Formation process of a slope basin in the Nankai Accretionary prism reconstructed from high-resolution SBP integrated with core data of ODP Site 1175 and Site 1176

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Upper plates of subduction zones record various phenomena associated with plate subduction. Geological records of slope basins overrapping accretionary prisms are useful to reconstruct tectonic activities of decollements and/or splay faults. In general, low-frequency sources are preferred for seismic reflection profiling to avoid attenuation in the water. However, low-frequency sources permit limited resolution of profiles due to trade-off relationship of frequency and resolution. For this reason, only limited studies focused on detail structures of the shallow portion of the deep-sea slope basins (e.g., Tsuji et al., 2014, *EPS*). In this study, we conducted interpretation of subsurface structures and reconstructed the formation process of the slope basin on the Nankai accretionary prism using high-resolution cross section images obtained by deep towed subbottom profiler on the R/V Hakuho-maru KH-16-5 cruise around the Nankai Trough off Muroto. This slope basin is located at 80 kilometers to 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. An obvious strike-slip fault including normal-slip orientation at 1 kilometer seaward from the basin and a splay fault at 2 kilometers from the strike-slip fault are confirmed by Underwood et al. (2003, *JSR*), there is a high possibility that the basin records those activities. Moreover, Kodaira et al. (2000, *Science*) reported the existence of a subducted seamount at north of the slope basin, which means that subduction of this seamount had an impact on formation of the basin. Two cores from Site 1175 and Site 1176 were obtained by Ocean Drilling Program (ODP) Leg 190 around the basin, we also compared the result of interpretation to depositional structures and age. The high-resolution cross section shows a splay fault, strike-slip fault and hillock associated with minor faults including a strike-slip fault with reverse fault component at the center of the hillock. In the landward region from the strike-slip fault on the hillock, structures indicating relative subsidence of landward margin of the basin were confirmed. Additionally, basin strata show the evidence of landward migration of a depocenter in that region, which is coincident with the structures in the seismic profiles (Shipboard Scientific Party, 2001). The dip angle near the Site 1175 increase with depth, which suggest continuous tilting. Only normal faults exist in the landward region from the top of the hillock. Especially, four normal faults getting through to the seafloor are attributed to successive faulting because the displacement of those faults increase with depth. In addition, landslide deposit flowed from landward slopes is ascertained in the cross section. On the other hand, the reverse fault group being part of a splay fault is included in the trenchward region from the strike slip fault. The subbottom profile shows the evidence of obvious reverse and normal faulting around that region. Notably, reverse faulting is dominant in trenchward-half of the hillock, although no faults are getting through to the seafloor. The reflecting surfaces correspond with volcanic ash or sand layers by comparison both reflection surfaces and stratigraphic succession of cores on the Site 1175 and Site1175. Depositional age from analysis of ash suggest that the tilting in landward region from the strike-slip fault was getting low in activity and calmed within 28 ka. It is difficult to presume the moment of initiation of tilting due to depth limit of SBP, however, the basin already started tilting when the 105 ka surface deposited because that tilting of the surface confirmed around Site 1175. Additionally, the number of faults cutting surface younger than 28 ka is less than those cutting older than that surface, and no faults except the well-developed strike-slip fault at the center of the hillock reach the

seafloor. Therefore, those results indicate that a high likelihood of that the tilting at shallow portion of the basin caused by faulting of the splay fault, and suggest that the tilting had initiated before deposition of 105 ka surface and stopped by 28 ka at the latest. In this way, deep towed SBP integrated with core data has a great potential for reconstructing high time-resolution basin growth and fault activity.

Keywords: Slope basins, Accretionary prism, Sub-bottom profiler

