MAGNITUDE CORRECTIONS

FOR

THE CENTRAL MISSISSIPPI VALLEY SEISMIC NETWORK

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Using earthquakes that occurred in the region of the Saint Louis University Central Mississippi Valley Seismic Network, the observed Lg-wave amplitude magnitude is modeled as

$$M = S + R + D$$

where S is the source term, R is a station correction, and D is a distance correction. Observations of 458 earthquakes recorded by similar instruments in the three years period from 1982 to 1984, peak magnification at about 10 Hz, were fit to this model. The results indicate some important features.

Assuming a coefficient of anelastic attenuation of γ=0.003km^{-1}, the distance corrections increase as distance increased. This indicates that a smaller gamma value (0.0004km^{-1}) should be used in the magnitude estimate. The distance correction can be dropped if a γ=0.0004km^{-1} is used. The station corrections reveal station site effects. The stations located in the Embayment need a negative value to correct observed magnitude, whereas, a positive correction is required for stations installed in the Upland.

Using the adjusted source terms for the earthquakes, a new set of duration magnitude corrections is also found to improve the duration magnitude estimates. This correction includes station correction and distance term (0.0018km^{-1}). The station correction for duration magni-

tude reflects differences in station instrument gains. The amplitude magnitude station corrections and the deviation of the duration magnitude corrections from a simple gain relation are mutually consistent.

The resultant station corrections will provide more uniform estimates of earthquakes magnitudes determined by the network.