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The onset of the aftershock decay rate across different stress regimes

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We analyze temporal properties of aftershocks of $2.5 < M < 4.5$ mainshocks in southern California in order to determine the time delay before the onset of the power law aftershock decay rate. We show that the c-value is a decreasing function of the magnitude of aftershocks and that it varies across different types of faulting. The time delay before the onset of the power law aftershock decay rate is in average shorter for thrust than for normal earthquakes. For strike-slip earthquakes this time delay takes an intermediate value. Assuming that thrust, strike-slip and normal faulting are associated with a decreasing value of differential stress, the duration of a non power-law aftershock decay rate over short times can be related to the level of stress in the seismogenic crust. Recently, similar observations have been reported for b, the slope of the earthquake size distribution, and we show a positive correlation between the b-value and the time delay before the onset of the power law aftershock decay rate. This observation reveals a similar time-dependent behavior of rock during earthquake rupture and for the nucleation of aftershocks.