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Long-term borehole observatory installation during Exp 332.

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Tonankai earthquakes are magnitude 8 class earthquakes known to occur every 100-150 years in the Nankai Trough, south of Japan. In order to monitor and watch detailed seismic process in the vicinity of its epicenter, we plan to establish a network of long-term borehole observatory in NantroSEIZE program in the IODP in three locations with different seismic characteristics; C0009 above the seismically coupled plate interface to cause Tonankai earthquake, C0002 near the edge of the seismically coupled zone, and C0010 above the aseismic part of plate interface of incoming Philippine sea plate and penetrating one of splay faults from the plate boundary. The C0010 and the C0009 Site were drilled during the Exp 319 in 2009. A pressure and temperature monitoring package called "Smart-Plug" was installed in the C0010A hole in 2009 for monitoring the pore-fluid pressure in the splay fault and seafloor.

During IODP Exp 332 in December 2010, we have successfully recovered the Smart-Plug from C0010A and replaced with further improved observatory package called "Genius plug", adding water-sampler (osmo-sampler) and in-situ microbial package.

In the IODP Exp 332, we also installed the first planned permanent seafloor borehole observatories in the NantroSEIZE program in IODP Hole C0002G. Strainmeter, tiltmeter and seismic sensors were cemented near the bottom of 980 m seafloor borehole to ensure stable environment required for these geodetic measurement, where distance to the Tonankai seismogenic fault is approximately 6 km. In the same borehole, we can also measure pore-fluid pressure in three depths and temperature in 5 depths. The borehole observatory in C0002G is currently measuring pore-fluid pressure in the accretionary prism, sediment basin, and seafloor. In March, 2011, we plan to start long-term seismic and geodetic observation in the C0002G borehole observatory. We expect the strainmeter, tiltmeter, pore-fluid pressure, and broadband seismometer data from quiet and stable environment in Hole C0002G and C0010A will produce a key observation defining slip behavior of the subducting plate in zone between seismically coupled and decoupled plate interface.