Towards an Improved Understanding of Deep Tremor in Central California and its Implications for the Cholame Segment of the San Andreas Fault

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Under this grant we have searched for low frequency earthquakes(LFEs) during episodes of tremor in the vicinity of the San Andreas Fault at Cholame (Figure 1). During the project period, *Gomberg et al.* [2008] reported the discovery of tremor in this region, that was triggered by the 2002 Denali, Alaska earthquake. Because this triggered tremor was both time-localized and strong (Figure 2), we made it the focus of our initial efforts.

We analyzed 20 sps data continuous data from the High Resolution Seismic Network (HRSN) and applied a running network autocorrelation method developed by *Brown et al.* [2008] to search for LFEs within tremor. We appear to have found LFEs during the triggered tremor sequence (Figure 3). This should allow us to bring the power of waveform cross-correlation to the tremor problem, which proved a key to understanding the origin of deep, non-volcanic tremor in Japan [*Shelly et al.,* 2006, 2007]. The results should be applicable, not just to the San Andreas fault in this region, but also to other places such as Anza, where triggered tremor is observed.

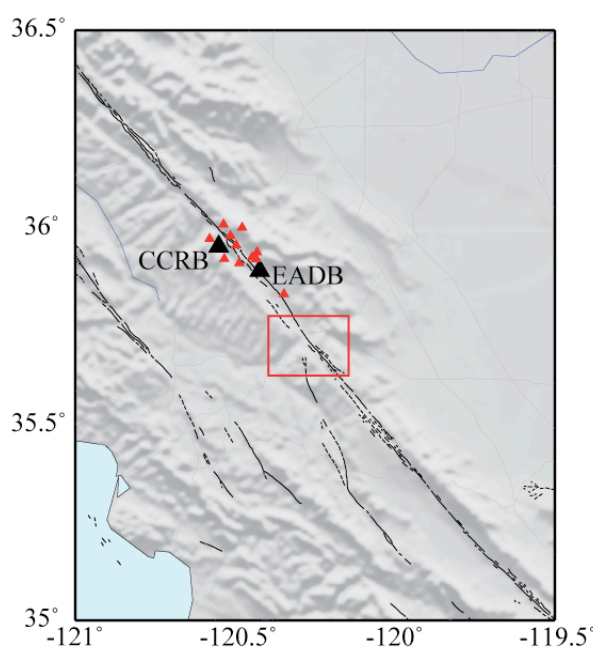
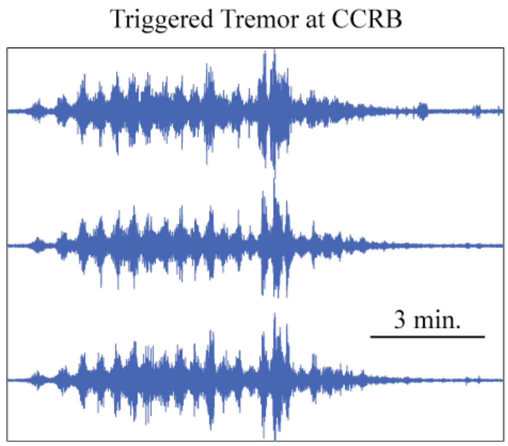


Figure 1. Study area is shown in map view. Red box marks the approximate location of tremor found by *Nadeau and Dolenc* [2005]. Faults are marked with solid black lines. Red triangles represent borehole seismic stations of the Parkfield high-resolution seismic network (HRSN).

Figure 2. Seismograms showing tremor triggered by the 2002 Denali earthquake [*Gomberg et al.*, 2008] as observed on 3 components of the HRSN station CCRB. Tremor excitation if modulated by the strong surface waves radiated by this earthquake not just in the Parkfield region, but also elsewhere in California.



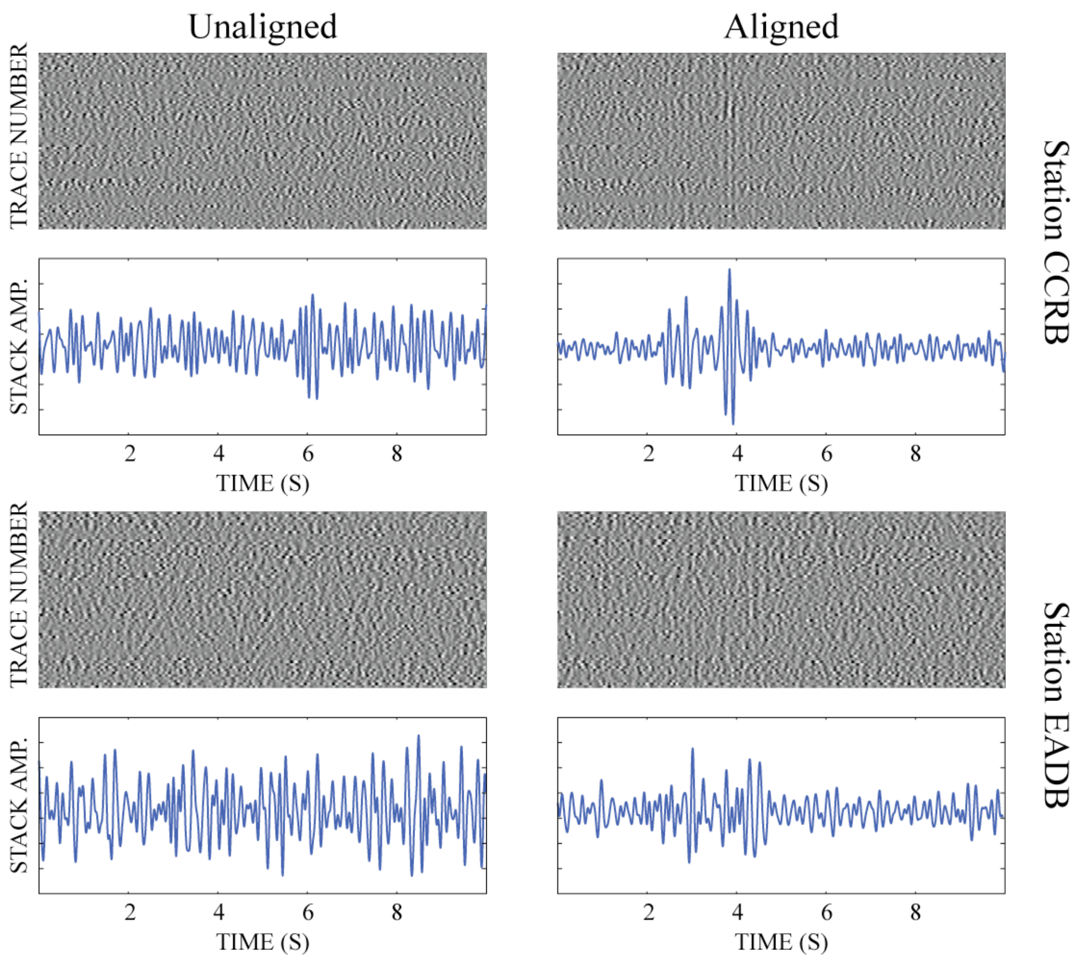


Figure 2 75 possible low frequency earthquakes (LFEs) as detected within the tremor using the method of *Brown et al.* [2008] for all available HRSN stations. After alignment, both P and S waves can be observed at station CCRB (channel DP1 is shown), and the stacked trace show two distinct arrivals, which we interpret as *P* and *S* waves. The *S-P* time of 1.5-2.0 seconds is not consistent with the tremor source determined by *Nadeau and Dolenc* [2005], and must be considerably closer to CCRB. The alignment at EADB is more difficult to interpret, but are most likely to be *S* waves.

References

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