Riserless contingency operations during IODP NanTroSEIZE Expedition 358

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The International Ocean Discovery Program (IODP) Expedition 358 in the NankaiTrough was carried out from October 10, 2018 to March 31, 2019. The original plan of this expedition was to deepen the existing cased borehole at Site C0002 in the Kumano Basin, and to reach the plate boundary fault lying below a high velocity zone by using logging while drilling (LWD). However, due to operational difficulties, drilling at Site C0002 was ended by the end of February 2019, with new depth records in scientific ocean drilling: LWD reached 3262.5 meters below sea floor (mbsf), and core samples were recovered from 2836.5 to 2848.5 mbsf.

After finishing riser operations at Site C0002, riserless contingency drilling was conducted at two sites until March 31, 2019. Site C0024 is located at the toe region of Nankai Trough, while Site C0025 is in the Kumano Basin. Site C0024 was selected to reveal fast/slow earthquakes and their history along the shallow plate boundary, with relation to core/log/long-term monitoring data from Sites C0006 and C0007. Site C0025 was chosen for understanding the background of geological evolution for the onset of seismogenic zone of the Nankai Trough.

LWD at Hole C0024A penetrated the probable plate boundary fault zone, and reached 869 mbsf. At shallow holes (C0024B/C/D/G), cores were retrieved down to 319.5 mbsf. Trench-wedge facies dominated by turbidites with volcanic ash layers was found in shallow holes. Sediments at C0024 are expected to record seismicity and fault activity in the frontal thrust system. Preliminary age data suggest that the top part of this site is missing due to surface erosion. At a deep hole (C0024E), cores record the trench-wedge to Shikoku Basin transition.

Coring at Hole C0025A started from 400 mbsf, and continued down to 580.5 mbsf. The early phase of sedimentation history of the Kumano Basin is expected to be recorded in the retrieved core. Description and measurement of the cores was performed in Chikyu at Shimizu Port in July 2019.

Despite limited shiptime, riserless contingency drilling during Exp. 358 operated efficiently. Upcoming data from Sites C0024 and C0025, together with previous data from other NanTroSEIZE drillsites, will help our understanding of spatial and temporal aspects of seismogenesis in the Nankai Trough.

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