



## **First Riser Logging in Scientific Ocean Drilling: Operational Planning and results/reality**

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The first wireline logging, downhole stress measurement, and two-ship walkaway VSP (Vertical Seismic Profiling) were conducted in the riser drilled hole during IODP Expedition 319 in 2009. The hole C0009 is first riser drilling hole in ODP/IODP history by JAMSTEC D/V Chikyū. The expedition 319 is one of series of NanTroSEIZE Project, which goal is to reveal earthquake mechanism in Nankai trough seismogenic zone in Japan. The hole C0009 is drilled at TD 1603.7mbsf under 2054m sea water. Sampling cores, cutting analysis, gas monitoring, wireline logging, downhole stress measurement, and two-ship walkaway VSP (Vertical Seismic Profiling) were conducted. This presentation report the operational planning, results and reality.

IODP standard wireline logging items: natural gamma-ray, resistivity, density, porosity, sonic velocity, resistivity image were measured. The advantages of riser drilled hole against riserless drilled hole for wireline logging are 1) stable hole condition, 2) accurate environmental correction by controlled drilling mud, and 3) large variation of tool selection because of regular hole size instead of slimhole by conventional IODP riser drilling. A couple of new tools were used for new measurement and improvement of the data quality. The SonicScanner (trademark of Schlumberger) successfully measured compressional and shear velocity in very low velocities at the soft sediment, where it has been difficult to measure them with conventional DSI tool.

The stress and pore pressure in the borehole were measured with the wireline logging tool, (Schlumberger MDT). The single probe tool enable to measure temporal formation fluid pressure. The double packer tool enable to fracture test by sealing and pumping in the borehole. These in-situ measurement and stress experiment data are very important to understand physical properties and mechanism of fault zone.

Super long offset walkaway VSP was conducted to reveal detail subsurface structure and velocity distribution. The 16 sets of the no planned 3-C geophone are clumped with 15m spacing at ~1300-1600mbsf in the cased C0009 hole by Chikyū. Eight OBS (Ocean Bottom Seismometer)s deployed at the seafloor. JAMSTEC R/V Kairei shot along 53km line (maximum offset from the hole is ~30km) and round 3.5km circle with 16-array tuned air-gun. Zero-offset VSP was conducted to measure velocity and create seismogram along the well as well. Using high resolution data obtained from the equipment, detailed structural interpretation, anisotropy analysis, and shear velocity analysis are being carried out.

Riser drilling takes not only operational advantages such as deeper and safety hole, but also scientific advantage such as increasing measurement items which has never done in riserless drilling and improving data quality. It enlarge the options to approach new discovery and Science.