

Fluid characteristics in the fault zone : examining chemical and mineralogical composition of the fault rocks in the drilling cores from TCDP well hole-A of the Chelungpu fault

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Abstract

To understand the chemical and mineralogical variations between the historical fault zone and the fault zone caused by the Chi-Chi earthquake, X-ray fluorescence analysis, X-ray diffraction analysis (XRD), LOI and CH measurement, density measurement, petrography and isocon method are carried out in this study.

The XRD analysis and petrographic observation found that main minerals in our samples are quartz, feldspar, calcite, and clay minerals. The semi-quantitative XRD analysis of clay minerals shows that kaolinite and chlorite usually reveal opposite variation trend in the fault zone.

Clay mineral transformation in the cataclasite of fault zone E includes kaolinite to montmorillonite, chlorite to montmorillonite and illite to montmorillonite. The illite- montmorillonite transformation and precipitation of calcite and quartz veins in the cataclasite of the fault zone E indicate that the fault zone could be an old fault zone.

By using isocon method, it is found that most fault zones display volume decrease except the cataclasite from the fault zone E and some damaged rocks. The volume decrease may be caused by feldspar breakdown to clay minerals; however, volume gain of cataclasite of the fault zone E and some damaged rocks may result from precipitation of quartz and calcite.

The precipitation of quartz and calcite, increase of chlorite (decrease of kaolinite), clay minerals transformed to montmorillonite and groundwater measurement all imply that low alkaline fluid infiltration may have occurred in the fault zones.