

Deep Triggered Non-Volcanic Tremor in the Slow Earthquake Active Regions in South Chile and Ecuador

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Deep non-volcanic tremor has been observed at many major plate-boundary faults and intraplate faulting systems. Recent studies have shown that the tremor triggered by surface waves of teleseismic earthquake occurs on the same fault patches as the spontaneously occurring ambient tremor. The observations suggest that the triggered tremor can be used as a proxy to estimate the background tremor activity. Here we search for tremor triggered by teleseismic earthquakes in south Chile and Ecuador where the ambient tremor and slow slip event have been observed respectively. In south Chile, we analyzed a temporal array data between 2004 and 2006 and observed clear triggered tremor following the 2004 Mw9.0 Sumatra, 2005 Mw8.6 Nias, and 2006 Tonga earthquakes. Triggered tremor sources are located at the central of the ambient tremor zone. The results indicate both Love and Rayleigh waves promote the tremor triggering potential. The tremor triggering threshold is around 2 kPa, similar to which in Parkfield. In Ecuador, we can only use single station to infer the existence of triggered tremor due to lack of seismic stations in this region. During the period between 2004 and 2012, we observed triggered tremor following the 2010 Mw8.8 Chile and 2007 Mw8.0 Peru earthquakes. Since there is no other station within 500 km near that station, we roughly estimate that the triggered tremor sources are located within 50 km from the station based on the attenuation of tremor from previous studies and the estimation of the time difference between P- and S-waves of triggered tremor. We infer that the triggered tremor source might be located at the region where the slow slip event has been observed. The apparent tremor triggering threshold in Ecuador is about 40 kPa. The high threshold infer a low background tremor rate or simply due to the network capability.

Keywords: non-volcanic tremor, triggered tremor, south America