clearly observed in MCS data.

For seismic observation, we deployed 36 seismic stations including 30 OBSs and 6 onshore stations. All OBSs are equipped with short period geophones. Onshore stations are deployed at Miyako, Tarama, Ishigaki, Iriomote, Kuroshima and Hateruma islands. They are composed of broadband and/or 2Hz seismometers. We also retrieved seismic data from 60 OBSs that was deployed for the active source refraction survey. Observed seismic waves of small earthquakes show path dependences of waveforms that suggest spatial variations of random inhomogeneities and attenuation. For example, OBSs in Okinawa trough did not record clear S-wave for most of earthquakes. However, they observed clear S-wave and long-lasting coda waves for some shallow earthquakes occurred at north of Iriomote and Yonaguni islands. These waveforms suggest strong random inhomogeneities at the shallow part and high apparent attenuation (due to scattering and intrinsic attenuation) at deeper part underneath the Okinawa trough. In this presentation, we outline our observations and notable features of obtained data.