



A continuum of fault slip modes

Deepa Mele Veedu and Sylvain Barbot

Earth Observatory of Singapore, Nanyang Technological University, Singapore (deepa004@e.ntu.edu.sg)

Observations of earthquakes, slow-slip events, tremors and stable creep on several plate boundaries indicate a continuum of fault slip modes in relieving tectonic stresses. Though experimental and numerical results suggest that slow slip modes can exist, no complete understanding is available at present on the influence of slow earthquakes on the earthquake cycle dynamics. Here, we show a broad range of fault slip events emerging between steady creeping and earthquakes. We present three distinct slow slip regimes (periodic slow events, period-multiplying slow-slip events, and period-multiplying slow and fast events), which occur as a band between stable sliding and regular earthquakes (bilateral and unilateral ruptures). Period-multiplying represents different multiplying factors for the interval between fault slip events. Period-multiplying slow-slip events and period-multiplying slow and fast events have not been observed experimentally yet. Our results predict the possibility that aperiodic slow-slip events can occur along with the well-observed phenomena of periodic slow-slip events along the plate boundaries. Our results suggest that a combination of friction parameters (a and b), characteristic slip distance, L and effective normal stress may control the continuum between earthquakes and stable creep transiting through slow earthquakes. The study implies that a unified view incorporating slow-slip events is essential for assessing earthquake hazards.