SCEC 2005 Annual Meeting: Abstracts

Your search produced the following results:

Abstract Title: 2004 Parkfield Kinematic Inversion Using Strong-Motion Data Corrected by Site Effects

Author(s): Custodio, Susana (UCSB), Pengcheng Liu (UCSB), and Ralph J. Archuleta (UCSB)

Abstract: The Parkfield section of the San Andreas Fault is one of the most well studied fault zones in the world. A vast network of geophysical instruments monitors the region permanently. Short-term surveys complement our knowledge of the structure of the fault-zone. The 2004 Mw6.0 Parkfield earthquake was extensively recorded in the near-source region. We invert strong-motion data recorded within 32 km of the epicenter to find a kinematic slip model for this event. Because the Parkfield fault region is very heterogeneous (Thurber et al., 2003; Eberhart-Phillips and Michael, 1993; Unsworth and Bedrosian, 2004), we account for site effects. The kinematic inversion is based on a global inversion method (Liu and Archuleta, 2004) where the fault is divided into several subfaults and the source parameters (slip amplitude, rake angle, rise time and rupture velocity) are computed at the nodes (corners) of each subfault. We invert data in the range 0.16Hz-1.0Hz. We use two different 1D layered models for the velocity structure, one for each side of the fault. The bilateral 1D velocity model is interpolated from the 3D velocity models of Thurber et al. (2003) and Eberhart-Phillips and Michael (1993). One of the most interesting features of the 2004 Parkfield earthquake was the large peak ground velocities (PGV) recorded on both ends of the rupture area. We use data from the Coalinga earthquake to infer site effects on the Parkfield array. The stations more affected by resonances (enhancement of certain frequencies) and local amplifications (general amplification of ground-motion at all frequencies) are close to the fault zone, often coincident with the large PGVs. The stations that most amplify ground-motion below 1.0Hz are FZ2 and FZ1, followed by FZ14, FZ10, FZ7, FZ6, GH1W and FZ3. Stations FZ14, FZ3, and CH1E, followed by FZ6, GH1W and FZ2 present the largest resonances. Of these, only FZ3 recorded a relatively low PGV during the Parkfield earthquake. On the other hand, only station FZ12 recorded an extremely high PGV and is not strongly affected by site effects. After taking site effects into account, we obtain a slip model characterized by maximum slip amplitude about 65 cm, confined to a region directly below and to the SE of the hypocenter. A secondary region of large slip is located to the NW of the hypocenter, at a shallower depth (2-8km). Little or no slip occurs below 10km.

Back