

Active parasitic folds on the Elysian Park anticline: Implications for seismic hazard in central Los Angeles, California.

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We characterize the seismic hazard of the Elysian Park fault, a blind reverse fault beneath central Los Angeles, by analysis of the Elysian Park anticline, which overlies it. New shallow-subsurface geotechnical data, combined with other surficial stratigraphy and geomorphology reveal that the Elysian Park anticline is an active, 20-km-long structure. From their style and rates of deformation, we estimate a contraction rate of 0.8 ± 0.3 mm/yr for parasitic folds on the southern limb of the anticline. This rate provides a basis for estimating a rate of contraction of the entire Elysian Park anticline, which, in turn allows us to estimate a 1.1 to 1.5 mm/yr rate of slip on the underlying fault. At this rate of slip, rupture of the Elysian Park fault could produce a nominal MW 6.4 to 6.7 earthquake every 700 to 1700 years, on average. Although this Elysian Park earthquake would recur infrequently, its size and recurrence interval are similar to those estimated for the sources of the destructive 1971 San Fernando and 1994 Northridge earthquakes.

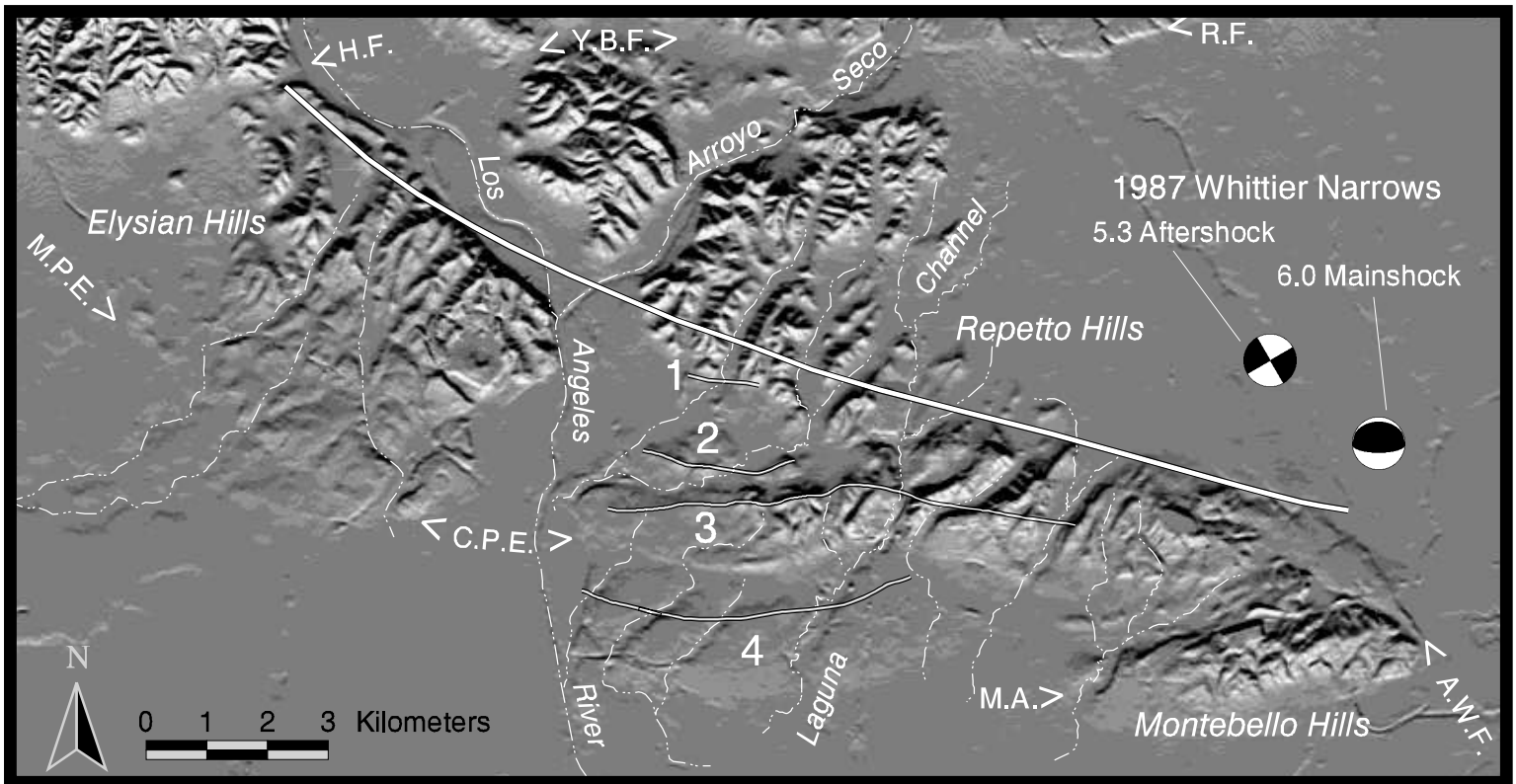


Figure 1: Shaded relief map of the Elysian Park anticline shows the relationship of topography to folding. Topographic relief correlates with the areal extent of the anticline and with the trends of parasitic secondary folds. Parasitic fold axes depicted by thin white lines numbered 1 through 4. The Elysian Park anticlinal axis is delineated by the thicker white line. Drainages crossing all or part of the Elysian Park anticline are shown as white dashed lines. White arrows highlight tectonically-produced topographic escarpments: A.W.F., Alhambra Wash fault; C.P.E., Coyote Pass escarpment; H.F., Hollywood fault; M.A., Montebello anticline; M.P.E., MacArthur Park escarpment; R.F., Raymond fault; Y.B.F., York Boulevard fault. This image is derived from 30m-pixel U.S.G.S. digital elevation models for the Hollywood, Los Angeles, and El Monte 7.5-minute quadrangles.

