

Geochemical approach to the detection of solid-fluid interaction in the fault zones: an example of the Chelungpu fault, Taiwan

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Geochemical analyses of fault-zone rocks provide opportunities for elucidating the presence of aqueous fluids within the slip zones and its role in dynamic fault weakening and earthquake rupture propagation. In this study, we determined trace element concentrations and Sr and Pb isotope ratios of the core samples recovered from the Taiwan Chelungpu-fault Drilling Project (TCDP) Hole B. The data show that the gouges from three main fault zones exhibit significant enrichment or depletion for some of the fluid-mobile elements and isotope ratios, whereas the compositions of fluid-immobile elements remain relatively homogeneous. The variation in fluid-mobile element compositions well correlate with the data of magnetic susceptibility and inorganic carbon content reported previously, suggesting that the observed chemical variation may result from high-temperature solid-fluid interaction in the fault zones induced by frictional heating during earthquake.