Probing the Physical Conditions and Mechanics of Faulting via Dynamic Triggering

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Seismic activity naturally occurs on active fault systems due to tectonic stressing between plate boundaries. While earthquakes mostly occur in the brittle upper crust of Earth, deep tectonic tremor, a nearly continuous seismic signal, is generally found in the lower crust along major plate-boundary faults. Sometimes tremor and earthquakes can be triggered 'ahead of schedule' by transient stress changes associated with the passing seismic waves of earthquakes. This process of fault failure induced by seismic waves is commonly known as 'dynamic triggering' and has been observed worldwide in a wide range of tectonic environments. Because seismic waves of earthquakes are capable of inducing fault failure, triggering studies can be used as a probe to not only understand a fault's current state of stress but to also better understand how seismic activity occurs on active fault systems and how faults interact with one another. In this talk, I present findings from active fault systems in the Western Hemisphere - tremor triggered on multiple strike-slip faults and earthquakes triggered in geothermal/volcanic regions. Triggered seismic activity is characterized as being induced by the large amplitude, long period surface waves of distant great earthquakes, and the attributes and mechanisms responsible for triggering are discussed. I compare my results from the Western Hemisphere to my initial findings of triggering in volcanic regions of Japan.