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Frictional properties of the seismically active Chihshang Fault, southern section of Longitudinal Valley Fault, Taiwan, and its implication for fault strength and slip behavior

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Fault slips along the fault plane can be either stick-slip or steady creep, and these two modes of slip represent seismic (unstable) and aseismic (stable), respectively. Chihshang Fault, the southern section of Longitudinal Valley Fault (LVF), is known to creep near the surface and also produce large earthquake (e.g., 2003 Mw 6.8 Chengkung earthquake). Numerous studies have demonstrated the spatiotemporal evolution of seismic and aseismic slip on LVF by means of geodetic techniques and seismological data. Instead, to date there is the lack of laboratory experiments to constrain the frictional properties of LVF. To better understand the friction strength and its instability of LVF, rock friction experiments on LVF borehole fault gouge are designed to deform from slow (3*10E-6 m/s) to high velocities (1 m/s) under dry, room-humidity, and wet condition. In addition, mineralogical and microstructural observation would be carried out such as XRD, FESEM, synchrotron XRD, and micro-Raman for the determination of physical and chemical processes triggered during simulated fault sliding. Combined with current geodetic and seismological data, this field- and laboratory-based approach would expand our understanding of fault deformation together with significant applications to tectonically active regions.