Lack of Precursory Slip to the 1999 Hector Mine, California, Earthquake as Constrained by InSAR

by Robert J. Mellors, Lydie Sichoix, and David T. Sandwell

Abstract

We looked for evidence of interseismic strain occurring between the 1992 Landers earthquake and the 1999 Hector Mine earthquake near the Lavic Lake and Bullion faults by using interferometric synthetic aperture radar (InSAR). Interferograms covering the Hector Mine epicentral region were studied for possible slip along the Bullion and Lavic Lake faults by both visual inspection and a matched filter technique intended to emphasize slip located at the nucleation point. Some indications of possible deformation associated with the 5 July 1992 M_L 5.4 Pisgah event was observed, but high decorrelation prevented a conclusive determination. We have seen no evidence for precursory slip in the epicentral region up to 30 days before the Hector Mine event. We estimated that the slip equivalent to a M_w 4.5 event would have been observable in the months before the Hector Mine event, and this places an upper bound on the long-term precursory slip, had it occurred. We have noted that InSAR is well suited for detecting precursory slip in general due to the high spatial resolution and the lack of ground instrumentation required but that the detection level depends on the depth and orientation of the slip.

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