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IODP Expedition 338 科学結果速報
Preliminary results of IODP Expedition 338: Scientific aspects

金川 久一[1*], Dugan Brandon[2], Moore Gregory[3], Strasser Michael[4], 前田玲奈[5], Toczko Sean[5], IODP Expedition 338 乗船研究者[6]
Kyuichi Kanagawa[1*], Brandon Dugan[2], Gregory Moore[3], Michael Strasser[4], Lena Maeda[5], Sean Toczko[5], IODP Expedition 338 Scientists[6]

[1] 千葉大学, [2] ライス大学, [3] ハワイ大学, [4] スイス連邦工科大学, [5] 海洋研究開発機構, [6]IODP Expedition 338
[1]Chiba University, [2]Rice University, [3]University of Hawaii, [4]ETH, [5]JAMSTEC, [6]IODP Expedition 338

The Nankai Trough Seismogenic Zone Experiment (NanTroSEIZE) is a multi-disciplinary scientific project designed to investigate fault mechanics and seismogenesis along subduction megathrusts through reflection and refraction seismic imaging, direct sampling, in situ measurements, and long-term monitoring in conjunction with laboratory and numerical modeling studies. As part of the NanTroSEIZE program, operations during Integrated Ocean Drilling Program (IODP) Expedition 338 were planned to extend and case riser Hole C0002F, begun on Expedition 326 in 2010, from 856 meters below the sea floor (mbsf) to 3600 mbsf. Riser operations extended the hole to 2005.5 mbsf, collecting a full suite of logging- and measurement-while-drilling (LWD/MWD), mud gas and cutting data. However, due to damage to the riser during unfavorable winds and strong current conditions, riser operations were cancelled. Hole C0002F was suspended at 2005.5 mbsf, but left for re-entry during future riser drilling operations, which will deepen the hole to penetrate the megasplay fault at about 5000 mbsf.

Contingency riserless operations included coring at Site C0002 (200-505, 902-940 and 1100.5-1120 mbsf), LWD at Sites C0012 (0-709 mbsf) and C0018 (0-350 mbsf), and LWD and coring at Sites C0021 (0-294 mbsf) and C0022 (0-420 mbsf). These sites and drilling intervals represent key targets not sampled during previous NanTroSEIZE expeditions, but relevant to comprehensively characterize the alteration stage of the oceanic basement input to the subduction zone, the early stage of Kumano Basin evolution, gas hydrates in the forearc basin, and the recent activity of the shallow megasplay fault zone system and submarine landslides.

Preliminary scientific results of Expedition 338 include:

1. LWD, mud gas monitoring and analyses of cuttings from the deep riser hole characterize two lithological units within the inner wedge of the accretionary prism at Site C0002, separated by a prominent fault zone at ~1640 mbsf. Internal style of deformation, downhole increase of thermogenically formed gas, and evidence for mechanical compaction and cementation document a complex structural evolution and provide unprecedented insights into the mechanical state and behavior of the wedge at depth.

2. Multiple samples of the boundary between the Kumano Basin section and the underlying accretionary prism at Site C0002 shed new light on this unconformity, the interpretation of which was debatable from previous samples and data. New samples suggest that variable erosional processes were active on small spatial scales.

3. Geochemical data characterize the gas-hydrate bearing zone (200-400 mbsf) in the Kumano Basin at Site C0002 as a zone of disseminated methane-dominated hydrate of microbial origin.

4. Operations at Site C0012 included 178.7 m of detailed LWD characterization of the oceanic basement, indicating an upper ~100 m zone of altered pillow basalts and sheet flow deposits, and a lower, presumably less altered basement unit.

5. Cores recovered at Site C0021 improve our understanding of submarine landslides in the slope basins seaward of the splay fault. LWD data acquired at Sites C0018 and C0021 characterize in situ internal structures and properties of mass-transport deposits (MTDs) which relate to the dynamics and kinematics of submarine landslides.

6. LWD resistivity images from Hole C0022A, located in the slope basin immediately seaward of the megasplay fault, show a conductive horizon where the tip of the megasplay fault is inferred from the 3D seismic data. Although the fault itself was not sampled at Hole C0022B, structural and porosity data from cores as well as interstitial water data suggest that the conductive horizon is possibly the splay fault tip.

Keywords: NanTroSEIZE, accretionary prism, forearc basin, megasplay fault, submarine landslide, subduction input