

Southern Extent of Seismicity in the Philippine Sea plate south of the Nankai Trough

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Meteorological Research Institute (MRI) has deployed the pop-up type Ocean Bottom Seismometers (OBSs) in the area south off Kii peninsula for several times to investigate seismicity in the area. Yamazaki et al. (2011, Tech. Rep. MRI) confirmed the microearthquake activities at a depth of 10-25 km around the Nankai Trough by the four time operations since 2005. Hirata et al. (2013 and 2012, JpGU meeting; 2012, SSJ meeting) carried out observations on the south of the Nankai Trough in 2010. They found microearthquakes at a depth of around 10 km by using the 22 OBSs. It was considered that these microearthquakes were classified as seismic activities in the oceanic crust of the Philippine Sea Plate (PSP) (Obana et al., 2005, JGR).

Where is the southern limit of this seismic activity? To investigate the extent of the seismic activity, we conducted the OBS observations in 2013 and 2014, in the area farther south of the 2010 network. The observation network was deployed in the range of 31.6-32.3N. We retrieved 10 OBSs in each 2013 and 2014 observations. First, clock time was corrected based on the time differences at the deployment and the retrieval. Next, event waveform data were selected from the continuous data by an event trigger. Finally, we picked the arrival times and amplitudes and determined the hypocenters with the method of Hirata and Matsu'ura, 1986. Here, we used the same velocity-structure model of P-wave velocity as Hirata et al. (2013) which was based on Kodaira et al. 2000. Sediment layer correction was done using the arrival times of PS converted wave.

Magnitude and hypocenter of an earthquake were determined for the events inside the observation network of 2013 and 2014. Magnitudes of events ranged in about M 0.0-0.5 and depths were estimated at about 10 km. This result shows that the same type of microearthquakes occur as in the area of the 2010 observation. Numbers of events determined inside the observation network of 2013 and 2014 are 36 and 23. Total number of the two operations is approximately half of the number of 112 in 2010. The seismic activity of the microearthquakes in the southern area of the observation network is relatively lower than that in the northern area. Furthermore we investigated the hypocenters determined outside the observation network. As a result, there are some hypocenters ($M \geq 1$) on the north of the network, however, there are not any hypocenters determined on the south of the network. Therefore, it indicates that the southern extent of the seismicity of the inside PSP ($M \geq 1$) is around 31.6-31.9N in the area of 135.3-136.3E.

We used short-period OBSs (4.5 Hz, 3-comp.). Deployment and retrieval of OBSs were done by the Keifu-maru and the Ryofu-maru of JMA. Observation periods, area and numbers of retrieved OBSs were as follows,

2010: Period, from 12/June to 14/Sep./2010 (about 3 months); Number of OBSs, 22;
Area, south off Kii Peninsula (off Cape Shiono-misaki) (31.9-32.8N, 135.6-136.2E)
2013: Period, from 12/July to 30/Sep./2013 (about 3 months); Number of OBSs, 10;
Area, south off Kii Peninsula (far south of obs. in 2010) (31.8-32.3N, 135.8-136.3E)
2014: Period, from 7/Aug. to 30/Oct./2010 (about 3 months); Number of OBSs, 10;
Area, south off Kii Peninsula (west side of obs. in 2013) (31.6-32.3N, 135.3-135.8E)

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