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Frictional Strength of Rock-Forming Mineral Gouge at Hydrothermal Conditions

KOJI MASUDA[1], TAKASHI ARAI[2], MIKI TAKAHASHI[1], KEIGO KITAMURA[1]
KOICHIRO FUJIMOTO[3] and NORIO SHIGEMATSU[4]

[1]*Geological Survey of Japan, National Institute of Advanced Industrial Science and Technology, Japan,*
[2]*National Institute of Technology and Evaluation, Japan*
[3]*Tokyo Gakugei University, Japan,*
[4]*Chiba University, Japan*

In order to understand the earthquake generation process, we need to understand the frictional properties of fault zone materials under high-pressure and high-temperature conditions. Laboratory data on frictional properties of fault zone rocks are useful for understanding the mechanism of faulting. Frictional properties of feldspar and quartz gouges under high-pressure and high-temperature conditions were obtained. In the laboratory study, we use the information on the natural fault materials based on the results of the geological study. We conducted geological studies on the exhumed seismogenic fault zone in Japan to characterize fault zone materials and fault zone structure. We conducted frictional experiments (the velocity-stepping test) by using feldspar and quartz gouges (about 3 micron diameters) under high-pressure and high temperature in the wet and dry conditions. Temperature varied from room temperature to 600C. Effective confining pressure was 150MPa. The values for a-b of quartz and feldspar were measured in order to constrain constitutive parameters in friction law such as rate- and state-dependent friction law. Velocity weakening of quartz and feldspar gouge is observed in the wet conditions while the values for a-b are positive in the dry conditions in all temperature ranges.

Keywords: Frictional strength, high-pressure and high-temperature, quartz, feldspar, fault material, seismogenic process, rate- and state-dependent law

References

[1] K.Masuda, K.Fujimoto and T.Arai, *Earth Planets Space*, **54**, 1091 (2002).
[2] K.Masuda and T.Arai, *J.Geography (Chigakuzasshi)*, **112**, 953 (2003).