

Chemical reaction induced by pulverization ~Chemical processes in fault immediately after earthquake ~

Tomohiko Saito[1]; Hidemi Tanaka[1]

[1] Dept. of Earth and Planet Sci., Univ. Tokyo

<http://www.eps.s.u-tokyo.ac.jp/index.html>

Generally, seismic slip pulverizes rocks in and around fault plane. Surface area of these rocks increase by pulverization. Increasing in surface area cause rocks to be chemically activated, resulting in chemical reaction. Fault gouges are observed as a result of both mechanical pulverization and chemical reaction. Therefore, we could say, [earthquake slip causes chemical reaction]. The timescale of this chemical reaction can be divided into two types: (1) during dynamic seismic slip and immediately after slip (short time scale), (2) during interseismic period after slip (long time scale). It is expected that type (1) time scale directly concerned with timescale of seismic slip or energy budget in earthquake. We focused on chemical reaction in short time scale and performed grinding experiment.

We use samples taken from Miyagawa (eastern part of Atotsugawa fault) drilled core 200m in depth. There are some fault gouge layers between host rocks in drilled core. Fault gouge show the past pulverization by seismic slip. The transformation process from host rock into fault gouge can be divided into two categories, one is mechanical pulverization and the other is chemical reaction caused by pulverization.

We grinded host rock with water and measured chemical composition on both rock and water after grinding. Here, grinding is analogous to pulverization in natural fault and measuring chemical composition is to study chemical reaction caused by grinding. We use the groundwater taken from borehole at Miyagawa as liquid media, which is intended that the system be close to natural fault. For comparison, we also use distilled water as liquid media.

Experimental results show that increasing in pH and increasing in concentration of metal ion in water and change of chemical composition in rock sample after grinding. We discuss about chemical process in the time when immediately after seismic slip by comparing these experimental result with fault gouge.