REVISION OF THE CAMPBELL HYBRID-EMPIRICAL GROUND MOTION MODEL FOR EASTERN NORTH AMERICA

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The 2003 Campbell hybrid-empirical ground motion model for ENA used in the 2002 update to the U.S. National Seismic Hazard Maps was revised using new ground motion and seismological models. The application of the hybrid empirical method uses empirical ground motion models from WNA to estimate ground motions in ENA utilizing transfer functions derived stochastically from seismological models appropriate to each region. The same NGA empirical ground motion models that are being used to update the WNA hazard in the 2007 revision of the U.S. hazard maps were used to estimate ground motions in WNA. The ENA seismological model was updated with one recently developed by Atkinson and Boore (2006). A comparison of the spectral accelerations calculated from the NGA models with those simulated stochastically from the previous WNA seismological model indicated that a 100 bar stress parameter and 0.04s Kappa were still appropriate for an earthquake of unknown source mechanism, but that the anelastic attenuation term (Q model) needed to be revised. The Q model that best modeled the empirical strong-motion predictions out to 200 km (Q = 200 f^{0.65}, where f is frequency) was found to agree more closely with that derived from other strong-motion studies than with that used previously based on weak-motion recordings in So. California. In compliance with the linear site-response terms used in the stochastic simulations, the nonlinear response of generic rock predicted by the NGA models was removed before applying the transfer functions and then reapplied to the estimated ENA linear NEHRP B-C boundary ground motions. This step was important because the higher ground-motion amplitudes predicted in ENA result in larger nonlinear site effects than observed for the same site conditions in WNA. The revision of the hybrid-empirical model described above results in a net decrease in the median prediction of spectral acceleration at short periods for NEHRP B-C site conditions in ENA.