

Frictional behavior of quartz gouge at high-temperature hydrothermal conditions

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Friction experiments on quartz gouges at high-temperature (927C) hydrothermal conditions revealed two types of frictional behavior. Under conditions which favor the activity of pressure solution, i.e. for small grain size or at slow displacement rates, deformation is distributed across the whole gouge layer, and the frictional behavior is characterized by continuous slip hardening and high strength with velocity strengthening. In contrast, for specimens with large grain size sheared at fast displacement rates, the frictional behavior is characterized by slip softening and subsequent localized sliding at low strength with velocity strengthening. This slip localization may represent a new variety of instability independent of velocity dependence of friction.