



Erosion influence the seismicity of active thrust faults

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Assessing seismic hazards remains one of the most challenging scientific issue in Earth sciences. Deep tectonic processes are classically considered as the only persistent mechanism driving the stress loading of active faults over a seismic cycle. Here we show with a mechanical model that erosion also significantly influences the stress loading of thrust faults at the timescale of a seismic cycle. Indeed, erosion rates of about ~ 0.1 to 20 mm/yr, as documented in Taiwan and in other active compressional orogens, can raise the Coulomb stress by ~ 0.1 to ~ 10 bar on the nearby thrust faults over the inter-seismic phase. Mass transfers induced by surface processes in general, during continuous or short-lived and intense events, represent a prominent mechanism for inter-seismic stress loading of faults near the surface. Such stresses are probably sufficient to promote the rupture of deep continental earthquakes up to the surface or to trigger shallow seismicity. We illustrate this last point by identifying seismic events in Taiwan, by the mean of a coupled statistical and mechanical approach, that were induced by intense erosional events.