

Geological structure and cold seep of the Nankai accretionary prism off Kumano - Previous studies and preliminary report

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Accretionary prisms in the Nankai Trough show various shape and internal structures according to decollement development controlled by morphology and/or lithology of the subducting oceanic plate. These variations probably correspond to five domains of main slip areas on great earthquakes in the Nankai Trough, suggesting close relationships between prism growth and seismogenic processes. Moreover, studies on source and expulsion of fluids provide us with knowledge of growth process, material cycle and seismogenic processes in accretionary prisms because fluids play significant roles in subduction zones. Growth and fluid in the Nankai accretionary prism off Kumano have been studied using Shinkai 6500 in 2000, 2001 and 2002. Three main fault scarps (2500, 3500 and 4000m in water depth) were investigated. Chemosynthetic biological communities were observed near the base of the slope in each fault scarp, suggesting fluid expulsion including methane gases. Especially, studies in 2002 conducted push core sampling for geochemistry, heat flow and gamma ray measurements at the upper fault scarp. Low Cl anomaly and high content of Uranium series nuclides were observed. Moreover, high thermal gradient anomaly is measured on long term monitoring of heat flow suggesting active fluid discharge. The exposures of the scarp are mainly composed of highly tilted siltstone, alternations of sandstone and siltstone, and light-colored tuff. These sequences are regarded as accreted trench-fill sediments by offscraping based on the seismic reflection profile. In contrast, seismic profiles show that the decollement does not extend seaward of the deformation front, but continue to the frontal thrust. Displacement of the decollement itself exposes relatively lithified rock even at the prism toe. We will also report preliminary results of the 2003 dive survey.