S231-006 **Room: 302** **Time: May 24 10:15-10:30**

Permeable convection and mechanical coupling of the plate boundary zone

mitsuhiro toriumi[1]

[1] Univ.Tokyo

PERMEABLE CONVEVCTION AND MECHANICAL COUPLING OF THE PLATE BOUNDARY ZONE

Mitsuhiro TORIUMI (GSFS, UT/ IFREE)

The permeable convection model of the plate boundary zone with large permeability (Toriumi and Yamaguchi,2000; Toriumi,2006) have strongly suggested that sporadic distribution of asperity and non-asperity (slip zone) should be explained by the upflow and downflow regions, respectively because of solubility change of quartz due to PT change of permeable solution. This model also predicts the regional chemical change of boundary rocks due to dissolution and precipitation of minerals from convection solution as proposed by Toriumi and Sakaguchi (2006, GSJ meeting). In this paper we also show the principal stress orientation change derived from degree of mechanical coupling due to this convection system.

The model is to be proved by the seismic anisotropy derived from the small crack population filled with fluid. The mechanical state of the plate boundary zone above the slab is governed by the stresses bending the slab and shear stress due to the slab subduction. As the result, the maximum stress is nearly vertical for the maximum tectonic stress is controlled mainly be the bending of the plate. The minimum principal stress should be subparallel to plate motion in the case of strong coupling but it turns to intermediate principal stress orientation in the decoupling case (non asperity case). These situation of stresses should resulted in the population and orientation of the open cracks filled with fluid. Thus in the case of mechanically coupled state, the open cracks dominate the orientation elongating normal to the plate subduction, but in the case of decoupled state open cracks elongate parallel to the plate subduction.

Natural examples can be seen in the subduction metamorphic rocks such as Sambagawa and Shimanto metamorphic rocks. In the Sambagawa metamorphic rocks have widely sealed open cracks which can be classified into two types in terms of orientation; one is the shear parallel sealed cracks and the other the shear normal sealed cracks. These different orientations of open cracks were probably formed in the different mechanical coupling states discussed above. This suggestion leads to interesting conclusion that the present asperity and non asperity region of the plate boundary must display the different seismic velocity anisotropy and shear wave seismic splitting.