GROUND MOTION STUDIES IN THE SOUTHERN GREAT BASIN OF NEVADA AND CALIFORNIA

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Spatial amplitude attenuation of high frequency seismic waves of locally recorded earthquakes in the Southern Great Basin near the Nevada Test Site was studied by constructing a response spectra data base of SV and PSRV using a time-domain deconvolution method to restore the ground motion from instrumental recordings. Response spectra are shown to be an efficient method for estimating ground motion for attenuation studies of small size earthquakes at local distances. The epicentral distances for the data set are from 5 km to 200 km.

The geometrical spreading rate changes markedly between 60 and 120 km, requiring a segmented geometrical spreading approach to be used. PSRV attenuation is controlled by a moderate frequency dependence with $Q = 600\ f^{0.15}$ for $f < 8$ Hz and $Q = 150\ f^{0.8}$ for $f > 8$ Hz. Coda Q values based on a single scattering model were calculated to be $Q_c = 150\ f^{0.9}$. Based on source-site-path separability of coda, the S-waves were normalized to a common source excitation and the resultant data base was inverted for attenuation parameters. A frequency-dependent Q similar that of the SV regression resulted from this data set. In addition, a frequency-independent Q of $Q = 1661$ with geometrical spreading r^{-1} also describes the data well, but fails in describing the detailed attenuation in the 60 - 120 km range. The Q values calculated for the S waves at distances less than 60 km are close to the coda Q values.

The Radiative Transfer Energy approach shows that the coda Q values at lower frequencies are dominated by scattering and that the peak motion attenuation, on the contrary, is dominated by anelastic attenuation. Site effects are dominant features that affect spectral levels in the Nevada Test Site. Site amplification studies were conducted using the coda waves, response spectra data, and spectral method. There is general agreement among the three methods and the agreement between the site terms from peak motion and the residual of spectrum is particularly good when the number of recordings at a given station exceeds 10. A correlation is noted between site terms and site geology.