

LWD log characterization and lithostratigraphy of Nankai Trough off Kumano: Preliminary Results from IODP Expedition 314

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During IODP Expedition 314 at Nankai Trough offshore Kii Peninsula, five sites were successfully drilled and logged with logging-while-drilling (LWD). The drillsites are located in Kumano Basin (Site C0002), splay fault area (Sites C0001, C0003, and C0004), and frontal thrust area (Site C0006). Log units were defined and lithologies were interpreted for each site based on the log trends and characteristics.

At Site C0002 drilled in Kumano Basin four log units were defined. Log Unit I is interpreted as slope basin deposits. Log Units II and III are interpreted as thick basin-fill dominated by repeating turbidite deposits. Within log Unit II are two zones of particular interest defined by changes in the log responses. Zone A (218.1-400.4 m) is interpreted as a hydrate-bearing zone, with the gas hydrates concentrated in the sandy horizons of the turbidite deposits. Zone B (481.6-547.1 m) is interpreted as a potential gas-bearing interval. Log Unit III is a homogeneous clay-rich interval of mudstone, immediately overlying the top of the older accretionary prism section that forms basement to the basin at 936 m. Log Unit IV, from 936 to 1401 m, corresponds with the prism composed of sand-rich alternating beds.

In the splay fault area three sites were drilled and logged. At Site C0001 three log units were defined. Log Unit I (0-198.9 m) is interpreted as slope basin sediments. Log Unit II (198.9-529.1 m) is composed of relatively homogeneous hemipelagic mud and silt turbidites. Log Unit III (529.1-976 m) contains highly fractured zones. Both log Units II and III are interpreted as accretionary prism sediments. At Site C0003, located 1 km south of Site C0001, three log units were defined. Log Unit I (55-76.6 m) is interpreted as muddy to sandy slope basin sediments. Log Unit II (76.6-151.5 m) is interpreted as unconsolidated and porous sandy beds. Log Unit III is interpreted as clay-rich sediments as part of the thrust sheet of the megasplay fault branch. At Site C0004, located at the toe of the splay fault, three log units were defined. Log Unit I is interpreted as slope basin deposits. Log Unit II was defined for the thrust sheet and associated complexes. The upper part of the log unit II (67.9-96.2 m) is interpreted as deformed sediments, possibly gravitational in origin. The lower part of the log unit (236.4-323.8 m) is characterized by strong deformation especially at 292 m, possibly the boundary between hanging wall and footwall. Log Unit III is interpreted as sediments underthrust beneath the splay fault.

At Site C0006, located at the frontal thrust of the prism near the trench axis four log units were defined. Log Unit I is interpreted as sandy and muddy deposits. Log Unit II is interpreted as mudstone with thick sandstones. Possible repeated stratigraphic sections are recognized in this log unit. Log Unit III was defined for the alternating beds of mudstone and sandstone. The base of Log Unit III (at 711 m) is interpreted as a detachment zone as well as sharp lithological boundary. Log Unit IV is characterized by Low gamma ray and low resistivity and interpreted as massive sandstones.

The overall lithostratigraphy in the shallow part of Nankai Trough offshore Kii peninsula was interpreted by the LWD transect. Further investigations of core-log-seismic integration using core data recovered from Expeditions 315 and 316 are in progress.