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A graticule for macroseismic estimation of the focal depth of earthquakes

The purpose of this article is to simplify the estimation of focal depth within a permissible error range by means of a graticule. Various formulas have been employed by seismologists. The author recommends the following general formula applicable to all cases:

$$h = \Delta_i \sqrt{\frac{(I_0 - I_i)}{S - 1}}$$ (7)

where $h$ = depth of the centrum, $\Delta_i$ = isoseismic radius, $I_i$ = intensity at the centrum, $S$ = a parameter, and $I_0$ = epicentral intensity. In terms of common logarithm the formula will become

$$\log h = \log \Delta_i - \frac{1}{2} \log \left(\frac{10(I_0 - I_i)}{S - 1}\right)$$ (3)

Taking $x = I_0 - I_i$, $y = \frac{1}{2} \log \left(\frac{10(I_0 - I_i)}{S - 1}\right)$, and $S$ as a variable parameter, the basic points are established with $x = I_0 - I_i$ as an abscissa and $y = \log \Delta_i$ as an ordinate. By means of graticules, the values of $S$ and $h$ for 19 earthquakes in China were estimated. The $S$ values for eastern China are lower than those for western China. Based on data obtained from 61 earthquakes, $S$ values increase with increasing focal depths. There are 4 figures and 1 table. English-language references are: Gutenberg, B. and Richter, C. F., Earthquake Magnitude, Intensity, Energy and Acceleration, Bull. Seism. Soc. Amer., v. 32, 1942; Blake A., On the Estimation of Focal Depth from macroseismic data, Bull. Seism. Soc. Amer. v. 31, 1941.

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