HIGH FREQUENCY GROUND MOTION IN CENTRAL MÉXICO: SITE, EXCITATION AND ATTENUATION

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A regional study of ground motion scaling parameters is presented for the region surrounding the Valley of México. Of particular importance to the seismic hazard in this region are intermediate-depth earthquakes, not only because of some highly energetic events, but also because of the proximity to the cities and villages in the Mexican Altiplano. We examined 227 regional earthquakes and mining events ranging in depth from the surface to 100 km and in magnitude from 3 to 7. We also studied several intermediate-depth (100-300 km) events, including the major event of June 15, 1999. From these observations we estimated empirical attenuation relations and an average Q for frequencies between 0.7 and 7 Hz. A simple regression model to separate the source, site, and propagation terms is applied using: $Y = log(A\,(R, f)) = Src\,(f) + Site\,(f) + D\,(R, f)$. Our primary objective is to estimate the propagation term *D(R,f)* which includes the effects of anelastic and scattering attenuation as well as geometrical spreading. An analysis is done in both the frequency and time domains.

Our data were generated by small earthquakes, mining explosions and volcanic activity especially from the Popocatépetl volcano. The estimated excitation shape for the mining events clearly show different populations that distinguish earthquakes from volcanic and mining activity. We parameterized the observations to be able to use random vibration theory to predict peak motion.

A coda normalization technique used for an initial estimate of the propagation term, did not fit the regression results well. I measured the average

attenuation of S and Lg waves and found that a $Q(f) = 220\, f^{0.66}$ described the attenuation and a geometrical spreading as r^{-1} for $r \leq 180\, km$ and as $r^{-0.5}$ for $r \geq 180\, km$. The results indicate that this region is characterized by a rapid decay of amplitude with distance similar to those in other tectonically active regions.