Frictional and fluid transport properties of fault gouge

Miki Takahashi[1]; Takashi Arai[2]; Koji Masuda[2]

[1] Institute of Geoscience, AIST; [2] AIST

Recently, measurements of permeability of fault rocks become one of the important test items to understand the fluid flow properties in the vicinity of the faults. Numerous studies generally have been clarifying permeability profile of the fault rock. While fault gouge, due to its smaller grain size, shows low permeability and becomes a seal to prohibit fluid flow across the fault, the fault breccia including numerous connecting fractures becomes the high permeable conduit along the fault. However, most of previous studies did not address these change of transport properties with fault development, because they have investigated the permeability of fault rocks under hydrostatic pressure. Here, to reveal the evolution of transport properties of various fault rocks relevant to fault sliding, the high-temperature and high-pressure triaxial testing machine was employed to investigate the permeability changes of artificial and/or natural fault gouge during the fault sliding. We would here show preliminary results of two series of experiments on frictional properties of gouge; one was employed to understand relation between frictional behavior and fluid transport properties of clay gouge and another was to reveal sliding and healing process of granite gouge under high-temperature and high-pressure conditions, viewed by monitoring of permeability development. It will be of particular interests in the estimation of pore pressure increasing/decreasing in the vicinity of the fault, caused by porosity change during fault sliding. This kind of research would be a key to deduce the mechanism of abnormal pore pressure occurrence at faulting, considered as a trigger of seismic event.