

Slip velocity and shear crack sealing in the subduction zone

mitsuhiro toriumi[1]

[1] Univ.Tokyo

The subduction related metamorphic rocks have commonly shear cracks filled with metamorphic minerals (Toriumi and Hara, 1995). These sealed shear cracks are characterized by wavy walls and sealing grains elongated subparallel to the wall. The author proposed the model of competing shear slip rate and sealing by precipitation of metamorphic minerals. Further the wavy surface of the walls has been interpreted by the instability of viscous shear interface. On the other hand, the slip velocity of the shear cracks varies from sound velocity to geological plate motion and thus it is required to estimate the actual slip rate in the boundary rocks.

The slip velocity may not be constant but it should increase rapidly with time and then it attains a peak velocity. The peak of the slip velocity must be controlled by the stress operating on the shear plane and back stress due to fluid pressure. Therefore fluid pressure is delayed to increase against slip velocity increase. Thus the dynamics involving shear slip and fluid pressure change controls stability of the shear movement.

In this talk we will propose the dynamical system having two parameters of water content and frictional coefficient dependent on shear velocity and discuss the instability of shear velocity and shear plane instability.

References

Toriumi M., and E. Hara, 1995, Crack geometries and deformation by the crack-seal mechanism in the Sambagawa metamorphic belt, *Tectonophysics*, 245, 249-261.