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**GROUND MOTION ATTENUATION RELATIONS  
FOR THE CENTRAL AND EASTERN UNITED STATES**

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**ABSTRACT**

We have developed ground motion attenuation relationships for the central and eastern United States for use in future revisions of the National Seismic Hazard maps produced by the USGS. The ground motion attenuation relations describe the dependence of the strength of the ground motions on the earthquake magnitude and on the distance from the earthquake. We first developed earthquake source scaling relations for use in generating ground motions. The source models have spatially varying slip distributions on the fault plane, and are described by self-similar scaling relations between seismic moment and source parameters such as fault dimensions and rise time derived from the slip models of three recent earthquakes in eastern Canada. We generated suites of ground motion time histories using these source scaling relations. The broadband time histories are calculated using a representative crustal structure model and ranges of source parameter values consistent with the source scaling relations. These broadband simulations were used to generate ground motion attenuation relations for hard rock conditions in the central and eastern United States. Ground motion models for both the horizontal and vertical component were developed for response spectral acceleration in the period range of 0 to 4 seconds. Separate ground motion models were developed for earthquake depth distributions that correspond to rifted and non-rifted domains.