Seismogenic zone imaging, off Kumanonada

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According to the compilation of all available seismic profiles in the Nankai Trough, we understood that splay faults (Out-Of-Sequence Thrusts; OOSTs) are prominent structure in the Nankai accretionary prism. The splay faults merging to the plate interface between the subducting Philippine Sea plate and the overriding Eurasian plate. The contact area of the splay faults and decollement plane may be possible up-dip limit of the seismogenic zone from geological interpretation point of view (see umbrella proposal). The splay faults are not continuously traced nearly parallel to the trough axis. The discontinuity of splay fault system coincides with the basement structure from magnetic anomaly map. The splay faults are understood as out-of-sequence thrusts and can trace more than 100 km in the Tonankai domain. The faults are recognized as the outer-arc-high in the Kumano accretionary wedge. The splay fault system has an important scientific target that will be clarified by drilling. These are: 1) What the relationship between 'locked zone' and splay fault? 2) How do they form and how do they evolve? 3) How the splay faults act as 'Tsunamigenic fault' 4) How splay faults act during large rupture process?

A new bathymetric survey and dive observations by manned submersible are carried out in the Kumano accretionary wedge. Basic morphological interpretation and dive observations give a new insight of tectonic framework of the Kumano area. Prominent splay fault system shows transpressional fault system and associated by active folding and faulting structures. One of the splay fault has dextral slip component from en-echelon structural interpretation. Several seepage sites are discovered along the splay faults. Preliminary chemical analysis of sediment pore fluids on the splay fault shows up to 10 % depletion of chloride concentration compare with bottom seawater and extremely high methane concentration of more than 600 umol/kg. A significant gamma-ray anomaly also discovered from the same site. These data suggest that the origin of fluid is significantly deep and the fluid may flow along the splay fault. A recent Tsunami inversion study suggest that the rupture area during the last large earthquake (Tonankai, 1944) spread over even the splay fault system area. The splay faults show significant differences of activities from structural interpretation of each fault. The lower fault is cut by upper one and covered by slope sediments that are not deformed. This phenomena are confirmed by surface observations by submersibles and deep-towed camera surveys.

Recent MCS profiles of the JAMSTEC revealed extremely clear image of plate boundary faults between the subducting Philippine Sea plate and the Eurasian plate in the Kumano area. One of the prominent feature of plate boundary at near proposed up-dip limit of seismogenic zone is the highly reflective (reverse polarity) splay faults. The phenomena suggest the splay faults are conduits of fluid flow from decollement at proposed locked region in depth. New data will be presented and discussed.