Reconstruction of splay fault activity based on integrated subsurface geological data of the slope basin on the Nankai accretionary prism off Muroto

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Estimating activity of a splay fault is important to understand the long-term formation process of an accretionary prism as well as a pattern of coseismic slip propagation. Splay faulting causes local uplift in an accretionary prism, which would be recorded in a slope basin.
In this study, we conducted interpretation of subsurface structures of a slope basin located at the hanging wall of a splay fault to reconstruct activity of the splay fault on the off-Muroto area of the Nankai accretionary prism. 3-D seismic volume obtained during R/V *Ewing 9907/9908* cruise (Bangs et al., 2004) and high-resolution cross-section images obtained by deep towed subbottom profiler on the R/V Hakuho-maru KH-16-5 cruise were used in this study. This basin is located at 80 kilometers to the southwest of the Cape Muroto and a depth of 3000 m, and 8 kilometers long in northwest-southeast and 6.5 kilometers long in northeast-southwest forming an ellipse shape. Cores from Site 1175 and Site 1176 obtained by Ocean Drilling Program (ODP) Leg 190 were also reanalyzed to constrain lithology, structures and age.
As a result of seismic interpretation, three structural units and two splay faults were confirmed. They were named as Unit A, Unit B and Unit C from top to bottom, and landward and seaward splay faults as Splay Fault Y and Splay Fault Z, respectively. Unit A is characterized by tilted reflectors that getting steep with depth. The age of the bottom of this unit is estimated to be ~0.5 Ma, which means the tilting had started ~0.5 Ma due to the activity of Splay Fault Z. The high-resolution cross-section obtained by subbottom profiler (SBP) combined with tephra age results from Site 1175 core shows that activities of minor faults at the southern edge of slope basin, subsidiary formed by Splay Fault Z, decreased at ~105 ka, and stopped at ~28 ka. Considering these results, we constrained changes the activity of Splay fault Z: faulting started at ~0.5 Ma, gradually decreased at ~105 ka and stopped at ~28 ka.

Keywords: slope basin, High resolution sub-bottom profiler, Nankai accretionary prism, Ocean Drilling Program, Splay faults

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