Complex migration pattern of non-volcaninc tremor in the San Andreas Fault revealed by a mini seismic array

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Since April 2013, we are monitoring seismic activity in the Parkfield segment of the San Andreas Fault using a mini seismic array consists of 18 broadband stations. Here, we focus on about a month-long time period around Mw 6.0 South Napa Earthquake in August 2014, located approximately 330km away from the array in the San Andreas Fault. We use a beam backprojection method [Ghosh et al., 2009; 2012] to detect and locate Non-Volcanic Tremor (NVT). In addition, we use matched-filter method to detect Low-Frequency Earthquakes (LFEs) in the same area. We compare tremor activity imaged by the backprojection method with LFE activity. LFEs are used to calibrate an array in combination with regular earthquakes. We observe a strong burst of NVT associated with Mw 6.0 South Napa Earthquake. A significant duration of tremor activity may be remotely triggered by the Napa earthquake. Using a beam-backprojection method [Ghosh et al., 2009; 2012], we show details of the activity prior to the triggered tremors, a period of strong burst, and a protracted end of the burst. We detect rate of background tremor activity already reaching to the highest level since April 2013 even 10 days prior to the Napa event. Although northwestern part of the study area near Parkfield was active during those 10 days, we observe a delayed triggering of tremor in the Cholame segment, southeast of the study area along the San Andreas Fault. Interestingly, tremor seems to show complex migration pattern during this entire episode. We also detect numerous LFE near Cholame during the tremor burst, which is consistent with high tremor activity in this area. The mini seismic array near Cholame is providing an intimate look at the tremor and LFE activity allowing us to study their implications on fault dynamics.

Keywords: slow earthquake, array, beamform, Parkfield, San Andreas Fault, low frequency tremor

