MEETINGS: ABSTRACTS

SSA 2009 Annual Meeting Abstract

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INVESTIGATION OF GROUND ACCELERATION DURING THE 2004 M6.0 PARKFIELD, CALIFORNIA, EARTHQUAKE BASED ON ISOCHRONES

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On September 28, 2004 a M6.0 earthquake hit Parkfield, California. Because this earthquake had been expected, a vast network of geophysical instruments was in place to record it. In particular, the 2004 Parkfield earthquake was recorded by more than 50 strong-motion accelerographs located near the fault (eight stations were located less than 1 km away from the fault, with more than 40 stations located between 1 and 10 km from the fault) (Shakal et al., BSSA 2006). Despite its moderate magnitude, the 2004 Parkfield earthquake generated peak accelerations over 1.8g. Equally important the earthquake produced a wide variation of peak accelerations—0.13g to over 1.8g—in the near-fault region; this variation was larger than what is typically observed (e.g. Boore et al., BSSA 2003; ShakeMap interpolations) (Shakal et al., BSSA 2006). It is essential to understand whether these variations close to the fault are mostly a source effect or a site effect. We investigate the origin of the ground accelerations using isochrone theory. Previous studies have shown that strong site effects affect strong-motion stations in the Parkfield region (in some stations the ground-motion is locally amplified by more than 300%) (Liu et al., BSSA 2006). Indeed, most of the stations that recorded large ground accelerations were inferred (in the study of site effects) to locally amplify the ground-motion by considerable factors. In this work we will conclude on how much the ground acceleration pattern is due to source effects. We will use the latest kinematic rupture model derived from strong-motion and GPS data (Custódio et al, JGR in press) to compute the isochrones of the Parkfield earthquake. The isochrone method will determine how much source radiation reaches each station at a given time. We will concentrate on the isochrones corresponding to the time of the peak acceleration.

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