# Frictional behavior of feldspar and quartz at the temperature of brittle to ductile zone

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Most of earthquakes in the crust occurred at the depth of 5 to 20km, and the distribution of mainshocks matches the base of this zone, where is considered to be consistent with brittle-ductile transition zone. At the depth of this zone, the temperature is about 350 degreeC. The physical properties of rocks at around this temperature were determined by many frictional experiments. These results indicated the velocity dependence of steady state friction was switched from velocity weakening to velocity strengthening at around 350 degreeC. In these experimental studies, granites and quartz were generally used. On the other hand, frictional experiment with feldspar is very few in spite of dominant phase in the crust. In order to understand the source processes of earthquakes, it is important to evaluate the physical properties of minerals which composed of crustal rocks, for example feldapar and quartz.

In this study, we conducted frictional experiments by using anorthite, albite and quartz gouges under high pressure and high temperature in a triaxial apparatus, and compared frictional behaviors of three minerals with elevated temperature under the wet and dry conditions. Temperature varied from room temperature to 600 degreeC. In the dry conditions, experiments were conducted under the confining pressure up to 150MPa. In the wet conditions, pore water pressure was applied up to 50MPa. Fine- (1-10um) and coarse-grained (50um) samples were prepared to evaluate the effect of different grain size, and were put between upper and lower sawcut cylinders (20mm diameter*40mm long). The sawcut was oriented at 30 degree to the loading axis. These were jacketed with thin sleeves of annealed Cu.

Main results are as follows. (1) The velocity dependence of steady state friction in feldspar were changed between the temperature of 300 degreeC and 400 degreeC as well as the results of past frictional studies with granites. (2) Feldspar slip-softened at the temperature of 600 degreeC, which is probably caused by the effect of dissolution.