

## Estimated dynamic shear stress and frictional heat during the 1999 Taiwan Chi-Chi earthquake

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We performed isothermal heating experiments on samples from a breccia zone adjacent to the slip zone of the Taiwan Chelungpu fault that slipped during the 1999 Chi-Chi earthquake to determine the chemical kinetics function and parameters for thermal decomposition of carbonate minerals in the fault zone. We found that a zero-order reaction was the most likely reaction mechanism for thermal decomposition of these samples and determined an activation energy for the reaction of 137 kJ mol<sup>-1</sup>, and a pre-exponential term of  $1.15 \times 10^4 \text{s}^{-1}$ . We applied these parameters in chemical kinetics calculations, taking into account the temperature change over time caused by frictional heating and heat conduction, energy conservation, and energy taken up by the endothermic reaction, to estimate the dynamic shear stress and maximum temperature reached in the slip zone, and found them to be 6.62 MPa and 1079 °C, respectively.