

ATTENUATION OF MODIFIED MERCALLI INTENSITY
FOR EARTHQUAKES IN THE IBERIAN PENINSULA

by
D.K. Shukla^I, W.J. Johnson^{II} and J.F. Kissenpfennig^{III}

A statistical analysis of Modified Mercalli Intensity (MMI) attenuation data for 106 historical earthquakes observed in the various tectonic regions of the Iberian Peninsula has been performed by the authors to obtain the best fit attenuation curves. Recently, Howell and Schultz (1975) investigated the following form of attenuation relationship and found it to be reasonably appropriate:

$$I - I_0 = a - b \ln D - cD \quad (1)$$

where: I = Epicentral MMI
 I_0 = MMI at an epicentral distance 'D'
 D = Epicentral distance in kilometers
 a, b, c = Constants describing attenuation characteristics

Additionally, based on recommendations by Esteva (1970), the authors have found the following relationship to be appropriate to describe the attenuation characteristics of the Iberian Peninsula and Central Europe:

$$I - I_0 = e + f \log (D + 25) \quad (2)$$

where: e, f = Constants describing attenuation characteristics

Based on geologic/tectonic/seismologic considerations, the Iberian Peninsula was divided into six general regions, which exhibit fairly unique and homogeneous attenuation characteristics. More detailed studies may indicate the presence of smaller attenuation provinces within these general regions. The least squares error attenuation curves derived from Equations (1) and (2) were fitted through the observed earthquake data for each of the regions and are presented on Figures 1 and 2, respectively. Isoseismal lines from the original data were interpreted to represent contacts between regions exhibiting different Intensity values. The plots are presented only for distances for which the original data are generally valid. The two relationships used here yield about the same Root Mean Square (RMS) error of about 0.85 on Intensity value. To avoid unrealistic attenuation plots with double curvature, the c values in Equation (1) were restricted to be non-negative, and for this reason Equation (2) is perhaps more appropriate as such restrictions are not necessary.

Variations of attenuation in different regions of the Iberian Peninsula appear to be somewhat related to regional variation in focal depths and/or surface sediment conditions. However, focal mechanism and crustal structure also appear to play important roles. Although the available space limits further discussion, the authors believe that the regional attenuation relationships presented are appropriate for evaluation of seismic risk in the Iberian Peninsula.

I Assistant Project Engineer) European Office
II Project Geophysicist) D'Appolonia Consulting Engineers,
III Managing Director) Inc., Brussels, Belgium

LIST OF REFERENCES

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Howell, B.F., Jr., and T.R. Schultz (1975). Attenuation of Modified Mercalli Intensity With Distance From the Epicenter. Bulletin of the Seismological Society of America, Vol. 65, No. 3, June 1975.

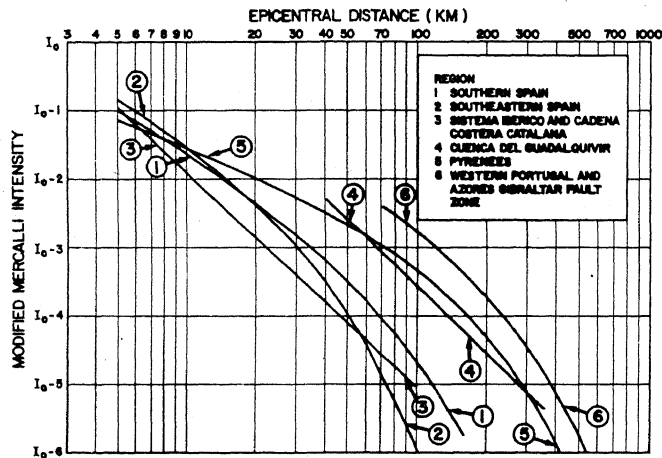


Figure 1: ATTENUATION CURVES ACCORDING TO EQUATION 1

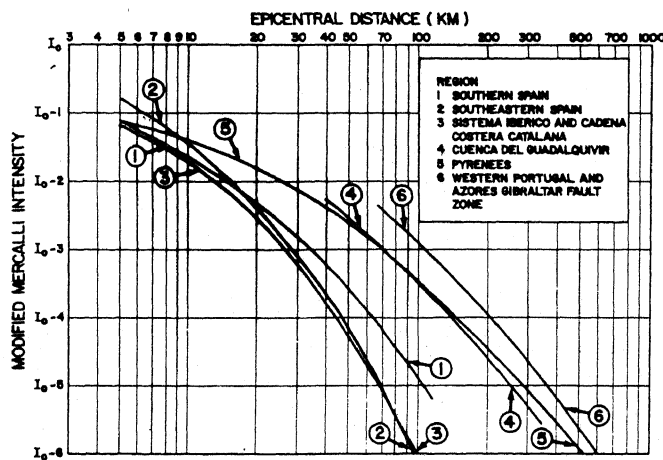


Figure 2: ATTENUATION CURVES ACCORDING TO EQUATION 2