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What controls the spatial distribution of remote aftershocks?

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I use a quasi-dynamic spatially discrete model of a rate- and state-dependent fault to examine the effect of multiple elastic stress transfers on the spatial extent of aftershock activity. I show that multiple stress transfers may significantly alter the spatial distribution of aftershock sequences, and give rise to stress-seismicity relations that are inconsistent with Dieterich's aftershock model. Specifically, I present an example in which, owing to the effect of multiple elastic stress transfers, the area experiencing seismicity rate change is much larger than that subjected to a stress change. I define a parameter that quantifies the proximity to the failure in the model, and show that differences in the magnitude of aftershock rates are due to differences in the proximity to failure that prevailed prior to the mainshock. I show that accelerating and decelerating cumulative Benioff strains are indicative of a region approaching to or moving away from failure, respectively. Finally I compare the cumulative Benioff strains in remote sites triggered either by the Landers or the Hector Mine earthquake, and infer that differences in the state of stress that prevailed prior to these mainshocks may explain the different spatial distribution of their remote aftershocks.