Preliminary Results of Mega-Splay Riser Pilot during IODP Expedition 315 in the central Nankai Trough

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http://ofgs.ori.u-tokyo.ac.jp/~ofgs/ashi/ashi-res-j.html

IODP Expedition 315, entitled *Megasplay Riser Pilot*, was conducted from November 16 to December 18, 2007 near the seaward limit of the rupture zone of the 1944 Tonankai earthquake in the central Nankai Trough as one of the Stage 1 expeditions of the NanTroSEIZE (Nankai Trough Seismogenic Zone Experiment). We collected core samples from tow drilling sites where the future deep riser drillings of the megasplay fault are planed in Stages 2 and 3. Objectives of our expedition include acquisition of geotechnical information needed for well planning of future deep riser holes as well as scientific objectives for each drilling site.

Site C0001 is located at the small bench on the hanging-wall of the megasplay fault (the lower splay fault) and the footwall of the subsidiary fault (the upper splay fault). Seismic profiles show the slope basin with 200 m thick series of layered reflectors above the more transparent unit. The coring revealed that the slope basin was composed mainly of Quaternary to late Pliocene silty clay and clayey silt with numerous intercalations of volcanic ash layers. The bottom of the basin is composed of a thick sand layer which overlays the late Pliocene to late Miocene accretionary prism unit. Site C0002 is located at the southern margin of the forearc basin. Age determination of the forearc basin sedimentation overlying the accretionary prism is critical to the estimation of the beginning and activities of the splay fault. Site C0002 penetrated Quaternary alternation of fine-grained sandstone and mudstone and basal Pliocene mudstone, and cored the late Miocene accretionary prism rock. Facies analysis revealed rapid sedimentation in the forearc basin during the Quaternary and sediment-starved conditions in the basal slope basin during the Pliocene.

Minor faults mostly recognized as dark-color seams were pervasive in clayey sediments and mudstone at both sites. Structural analyses of such faults are crucial for estimating changes of paleostress fields. Our preliminary analyses at Site C0001 suggest that the direction of the maximum horizontal compressive stress remains northwest-southeast throughout the entire interval; changes of vertical stress exhibit normal faults in the shallow formation and reversed and strike-slip faults in the deep formation. Site C0002 shows the similar changes of paleostress recorded around the boundary between the forearc basin and the accretionary prism. Moreover, north-south extension by normal faulting was overprinted at the forearc basin unit. The latest deformations at both the sites are consistent with the results from the borehole breakouts observed by LWD during Expedition 314.

Downhole temperature measurement using the APCT3 was first applied to the Chikyu expedition and successfully conducted to 171 mbsf at Site C0001 and to 159 mbsf at Site C0002. Results of downhole temperature measurements yielded almost linear increases with depth. Downhole measurement provides better information about temperatures at great depths than conventional type near-surface heat flow measurements, which are highly affected by fluctuation of seafloor temperature. Acquisition of a good temperature profile and thermal conductivity data are crucial for future deep well planning and the mechanical design of long-term borehole tools installed during Stage 4.