Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

SSS019-07 Room: 303 Time: May 24 09:00-09:15

Preliminary Results from IODP Expedition 322: NanTroSEIZE Subduction Inputs

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Integrated Ocean Drilling Program (IODP) Expedition 322 was designed to document characteristics of incoming sedimentary strata and igneous basement prior to their arrival at the subduction front. To accomplish these objectives, coring was conducted at two sites in the Shikoku Basin on the subducting Philippine Sea plate. Site C0011 is located on the northwest flank of the Kashinosaki Knoll, whereas Site C0012 is located near the crest of the knoll. The resulting data, which include logging-while-drilling during IODP Expedition 319, provide a wealth of new information on presubduction equivalents of the seismogenic zone. Near the end of Expedition 319, LWD data were collected at proposed Site NT1-07 (Hole C0011A). LWD data include natural gamma radiation, resistivity, and resistivity images. We were able to make confident correlations and comparisons between the logs and subsequent core description and multisensor core logger (MSCL) data. The whole section was divided into five logging units on the basis of visual inspection of the log responses. These divisions also correlate reasonably well with the seismic stratigraphy. Analysis of borehole breakouts indicates that the maximum horizontal stress field (SHmax) is orientated north-northeast?south-southwest, roughly perpendicular to the convergence direction of the Philippine Sea plate. Although coring at Site C0011 failed to reach the total depth target, coring at Site C0012 penetrated 33 m into igneous basement and recovered the sediment/basalt interface intact at ~540 m CSF. The age of basal sediment is >18.9 Ma. The merger of lithofacies and age-depth models from the two sites captures all of the important ingredients of basin evolution; including an unrecognized interval of late Miocene tuffaceous/volcaniclastic sandstone designated the middle Shikoku Basin facies. An older (early to middle Miocene) turbidite sandstone/siltstone facies with mixed detrital provenance occurs in the lower Shikoku Basin; this unit is broadly correlative with similar Miocene turbidites on the western side of the basin. Another result came from geochemical analyses of pore water and hydrocarbons at Site C0012. Pore fluids on top of the basement high show clear evidence of a seawater-like source, with chlorinity values increasing toward basement because of hydration reactions and diffusion; the fluids are largely unchanged by the effects of focused flow and/or in situ dehydration reactions associated with rapid burial beneath the trench wedge and frontal accretionary prism. Thus, Site C0012 finally provides a reliable geochemical reference site for the subduction zone.

Keywords: Integrated Onean Drilling Program, NanTroSEIZE, subduction inputs, D/V Chikyu, Expedition 322, logging-while-drilling