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Feature of microseismicity around the Nankai trough south off the Kii Peninsula

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A boundary between estimated source region of the next Tonankai and Nankai mega-thrust earthquake is located south off the Kii Peninsula. The both beginning points of rupture of the 1944 Tonankai and 1946 Nankai earthquakes were determined around this region, and also that of the next Tonankai and Nankai earthquakes are supposed to begin the same region. By these reasons, the seismicity and its temporal change south off the Kii Peninsula are interested.
In order to investigate the seismicity around the region, we conducted a pop-up ocean bottom seismometer (OBS) observation south off the Shionomisaki in 2005. As a result, we could detect an active microseismic activity around the trough axis. Most of the detected microearthquakes by OBSs are not listed in the earthquake catalogue by JMA. To investigate the seismic activity in more detail, we conducted OBS observations three times from 2006 to 2008 with shifting the observation area to westward. The obtained seismic distribution shows the following features.

1. A seismogenic layer lies from 10km to 25km in depth with a clear boundary of lower limits. Little earthquakes occur deeper than 25km.
2. Some seismic clusters and liner arrangements are detected in the distribution of the microseismicity. Also, several seismic gaps of the 20km to 30km in diameter are detected.
3. As a general tendency, the microseismic distribution has south inclination at sea-side from the trough axis, north inclination at land-side, in contrast.

In general, seismic activity around trough axis has been considered to be generated by bending of oceanic plate. It is known that normal fault earthquakes are exceeding at shallower than 20km to 30km in depth, then they change to reverse fault at more deep. We supposed that the detected microearthquakes around the Nankai trough axis are mainly normal fault earthquakes, and the lower limits of seismogenic layer suggests a neutral plane between tensional and compressional tectonic stress. To confirm it, we determined the focal mechanisms by initial motion polarity method for the relatively bigger earthquakes among the detected microearthquakes. However, we could not find a clear tendency in the obtained focal mechanisms.
We also point out a possibility that the temporal change of the microseismic activity around the trough axis reflects a temporal change of the plate motion or a somewhat change of plate coupling conditions.

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Keywords: ocean bottom seismograph, Tonankai earthquake, Nankai earthquake, Nankai trough, microseismicity, Philippine Sea plate