P-10

Tidal triggering of LFEs near Parkfield, CA

Amanda Thomas [1], Roland Bürgmann [1] and David Shelly [2]
1 University of California
2 U.S. Geological Survey
amthomas@berkeley.edu

Studies of nonvolcanic tremor (NVT) in Japan, Cascadia, and Parkfield, CA have established the significant impact of small stress perturbations, such as the solid earth and ocean tides, on NVT generation [*Thomas et al.*, 2009 and references therein]. Similar results irrespective of tectonic environment suggest that extremely high pore fluid pressures are required to produce NVT. We analyzed the influence of the solid earth and ocean tides on a catalog of ~500,000 low frequency earthquakes (LFEs) constituting 88 event families distributed along a 150-km-long section of the San Andreas Fault centered at Parkfield [*Shelly, D. R. and J. L. Hardebeck*, 2010]. LFEs comprising the tremor signal are grouped into families based on waveform similarity and precisely located using waveform cross-correlation. Analogous to repeating earthquakes, LFE families are thought to represent deformation on the same patch of fault. While the locations of repeating earthquakes are assumed to be coincident with the location of asperities in the otherwise aseismically creeping fault zone, NVT occur below the seismogenic zone, where fault zones behave ductilely. We explored the sensitivity of each of these LFE families to the tidally induced shear (RLSS) and normal (FNS), and stresses on the SAF [*Thomas et al.*, 2010]. Nearly all of the 88 LFE families are triggered by positive RLSS and in general correlation increases as a function of depth. Some LFE families experience enhanced triggering during times of extensional normal stress while others preferentially respond to compression. The level of correlation appears to be spatially continuous along the fault but exhibits no depth dependence.

References

Thomas, A.M., R. M. Nadeau, and R. Burgmann (2009) Tremor-tide correlations and near-lithostatic pore pressure on the deep San Andreas fault. *Nature*. 462, 1048-1051, doi:10.1038/nature08654.

Shelly, D. R., and J. L. Hardebeck (2010), Precise tremor source locations and amplitude variations along the lower-crustal central San Andreas Fault, Geophys. Res. Lett., doi:10.1029/2010GL043672, in press.

Thomas, A.M., Burgmann, R. and D. Shelly (2010) Tidal triggering of LFEs near Parkfield, CA. SSA annual meeting. Poster presentation.