



## Estimating Source Duration for Moderate and Large Earthquakes in Taiwan

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### ABSTRACT

To construct a relationship between seismic moment ( $M_0$ ) and source duration ( $t$ ) was important for seismic hazard in Taiwan, where earthquakes were quite active. In this study, we used a proposed inversion process using teleseismic P-waves to derive the  $M_0$ - $t$  relationship in the Taiwan region for the first time. Fifteen earthquakes with MW 5.5-7.1 and focal depths of less than 40 km were adopted. The inversion process could simultaneously determine source duration, focal depth, and pseudo radiation patterns of direct P-wave and two depth phases, by which  $M_0$  and fault plane solutions were estimated. Results showed that the estimated  $t$  ranging from 2.7 to 24.9 sec varied with one-third power of  $M_0$ . That is,  $M_0$  is proportional to  $t^3$ , and then the relationship between both of them was  $M_0 = 0.76 \cdot 10^{23} (t)^3$ , where  $M_0$  in dyne-cm and  $t$  in second. The  $M_0$ - $t$  relationship derived from this study was very close to those determined from global moderate to large earthquakes. For further understanding the validity in the derived relationship, through the constructed relationship of  $M_0$ - $t$ , we inferred the source duration of the 1999 Chi-Chi (Taiwan) earthquake with  $M_0 = 2.5 \cdot 10^{27}$  dyne-cm (corresponding to  $M_w = 7.5-7.7$ ) to be approximately 29-40 sec, in agreement with many previous studies for source duration (28-42 sec).