Detailed Structure of the Large Thrust Slice Zone in the Nankai Trough off cape Muroto revealed by the 3D seismic data

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Seismic reflection and refraction surveys have been conducted to image the deeper structure in the Nankai trough. A 3D seismic reflection data set were collected in the Nankai trough off cape Muroto in 1999. Pre-stack time migration has been performed on the 3D data. We will present on the detailed structure of the large thrust slice zone revealed from the 3D seismic reflection volume.

The Large Thrust Slice Zone (LTSZ) with ~25km length is located ~40km landward from the deformation front, where the water depth shallows to 3000m from 4000m. LTSZ is characterized by the imbricate structure which is also recognized in the frontal thrust zone, and thrust faults developed in the accretionary prism, which suggests that old accretionary prism in the LTSZ has been uplifted by the underplating and thrust faulting.

LTSZ can be divided into sub zones with structural characterization from the reflection image. Zone A, which is located in the most landward part of LTSZ with 7-8km long, is dominated by at least two imbricate thrust units. The imbricate units are clearly recognized in the western part of 3D Box, but not clear in the eastern part. The thickness of each unit is ~0.4s in two way time (TWT). In the western part of 3D Box, a low angle thrust fault can be recognized beneath Zone A, which is probably an out-of-sequence thrust (OOST).

An imbricate unit with clear stratigraphy dipping landward exists in the shallower depth beneath the upper slope of the LTSZ (Zone B). The imbricate unit has ~0.6s thickness in TWT, which is thicker than those in Zone A. The BSR was clearly imaged ~0.5s TWT below the seafloor in the eastern part of 3D Box, but it can not be clearly imaged in the central part of 3D Box. A high-angle (~20 degree) fault cuts Zone B in the landward part of this zone.

Zone C occupies the regions beneath Zone B and between Zones A and B, where landward dipping reflectors can be imaged however imbricate structure is not clearly recognized. A fault, which can be traced from near the top of subducting oceanic crust in the most landward part of LTSZ to near the seafloor, is obviously found, which can be regarded as an OOST. The complicated structure in Zone C may have been created by the activities not only of the OOST but other faults in Zone C.

At the depth of 6.5-6.7s TWT below Zone A and Zone C, low-angle landward dipping reflectors (LA-LDRs) are imaged whole 3D Box. LA-LDRs are clearly imaged but not continuously. The dip of LA-LDRs changes to high angle near the seaward end of each LA-LDR in some regions, and faults can be traced in the upward extension of the seaward end. This might suggest that LA-LDRs are a part of the fault planes, which are developed, in the accretionary prism. The LA-LDRs accompany with sigmoidal reflection events, which may represent a duplex structure. Another clear reflector similar to LA-LDR can be found beneath LA-LDR, which parallels above the top of the oceanic crust reflections with ~0.5s TWT distance. LA-LDR might be a roof thrust of the duplex structure that is related with the underplating process.