



Accelerating Moment Release before large earthquakes: The Stress Accumulation model versus Stress Triggering

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The Stress Accumulation model has been proposed as an explanation for the widely observed phenomenon of accelerating moment release before large earthquakes. This model treats the evolution of seismicity before a large earthquake as the result of loading of the main fault primarily by creep on an extension of the fault at depth. Alternatively, it has been proposed that accelerating moment release is due to a cascade of events driven by stress triggering. In this model, large earthquakes are the result of a period of self-organization in the background stress field (i.e. smaller earthquakes). While both of these models predict accelerating seismicity before the mainshock, they make different predictions of the spatial distribution of this activity. We test the predictions of these models against historical seismicity data from California. While each of the events had a spatial distribution of pre-event seismicity consistent with the Stress Accumulation model, only for one event - Hector Mine - can self-organisation reasonably be invoked as the origin of the observed accelerating moment release. Our study does not suggest that stress transfer is unimportant in understanding earthquake interactions; merely that it is not the main cause of accelerating moment release.