

## Energy taken up by co-seismic chemical reactions during a large earthquake: An example from the 1999 Taiwan Chi-Chi earth quake

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Frictional heat in a fault zone during earthquake slip transiently induces chemical reactions that may use energy released during the earthquake. We estimated the energy used by such reactions ( $E_c$ ) by a numerical analysis incorporating frictional heat, thermal diffusion, chemical kinetics, and energy conservation, and found that EC has an

auto-feedback effect that inhibits temperature rise in fault zone. During the 1999 Taiwan Chi-Chi earthquake, estimated EC was  $0.43 \text{ MJ/m}^2$ , corresponding to 0.79% of the frictional heat generated. This low percentage probably reflects the low initial concentrations of reactive materials. However, in the case of a fault with abundant reactive materials, EC could reach 50% of the frictional heat and the auto-feedback effect could be large. At this case EC is a non-negligible component on earthquake energy budget and can affect fault mechanics.