Why do earthquakes stop?

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The underlying structure of a fault determines whether an earthquake rupture will jump from one fault to another, magnifying its size and potential devastation. Understanding why some earthquakes terminate along a fault, while others jump or step-over a gap to another fault, is essential to forecasting the seismic hazard of complex fault systems, such as the San Andreas Fault.

In a paper published in this issue of BSSA (Bulletin of the Seismological Society of America), author David Oglesby of University of California at Riverside suggests that the pattern of stress at the end of the primary fault can strongly affect an earthquake's ability to jump to a secondary fault. He suggests that a smooth, gradual decrease in stress along a rupture results in slower rupture deceleration, less strain, less generation of seismic waves, and lowers the likelihood that the earthquake will jump to another fault.

In contrast, a stress pattern that terminates suddenly leads to abrupt rupture termination, higher strain, more seismic radiation, and a higher likelihood of the rupture jumping to a secondary fault. The results of this numerical study illustrate the importance of the slip gradient and the acceleration of the rupture front in determining the probability of a rupture jumping from one fault segment to another.

Source: Seismological Society of America