

Preliminary Scientific Results of IODP Expedition 348: Ultra-deep Riser Drilling into the Nankai Accretionary Prism

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The Nankai Trough Seismogenic Zone Experiment (NanTroSEIZE) is a multi-disciplinary scientific project designed to investigate fault mechanics and seismogenesis along subduction megathrusts through seismic imaging, direct sampling, in situ measurements, and long-term monitoring in conjunction with laboratory and numerical modeling studies. International Ocean Discovery Program (IODP) Expedition 348, the latest advance of the NanTroSEIZE project, started on 13 September 2013 and was completed on 29 January 2014. During Expedition 348, the drilling vessel *Chikyu* advanced the ultra-deep riser hole at Site C0002, located 80 km offshore of the Kii Peninsula, from a depth of 860 meters below sea floor (mbsf) to 3058.5 mbsf, the world record for the deepest scientific ocean drilling, and cased it for future deepening. The drilling operation successfully obtained data on formation physical properties from logging while drilling (LWD) tools, as well as from lithological analyses of cuttings and core from the interior of the active accretionary prism at the Nankai Trough. IODP Site C0002 is the currently only borehole to access the deep interior of an active convergent margin.

Preliminary scientific results of Expedition 348 include:

(1) Fine-grained turbiditic mudstones with coarser silty and sandy interbeds, exhibiting steep dips (between ~60 and 90 degrees) are predominant in the prism down to ~3000 mbsf. The biostratigraphic age of the sediments in the lowermost part of the hole is thought to be 9-11 Ma, with an assumed age of accretion of 3-5 Ma.

(2) Slickenlined surfaces, deformation bands and mineral veins are present throughout the drilled interval, while well-developed scaly clay fabrics are increasingly observed below ~2200 mbsf. A substantial fault zone with well-developed foliation was successfully cored from the deep interior of the prism at ~2205 mbsf.

(3) Porosity generally decreases from ~60% to ~20% from the seafloor to 3000 mbsf. However, physical properties including grain density, electrical conductivity and P-wave velocity suggest fairly homogeneous properties in the interior of the prism between ~2000 and 3000 mbsf.

(4) Drilling mud gas analysis during the riser drilling indicates that a source of hydrocarbon gas shifts from microbial origin to thermogenic at around 1700-2300 mbsf.

Lithological and structural characterizations, the style of deformation, and downhole physical properties all indicate a complex structural evolution and will provide unprecedented insights into the mechanical state and behavior of the prism at depth.

Keywords: IODP, NanTroSEIZE, Nankai Trough, accretionary prism