Physical Properties Measurements from IODP NanTroSEIZE Stage 1 Expedition 316

Akito Tsutsumi[1]; David Goldsby[2]; Robert Harris[3]; Tao Jiang[4]; Matt Knuth[5]; Laurent Louis[6]; Daniel Curewitz IODP Expedition 316 Scientists[7]; IODP Expedition 314 Scientists[7]

[1] Graduate School of Science, Kyoto University; [2] Brown University; [3] Oregon State University; [4] ORI, Tokyo Univ.; [5] University of Wisconsin; [6] Universite de Cergy-Pontoise; [7] -

Integrated Ocean Drilling Program (IODP) Expedition 316 is part of the Nankai Trough Seismogenic Zone Experiment (NanTroSEIZE) drilling project. Expedition 316 is focused on comprehensively evaluating the deformation, inferred depth of detachment, structural partitioning, and fault zone physical characteristics at the frontal thrust and the shallow portion of the megasplay fault system offshore the Kii Peninsula (Scientific Prospectus, Expedition 316). Drilling operations took place between 12 December 2007 and 5 February 2008. Two holes were drilled at site C0004 (proposed site NT2-01I), four at site C0006 (proposed site NT1-03B), four at site C0007 (proposed site NT1-03A), and two at Site C0008 (proposed site NT2-10). Physical property measurements at each site characterize lithologic units, states of consolidation, and deformation and strain, and are correlated with downhole logging-while-drilling data. In general, discontinuities in trends of bulk density and porosity aid in identifying structural and lithologic boundaries, while trends within in structural and lithologic units characterize states of consolidation. For example, at site C0004 located on seaward edge of the Kumano Basin uplift, an abrupt increase in bulk density and decrease in porosity is observed at around ˜320 mbsf marks the juxtaposition of older Pliocene sediments against younger, underthrust Quaternary sediments. The relatively low values of density and high values of porosity above 320 mbsf may be characteristic of the damage zone associated with faulting. At site C0006 located at the seaward edge of the accretionary prism bulk density increases and porosity decreases to about 475 mbsf. At ˜475 mbsf, however, the trends in these properties change sign and is associated with a shear zone. Site C0007 is also at the seaward edge of the accretionary prism and similar trends in bulk density and porosity are here as well. These deviations of the density and porosity data trends from the general trends of these properties with depth are likely associated with lithologic and/or structural unit boundaries.

Physical properties measurements on core samples collected during Expedition 316 lead to new insights about fault zone behavior. These measurements provide a vital addition to the LWD data collected during Expedition 314 and, when integrated with other NanTroSEIZE expeditions, will characterize physical properties, strength, composition, and structure of the slope sediments, hanging wall, and footwall of the megasplay fault and other faults in the Nankai Trough region.