

# Heterogenous distribution of stress and fault related alteration along the seismogenic fault of subduction zone

# Arito Sakaguchi[1]; Haruka Yamaguchi[2]; Yukari Kido[2]; Kohtaro Ujiie[1]; Takamasa Kanaya[3]; Toshitaka Baba[2]

[1] JAMSTEC; [2] IFREE, JAMSTEC; [3] Geology, Kochi Univ

A heterogenous distribution of the coseismic slip and asperities are found by the seismologic observation and rock friction experiments, and the fault rock along the ancient fault zone varies in lithology. However, their relationship is still uncertain.

The Cretaceous Okitsu Melange is composed of the imbricated oceanic stratigraphic sequence with map scaled duplex structure, and pseudotachylyte bearing seismogenic fault zone is developed at the roof of the duplex structure. This fault zone is characterized by locally concentration of the mineral vein and pseudotachylytes with intense deformation of fault rock. This implies the relationship between the fluid flow and deformations of fault zone. The tectonic setting of this fault is very similar with the present Nankai subduction zone. The seismic survey found the fluid along the top of the underplating unit at the seismogenic depth in Nankai trough (Park et al., 2002). This study attempt to estimate the paleo-stress and fluid flow along the ancient seismogenic fault of subduction zone in the Okitsu Melange, Shimanto accretionary complex.

The fault rock analysis has been done at two sites for comparison. One site is characterized by the concentration of mineral vein and pseudotachylytes with deformation zone, 15m in thickness. The fault rock is composed of cataclasite and pseudotachylytes with basalt, sandstone, black shale and vein mineral fragments. Many of fault parallel and sub-parallel mineral veins of ankerite, calcite quartz are occurred along the fault zone, and some of vein minerals cemented fault rocks. Most of rocks at fault zone affected pressure solution deformation to make the S-C fabrics. The basalt blocks, 3m in thickness suffered alteration due to fluid flow along the fault. This altered basalt preserves few of igneous originated minerals less than 10 percent, and the carbonate minerals are dominant among the altered minerals. The paleo-piezometer of calcite twin reveals that over 10m of thick zone of fault rock suffered higher stress than background in this site with maximum value of 320 MPa.

In contrast, another site is characterized by the thin fault zone with a few of mineral veins. Although altered basalt blocks are occurred along the fault similar with the site A, twenty four percent of igneous primary minerals are survived. The many of chlorite and zeolite groups are found greater than the carbonates. Higher paleo-stress than the background is limited within 2m in thickness of the fault zone.

The fault rock where suffered high stress in thick zone, is characterized by large amount of carbonate precipitation. It seems that the carbon dioxide bearing fluid flow relates with the lock mechanism along the fault.