# 3D prestack depth imaging of the Nankai subduction zone off southeast Kii Peninsula

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The Nankai subduction zone off southwest Japan is one of the best-suited convergent plate margins for studying large megathrust earthquakes as well as growth of accretionary prism. Megathrust earthquakes have repeatedly occurred along the Nankai subduction zone with a recurrence interval of 100-200 years. In late 2007, the IODP NanTroSEIZE project began drilling into the seismogenic portion of the megathrust along which the 1944 Tonankai earthquake (M = 8.1) has occurred off the Kii Peninsula, southwest Japan. In order to figure out detailed crustal structure and physical property of the Nankai subduction zone off southeast Kii Peninsula, we have acquired three dimensional (3D) multi-channel seismic (MCS) data. The 3D MCS area (12 x 62 km) was designed to fully cover most of the drilling sites of the project NanTroSEIZE.

For the 3D bin gathers after pre-conditioning, we have constructed and updated interval velocity volume model for 3D prestack depth migration (PSDM). Wide-angle ocean bottom seismograph (OBS) velocity data guided the 3D PSDM velocity model building and updating. After 3D horizon-based tomographic updating, we have applied 3D grid-based tomography for final tuning of the 3D PSDM velocity model.

The 3D PSDM result provides both very detailed seismic images and P-wave interval velocities of the Nankai accretionary wedge. Based on reflection characteristics and P-wave velocity (Vp), we identify three major seismic units in the outer wedge between outer ridge and prism toe; upper unit, middle unit, and lower unit. The upper unit with Vp 1.6-3.5 km/s is characterized by many folds and imbricate thrust faults. We interpret this high-reflectivity upper unit to be offscraping layer. The middle unit just above decollement reflection with strong amplitude shows Vp 2.7-3.2 km/s and a few subparallel reflectors. We interpret this low-reflectivity middle unit to be underplating layer. The lower unit immediately beneath the decollement reflection shows Vp 3.5-4.0 km/s and almost reflection-free character. We interpret this reflection-free lower unit to be underthrusting layer.

In particular, the existence of the middle unit with lower velocity has not previously been reported, although numerous seismic reflection data have been accumulated along the Nankai subduction zone since the 1980's. Several wide-angle OBSs over the middle unit observe a 'shadow zone', referred to as a significant decline of first arrival amplitude, supporting the low velocity of middle unit. In this talk, we will focus on formation and implications of the low-velocity middle unit along the Nankai subduction zone.