Spatial Dependence of Acceleration Spectra in Elastodynamic Simulations of Earthquakes: Severely Increased Shaking Away from the Epicenter

Bruce Shaw[1]

(1) Lamont Doherty Earth Observatory, Columbia University.

ABSTRACT

We examine the radiated waves emitted by events on a model fault. The model produces a complex sequence of events with a wide range of sizes from a frictional instability. The spontaneous events emit a rich spectrum of radiated waves as they rupture through the complex stress field left by previous events. We quantify the radiation by measuring the acceleration spectra, averaging over events of a similar size, and then examine the spatial and magnitude dependence of the average acceleration spectra. For the largest events, we see a striking signal: for a given distance from the fault, as one moves parallel to the fault, away from the epicenter the average spectral acceleration actually Increases. These increases can be as high as a factor of 10 or more. We discuss the physical origin of this effect in the model, and point out the significance for earthquake hazard.