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Multichannel seismic reflection experiment across the southern end of the Nansei-Shoto trench-arc-backarc system

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The Nansei-Shoto trench-arc-backarc system to the south of Kyushu, Japan, is characterized by the Okinawa Trough, as a backarc basin, where continental rifting is incipient.

We have carried out a multi-channel reflection experiment to obtain detailed seismic images across the Nansei-Shoto trench-arc-backarc system since 2008.

International cooperative seismic exploration of Taiwan, the United States and France was conducted to elucidate the seismic structure to the west of Yonaguni-jima Island in the southern end of the Nansei-Shoto trench-arc-backarc system (Liu et al., 1995). They pointed out that the crustal structure in the forearc region is influenced by subduction of the Gagua Ridge which is a N-S trending topographic high to the south of the Nansei-Shoto Trench. However, there is almost no investigation aiming at grasp of the deep structure to the east of Yonaguni-jima Island and subducting Gagua Ridge.

We obtained the multi-channel seismic data across the Nansei-Shoto Island arc and backarc by using a 240 channel hydrophone streamer cable of 3000 m in length, shooting a 3-gun cluster airgun, 5.7 liter (350 inch³)x3 in a total volume, at an interval of 50 m. The survey line of north-south direction was designed to cross the southern part of the Yonaguni Submarine Graben in the south of the Okinawa backarc basin and the Okihateruma forearc basin (East Nan'ao Basin).

The obtained seismic reflection profile showed that a thick sedimentary layer with a thickness of about 2 sec two-way travel time in the forearc basin to the east of Yonaguni-jima Island. The sedimentary layers with almost horizontal reflectors in the upper part on-lap the forearc basement. Horst-and-graben structures in the northern part of the island arc and many intrusions in the trough sedimentary layer are identified, which shows same features obtained to the west of Yonaguni-jima Island by (Liu et al., 1995).