AFTERSHOCKS AND REGIONAL DEFORMATION

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Hypocenters have been determined for more than 800 aftershocks of the San Fernando earthquake. The majority of these lie on a V-shaped structure with north-pointing apex which dips about 45° north under the San Gabriel Mountains. The zone of observed surface breakage nearly closes the open end of the V. Geodetic measurements of surface deformation associated with the main shock indicate maximum slip (2 m reverse slip and 2 m left slip) just north of the zone of surface breakage. Simple dislocation models based on the geodetic observations, and an analysis of the aftershocks lead to the same conclusion that the main shock resulted from elastic strain release on a north-dipping fault. The aftershocks may result from stress concentrations on the margins of the slipped area. Fault-plane solutions are predominately thrust type. Strike-slip type solution, particularly along the southwest limb of the V, are interpreted as resulting from irregularities in the fault surface. The distribution of aftershocks also suggests activity on subparallel faults beneath the San Fernando Valley.

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SEISMOLOGICAL INVESTIGATIONS

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The San Fernando earthquake of 9 February 1971, now assigned a magnitude of 6.4 by the Pasadena Network, occurred in an area of low to moderate seismic activity in the years preceding 1971. There were no known reasons to suspect a major earthquake in this area more than in many other geologically and seismologically similar ares in Southern California, and there were no recognized events precursory to the main shock. It is assigned an epicenter at 34°24.7 min. N., 118°24.0 min. W., and a depth of about 8½ km. The seismic and geologic field data are in good agreement in pointing to a major N-dipping thrust fault as the cause of the earthquake. The aftershock sequence has been normal and is still continuing; major aftershocks delineate a lunate-shaped area that corresponds well to the assumed edge of the broken segment of the thrust fault except near Granada Hills and Chatsworth, where several larger aftershocks that have caused additional damage are not obviously related to the thrust fault of the main shock. The principal geologic and seismologic lesson of the earthquake is that, with some exceptions, we cannot as yet delineate in detail areas of markedly different seismic risk, and that for purposes of public policy in zoning and building codes, all of coastal California must be assumed to chare a relatively high earthquake hazard.

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