A possible mechanism for the precursory relative quiescence of aftershock activity

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Seismic quiescence has been attracting the attention as one of the precursors to a large earthquake. Also, it has been getting more attention than ever that the stress changes due to a large slip can explain the detailed mechanism of triggering another large event. Likewise, the relationship between the quiescence and stress lowering owing to a major rupture or silent slip elsewhere could be discussed as a general phenomenon, but sensitive detection of the quiescence need the modeling of normal aftershock activity. Thus, we expect that actual aftershock activity relative to the modeled rates is sensitive enough to measure slight stress changes, especially changes for the inhibition of the crustal relaxation process due to silent slip.

For example, the aftershock sequence of the 1992 Landers earthquake (M=7.3) showed clear quiescence relative to the modeled rate. The quiescence began about 6 months after the mainshock, and lasted more than 6 years leading up to the 1999 Hector Mine earthquake (M=7.1). Specifically, the quiescence was found only in the shallow aftershock activity down to 5 - 6 km depth in the shadow zones where Coulomb stress change would be negative from an assumed precursory slip within the Hector Mine rupture source, whereas the sequence of deeper events showed clear, normal aftershock decay. In contrast, the Hector Mine aftershock activity has been normal, at all depths, relative to the predicted decay during the 14 months.

We would like to show more examples as far as the time allows.