

Stress induced from large earthquakes since 1900 and temporal b value change in Nankai trough

Junhyung Lee¹, Ilgoo Kim¹, *Tae-Kyung Hong¹

1. Department of Earth System Sciences, Yonsei University

The perception of impending great earthquakes may be useful for seismic hazard mitigation. The seismicity is dependent on the stress field as well as medium properties. The Nankai trough is recognized to have a high hazard potential. Large earthquakes occur periodically in the Nankai trough with recurrence intervals of 100-200 years. The influence of fractional stress changes by precedent earthquakes on the induction of forthcoming earthquakes is investigated. We assess the global stress perturbation induced by 1626 earthquakes with magnitudes greater than or equal to 7.0 since 1900. We stack the Coulomb stress changes. The cumulative Coulomb stress changes reach up to an order of tens to hundreds of bars at convergent plate boundaries. Descendant large earthquakes appeared to occur in the regions with large lateral gradients in cumulative Coulomb stress changes induced by precedent earthquakes. The cumulative Coulomb stress changes over a century are comparable among subduction zones. The instability and inhomogeneity in stress field may play an important role in nucleation of great earthquakes. We also determine the temporal variation of the Gutenberg-Richter b values in the slow slip region along the Nankai trough for 40 years. It is observed that the b values were generally bounded between 0.6 and 1.0. The slow slips and associated plate motions accompany micro and small earthquakes, inducing b value increase. The b values increase concurrently at the times of slow slips. The b decay rates after slow slips are observed constant. The consistent b-value decrease rate since 2014 may suggest temporal approaching to a large earthquake.

Keywords: induced stress, Nankai trough, b value