

Seismic Velocity Mapping of the Plate Boundary Structures in the Slow Earthquake Gap Zone off Western Kii Peninsula, Nankai Trough

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Recently many slow earthquakes have been observed along the Nankai trough subduction zone, where the Philippine Sea plate underthrusts the Amur plate. These events show along strike variations, especially in the central part of the Nankai trough, they were observed off Kii channel and Shinomisaki, but not reported in the area between them, off western Kii peninsula. Slow earthquakes are considered to be the key to understand the nature of subducting plate boundary and its seismic coupling. In November and December 2018, an active source seismic survey was conducted by the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) using R/V KAIMEI in Nankai subduction zone off Kii channel to Shonomisaki to investigate the structural features and its possible relationship to the slow events.

The cruise carried out 34 dense gridded multichannel seismic (MCS) reflection profiles to obtain a 3D overview of the fault distribution and deformation of the sediments. At the same time, a 2D refraction seismic survey was also implemented, with air gun shooting at the interval of 100 m, recorded by 96 high resolution ocean bottom seismometers (OBS) that were spaced 1 km apart, covered from the seaward side of the subduction trench to the accretionary prism. The data quality is good and we can trace first arrivals up to ~80 km, it allow us to reveal seismic velocity structure within the overlying plate and the crust of the subducting plate. We applied travel time tomography to the OBS data, the seismic velocity and seismic reflection image show the depth of décollement and the volume of materials between décollement and the top of oceanic crust are diverse from Kumano area (e.g., Park et al, 2010; Kamei et al. 2013), where there are many slow earthquakes occurred. On the other hand, the toe of the accretionary prism is more homogeneous than that in the Kumano Basin, which could be due to the topography of the subducting oceanic crust, leading to different seismogenic structures.

Keywords: Nankai Trough, slow earthquake gap zone, seismic velocity model