

Mechanochemical effect on chemical reactions during earthquake slip

HIRONO, Tetsuro^{1*}, TANIKAWA, Wataru², ISHIKAWA, Tsuyoshi², KAMEDA, Jun³, FUKUDA, Jun-ichi⁴

¹Osaka University, ²JAMSTEC-Kochi, ³University of Tokyo, ⁴Dept. of Earth Sciences, Tohoku Univ,

Transient frictional heating in a fault zone during earthquake slip induces various chemical reactions. In the case of the Chelungpu fault in Taiwan, which slipped during the 1999 Chi-Chi earthquake, material within the slip zone was reported to be relatively low in inorganic carbon (mainly calcite), smectite, and kaolinite contents, compared with the surrounding rocks. These characteristics have been attributed to friction-induced thermal decomposition of calcite, dehydration of interlayer water and dehydroxylation of smectite, and dehydroxylation of kaolinite, and the released gas and fluids from such reactions have a strong role in dynamic fault weakening, similar to that of thermal pressurization. However, mechanochemical effect by coseismic slip is not fully considered on such process. Here we performed high-velocity friction experiment of clay mineral, and analyzed the samples after the experiments using TG-DSC, XRD, ATR-IR, and particle size analyzer. In this presentation, we show the preliminary result and discuss the mechanochemical effect on the chemical reaction during earthquake slip.