

Low-frequency events beneath the landward slope along the Nankai trough observed by ocean bottom seismographs

Koichiro Obana^{1*}, Aki Ito¹, Hiroko Sugioka¹, Shuichi Kodaira¹, Daisuke Suetsugu¹,
Yasushi Ishihara¹, Eiichiro Araki¹, Masataka Kinoshita¹, Yoshiyuki Kaneda¹, Yoshio Fukao¹

¹JAMSTEC

Anomalous very-low-frequency (VLF) earthquakes have been observed near the trough axis along the Nankai trough by land seismic networks (Ishihara, 2003, Obara and Ito, 2005). The focal mechanisms of the VLF earthquakes indicate an activity of thrust faults in the accretionary prism (Ito and Obara, 2006). After the 2004 Off Kii Peninsula earthquake (Mw=7.5), which occurred in the subducting Philippine Sea plate, many VLF earthquakes were observed in the aftershock area by the land seismic network (Obara and Ito, 2005). In addition to this, low-frequency tremors with dominant frequency range of 2-8Hz were observed by short-period ocean bottom seismographs (OBS) deployed off Kii peninsula along the Nankai trough before the 2004 earthquake (Obana and Kodaira, 2009). Epicenters of these low-frequency tremors observed by the OBSs were located near the shallowest part of the reverse faults in the accretionary prism. However, these events were small and did not observed by land seismic stations.

In July 2008, we have deployed 36 short-period OBSs (SPOBS) and 4 broadband OBSs (BBOBS) at 20 sites off Kii peninsula. This OBS observation were conducted as a part of "Research concerning Interaction Between the Tokai, Tonankai and Nankai Earthquakes" funded by Ministry of Education, Culture, Sports, Science and Technology, Japan. The SPOBSs were deployed with an interval of 10 km on the landward slope of the Nankai trough. At four of 20 sites, five SPOBSs and one BBOBS were deployed within an area of 500-1000m diameters to form a small array. The observation area of the OBSs covered epicenter area of the VLF earthquakes off Kii peninsula (Ito and Obara, 2006). The SPOBSs were recovered in October 2008. The VLF earthquakes were not observed by the SPOBSs during the observation period for about three months. On the other hand, BBOBSs were recovered October 2009 after over one-year observations and succeed to observe VLF earthquakes together with land-seismic stations in March 2009. These VLF earthquakes were located beneath the landward slope of the Nankai trough. The event locations show clusters near the toe of the accretionary prism and a major splay fault cutting through the accretionary prism. Locations of these clusters are similar to the low-frequency tremors observed during the previous OBS observations just west of the observation area in this study.

Keywords: Low-frequency earthquake, Nankai trough