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The crustal structures of the subduction of the Philippine Sea Plate in the northern Nansei-Shoto trench

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Seismic characters of convergent plate boundaries are reflected in the heterogeneity in the structural evolution, the interior regime as well as external architecture (Kopp, 2013). At the north end of the Nansei-Shoto trench the Amami plateau, which is known as a remnant arc, is subducting, and this causes a landward concave of the subduction axis. The Nansei-Shoto trench was recognized that its seismicity is rather low, but in the past few years, new scientific researches indicated the possibility of a mega earthquake is not so much low. There are needs to grasp the Philippine Sea plate's topography and crustal structure around the sea area of the Amami plateau because they might be constraint conditions how the mega earthquake could happen.

Japan Coast Guard conducted two integrated seismic experiments that combine a wide-angle refraction survey and a multi-channel reflection survey. The first line (line ECr10) was conducted in 2009 and the second line (line ECr11) was carried out in 2012. ECr10 started from the west end of the Amami plateau to the north sea area to the Amami-O-Shima island. ECr11 started from the Kikai basin to the just south of the Yaku Shima Island. A depression on the Nansei-Shoto arc between two seismic lines is well known as a major tectonic boundary of the Nansei-Shoto arc.

The southern end of ECr10 is the west edge of the large Amami plateau. Uyeda(2005) said that there is a local bouguer low anomaly and this means the crust of the Amami plateau should be thicker than the normal oceanic crust. The past seismic survey (Nishizawa et. al., 2009, 2014) reveals that the thickness of the center Amami plateau is approximately 16km, which is obviously thicker than the normal oceanic. The southern end of ECr11 is located on the Kikai basin. The Kikai basin's bouguer anomaly is rather high, this means the possibility that the crust of the Kikai basin should be an oceanic crust. The seismic survey supports the high anomaly because of its thin crust. However the composition of the crust shows the horizontal heterogeneity of its crust and an identification of the middle crust (6.0 - 6.5 km/s layer) exists (Nishizawa et. al. 2009). These characters do not support that the basin is a typical oceanic crust.

We made a comparison of the structure on the Philippine plate between ECr10 and ECr11, by using the seismic surveys results and the precise bathymetric data collected by Japan Coast Guard. Regarding topography, we found many normal faults parallel to the trench direction. Especially there are more faults on the margin of the Amami plateau than of the Kikai Basin. As for crustal structures, the crust of the Amami plateau has a middle crust. The existence of middle crust is along with the past results but not only of the Amami plateau but also of Kikai basin. This means that the subducting margin of the Kikai basin might not be a typical oceanic crust.

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