

Physical meaning of seismic quiescence

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Seismic quiescence can be explained by decrease of local stress or/and increase of local fracture strength of asperity between fault surfaces in the process of stress build-up over fault plane. Historically the following hypotheses have been proposed to explain the phenomenon. I) Dilatancy Hardening (Keleher and Savino, 1975), II) Stress Flattening (Mogi, 1976), III) Asperity Failure (Kanamori, 1980), IV) Pre-slip (Wyss, 1988), V) Fracture Stress (Ogata, 2001), etc.. To evaluate them we assume an additional condition. That is, if the seismic quiescence occur prior to unstable major sliding, contact area between fault surfaces should decrease and acceleration of local pre-slip should occur. Among the hypotheses, according to the assumption, Dilatancy Hardening (I) can explain the decrease of the contact area between fault surfaces with increase of the gap volume, or Pre-slip (IV) can explain unstable growth of local pre-slip prior to main sliding.