How do Earthquakes Converse?

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I will argue that large earthquakes can promote and inhibit failure on nearby faults, triggering other quakes, and that the transfer of stress plays a governing—but not exclusive—role in this interaction. Through a series of physical demonstrations and slides, I will use these concepts to explain the distribution of mainshocks, aftershocks and progressive earthquake sequences, around the world.

This work has always been a team effort, so in this talk, I will be conveying work of my outstanding collaborators, Geoffrey King, Shinji Toda, Jian Lin, Tom Parsons, Jim Dieterich, Keith Richards-Dinger, Aykut Barka, and Volkan Sevilgen. They bring a rich range of insights and talents.

At heart, we find that the stress imparted by earthquakes does not simply turn seismicity on or off; rather, the background seismicity rate is enhanced by stress increases, and suppressed by stress decreases. This, we believe, best explains why seismicity in stress trigger zones is often patchy or discontinuous; why seismicity rate declines in stress shadows can be subtle or absent, and why some aftershock zones expand, migrate or densify over time, and why some aftershocks last for years and others persist for centuries.

While this model is a far cry from earthquake prediction, it perhaps can take us on the road to the more useful and accurate earthquake forecasts that we all seek.
Stress transferred by the 1992 Landers, California, quake to surrounding faults