

Seismic reflection image of the splay faults in the 1946 Nankai earthquake rupture zone off Kii Peninsula, SW Japan

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In order to obtain detailed crustal structure images of the 1946 Nankai earthquake rupture zone, we conducted a MCS survey in the Nankai Trough subduction zone off Kii Peninsula, southwest Japan, using R/V Kairei of the Japan Marine Science and Technology Center (JAMSTEC) in 2001. For deep-penetration seismic imaging, a large volume (~200 liters) air gun array was used as the controlled sound source. The MCS data recording was done with a 4 km, 160-channel streamer with 25 m group spacing. Data processing included trace editing, pre-filtering, spherical divergence correction, signature deconvolution, CMP (Common Mid Point) sort, NMO correction, multiple suppression by parabolic radon transform, CMP stack, and time-migration. For the pre-conditioned MCS data, we performed prestack depth migration processing.

The MCS profiles reveal steeply landward-dipping splay faults in the rupture area of the magnitude (M) 8.2 Nankai earthquake in the Nankai subduction zone. These splay faults branch upward from the plate-boundary interface at ~13 km depth and ~70 km landward of the trough axis, breaking through the upper crustal plate. The splay fault almost reaches the seafloor and is apparently within the 1946 Nankai coseismic rupture area estimated from tsunami waveform inversion. Slip on the splay fault may produce a conspicuous seafloor fault scarp and a subsequent outer ridge, which are almost continuous from the 1944 Tonankai coseismic rupture area. In this talk, we will discuss detailed geometry of the splay faults and its implications on subduction thrust earthquakes along the Nankai subduction zone.

Keywords: seismic reflection, splay fault, Nankai earthquake