3D Imaging and Modeling the Basins of the Santa Clara Valley: Technical Abstract
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Technical Abstract

We have investigated ground motion amplification in the Santa Clara Valley using teleseismic body waves observed during the 1998 deployment of 41 short-period seismometers in the Santa Clara Valley Seismic Experiment (SCVSE, e.g. Lindh et al., 1999). In addition, we have performed a preliminary analysis of microseism amplification. The SCVSE recorded 7 large (M_W>6.4) teleseisms with excellent signal-to-noise ratios. Measured P-wave arrival-time delays, relative P-wave amplification, P-coda duration, and wave energy were used in the analysis. In addition, we performed a series of 3D finite-difference simulations of the teleseismic wavefield to model these parameters using both the UCB (Stidham et al., 1999; Stidham, 1999) and the USGS (Jachens, 2000) 3D velocity models. The results indicate that arrival-time delays on the order of ±0.25 sec correlate strongly with the reported basin thickness in the two models. Furthermore, the relative P-wave amplification is found to correlate even more strongly with the arrival-time delays. Both the wave energy and microseism amplification are found to correlate with the observed teleseismic arrival-time delays. We find that the correlation to basin thickness is strongest for the USGS model, however the UCB velocity model yields wave amplification, which better matches the data. The finite-difference simulations indicate that the observations may generally be reproduced with both of the 3D velocity models, however refinements to the proposed 3D structure for the Santa Clara Valley is needed.