

Forecasting earthquake ground motions

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Abstract

The "forecasting" of earthquake ground motions involves developing methods to describe the shaking expected at a site as a function of earthquake magnitude and distance (and sometimes other variables). Earthquake ground motion forecasts are the most critical input to seismic hazard analyses, and are also used to develop site-specific simulated earthquake records for design purposes. Advances in this area enable the cost-effective seismic design of engineered structures.

The foundation of ground-motion forecasting is the analysis and interpretation of earthquake source, path and site effects. This agenda may be pursued using empirical regression techniques, applied to large seismological databases. Alternatively, detailed modeling of specific events may be used to elucidate the underlying processes that drive the observed ground motions. Recent research advances in these areas will be overviewed.

Over the last decade, the volume of data available for developing and validating ground-motion forecasting techniques has increased more than tenfold. This offers unprecedented opportunities for furthering our understanding of earthquake processes and improving ground-motion forecast models.