# Structural and seismic reflection characteristics of the splay fault and deep strong reflector in the Nankai accretionary wedge

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Multichannel seismic (MCS) reflection profiles show splay faults in the rupture area of the 1944 Tonankai earthquake. The MCS profile reveals a unique, landward dipping, ~30-km-long thrust fault with bright reflection, which branches upward from the plate-boundary interface at ~10 km depth and ~55 km landward from the deformation front (trough axis) in the forearc basin. This thrust fault becomes steeper as it approaches the seafloor just seaward of the outer ridge, breaking through the Nankai accretionary wedge. Because the thrust fault almost reaches the seafloor and is apparently within the 1944 Tonankai coseismic rupture area estimated from tsunami and seismic waveform inversions, we suggest that it corresponds to a splay fault branching upward from the subduction zone plate boundary. We note the reverse polarity reflection of the splay fault, which may indicate elevated fluid pressure in the fault zone.

We observed another fault plane with bright reflection within the Nankai accretionary wedge, which was almost parallel to the top of subducting oceanic basement. We call it a deep strong reflector (DSR). Structural features and reverse polarity reflection characteristics suggest that the DSR as an upper interface of the underplated layer corresponds to a shear plane or a fault zone with high pore fluid pressures. Based on the BSR-derived temperature of the DSR off Cape Muroto, the presence of the fluids around the DSR may be explained by the clay mineral dehydration due to smectite-to-illite conversion. We found that most of the DSR was observed in a region which has not suffered from the 1946 coseismic dislocation even though it was locked during the interseismic period. The DSR as a shear plane or a fault zone constrains a regional variety of the coseismic dislocation around the updip limit of the Nankai seismogenic zone. Considering all of the DSR characteristics, we propose a hypothesis for the DSR's development and role. For the DSR zone, the plate boundary is fully locked and the active underplating process takes place. The fluids derived from the mineral dehydration of the underplated materials may infiltrate into the structurally weak roof thrust zone that was already inactive, creating a strong reflection with reverse polarity such as the DSR. Assuming that the fluids make the roof thrust reactive and it is in a steady-state slip during the interseismic period, the shear stress due to the basal decollement process may be released, resulting in a very small coseismic dislocation. Consequently, the DSR may play an important role as a possible releaser of the shear stress energy stored at the plate boundary around the updip limit of the Nankai seismogenic zone.