

Laboratory studies of effects of water on deformation, fracture, and frictional processes of rocks

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We review our experimental studies of the effects of water on deformation, fracture, and frictional processes of rocks and gouge. Physical and physico-chemical effects of water on rock deformation and frictional processes are investigated. The triggering of seismicity by fluid flow or pore-pressure change is controlled by the pre-existing in situ differential stress state. The time-dependent properties of rock strength and deformation are the results of physico-chemical reaction at the crack tips. Effects of water on the frictional behavior of rock-forming minerals such as quartz and feldspar are imminent at the high temperature ranges. Although its importance is well recognized, only limited amounts of data on the effects of water on the deformation processes of fault materials under high-pressure and high-temperature conditions are available.