

Determination of the coefficients of M_{hdd} by a grid search approach

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Hara (2007) developed an empirical magnitude formula using durations of high frequency energy radiation and maximum displacement amplitudes using tele-seismic P waves. Recently, Hara (2013), who referred to this magnitude as M_{hdd} , tried to re-determine the coefficients of the formula using a larger dataset by a linear inversion. The M_{hdd} calculated by the proposed coefficients better agree with the moment magnitudes from the Global CMT catalog. However, there is slight epicentral distance dependence for their differences. In this study, in order to reduce this epicentral distance dependence, we performed a grid search to determine the coefficients of M_{hdd} by minimizing both the differences between M_{hdd} and moment magnitudes and the dependence of their differences on the epicentral distance. The dataset is the same as that of Hara (2013). The search ranges for each coefficient can be set reasonably based on the studies of Hara (2007) and Hara (2013). The preliminary result suggests that it is possible to reduce the epicentral distance dependence using the coefficients obtained by the grid search method.

Keywords: magnitude, high frequency energy radiation, Grid search method