

Micro-seismicity along the Nankai trough seismogenic zone revealed by ocean bottom seismograph observations

Koichiro Obana[1], Shuichi Kodaira[1], Kimihiro Mochizuki[2], Masanao Shinohara[3], Kiyoshi Suyehiro[4], Yoshiyuki Kaneda[5]

[1] IFREE, JAMSTEC, [2] EOC, ERI, Univ. of Tokyo, [3] ERI, Univ. Tokyo, [4] JAMSTEC, [5] JAMSTEC, Frontier, IFREE

Along the Nankai Trough, southwestern Japan, the Philippine Sea plate is subducting beneath the Eurasian plate with a convergence rate of about 4 cm/year. Great interplate earthquakes caused by the subduction of the Philippine Sea plate have occurred repeatedly. Records of the great earthquakes can be seen in historical documents from the seventh century and the recurrence interval between them is about 100-200 years. Many seismic surveys using controlled sources have been conducted to obtain crustal structure at the Nankai Trough subduction zone. The splay faults cutting both underthrust sediments and the overriding accretionary prism were imaged by multi-channel reflection surveys. These faults locate around the seaward limit of the coseismic slip area of the latest great interplate earthquakes, 1944 Tonankai and 1946 Nankai earthquakes. The splay faults may relate to the thrust faulting at the seaward part of the fault area of the great interplate earthquakes. The location of the seaward updip limit of the seismogenic zone and its relation to the crustal structure are important to understand the transition process of the seismogenic behavior along the plate interface. Seismicity during the interseismic period could show the location of the updip limit of the seismogenic zone along the plate interface. However, the seismicity along the Nankai Trough is very low and hypocenters are not determined accurately by on-land seismic stations. We performed micro-seismicity observations using ocean bottom seismographs at the coseismic slip area of the 1944 Tonankai and 1946 Nankai earthquakes. Hypocenters were determined using 2- or 3-D realistic velocity structure referring to seismic surveys. Off cape Muroto, fault area of the 1946 Nankai earthquake, several micro earthquake clusters locate around the plate interface. The seaward limit of the seismicity is characterized by clusters of earthquakes with very similar waveforms. These clusters locate about 30-45 km landward from the deformation front and coincide with the stepping down of the decollement. These earthquakes are considered to occur at small asperities in the aseismic-seismogenic transition zone of the plate interface. Off Kii peninsula, the rupture area of the 1944 Tonankai earthquake, seismicity is locally active around the toe of the accretionary prism. These earthquakes occurred at the seaward limit of the coseismic slip area of the 1944 Tonankai earthquake. Very few numbers of earthquakes were observed along the splay faults or in the rupture area of the 1944 Tonankai earthquake.