Mini-proposals of PBO: Borehole Strainmeter Installation at the Landers-Hector Mine Epicentral Area and the Southern San Andreas

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Landers-Hector Mine Epicentral Area

We propose to deploy borehole strainmeters in the Landers-Hector Mine epicentral region to detect possible "stress waves" generated by future earthquakes in the region. Rydelek and Sacks (1988) hypothesized the existence of such waves and estimated its travel speed based on earthquake migration data from Japan. The best chance to observe such waves, we believe, comes from future significant earthquakes in southern California. The region to have the highest probability of such earthquakes, arguably speaking, is the vicinities of the Landers/Hector Mine epicentral region because of its recent seismic activities.

Our proposed network in the region is composed of two sets of strainmeters. The first set could be deployed along two profiles normal to each other, and centered around the Hector Mine epicenter. The goal of this group is to catch the differential arrival times of the "stress waves". Another group could be deployed with about equal azimuthal coverage, to detect azimuthal pattern of the waves.

Southern San Andreas

When a significant earthquake takes place in southern California, the changes in static stress and the dynamic stress impulses can induce transient responses from the San Andreas fault (King et al., 1994). For example, after the Landers earthquake, Shen et al. (1994) detected displacements across the San Bernardino section of the San Andreas using GPS. Johnston et al. (1994) reported postseismic relaxation signal from a borehole strainmeter in the Devil's Punchbowl close to the Mojave section of the San Andreas after the same earthquake. We propose to deploy strainmeters in pairs along the San Andreas straddling the fault to detect such signals. The locations of the pairs could be: 3-4 at the Mojave, 1-2 at the San Bernardino, and 2-3 at the Coahchella sections of the San Andreas, respectively. The strainmeters would be deployed 10-15 km away from the fault, and the pairing will help detect the deformation sources and eliminate site effects.

References:

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