Geophysical Research Abstracts,
Vol. 11, EGU2009-9080, 2009
EGU General Assembly 2009

Formation of imbricate accretionary wedge in prism toe: NanTroSEIZE Expedition 316, Sites C0006 and C0007

Y. Kitamura (1), T. Kanamatsu (2), X. Zhao (3), Expedition 314, and 315 and 316 Scientists ()

(1) IFM-GEOMAR, Leibniz Institute of Marine Sciences at the University of Kiel, Kiel, Germany (ykitamura@ifm-geomar.de), (2) Institute for Research on Earth Evolution, Japan Agency for Marine-Earth Science and Technology, Yokosuka, Japan, (3) Department of Earth and Planetary Sciences, University of California Santa Cruz, Santa Cruz, USA

This study presents magnetic fabric analysis to examine internal structure of the accretionary wedge, especially at the toe of the prism in the Nankai Trough, off Japan. Nankai Trough Seismogenic Zone Experiment (NanTroSEIZE) is a complex drilling project within a framework of Integrated Ocean Drilling Project (IODP) and aims to reveal insitu phenomena of seismogenic zone processes in subduction zone. This multi-stage, platform and expedition project has been started in 2007 with three expeditions as the first stage.
Two sites (C0006 and C0007) were drilled as a part of IODP Expedition 316, which penetrated the sediment section including in-sequence thrusts and the frontal thrust. Measurement of anisotropy of magnetic susceptibility (AMS) provides insight into recorded strain during sedimentary and tectonic processes. Results from the upper part of the wedge show sedimentary acquired compaction fabric in general. In the lower part, AMS fabrics occasionally rotate almost ninety degree and suggest horizontal compression. In contrast, magnetic fabric did not show any correspondence to in-sequence thrusts or minor faults, which implies that those faults have developed with concentrated shear deformation without disturbing surrounding sediments. Dense sampling from two adjacent drilling sites clearly figured out a change in strain field which is reported by previous ocean drilling studies. Based on the results, we propose a model of structural evolution at the toe of the prism. Plunging sediments induce horizontal stress in the lower part of the wedge, which reduces the effective stress and forms high pore pressure anomaly and fracture zone. The frontal thrust is bended geometrically and terminates its activity in response to increase of friction that triggers initiation of the next-generation frontal thrust. The upper part of the wedge tilts accordingly that results in unstable slope of the wedge surface. This model is only for ~1km scale tectonics at the deformation front but is very important to build up the “imbricate fold and thrust zone”. Since the region behind the prism toe is only dead structure unless they are cut by out-of-sequence thrusts later, deformation in the prism toe would be a key for whole accretionary wedge.