Description of fault-related veins in the Central Range of Taiwan: a possible fossilised seismogenic fluid

Hideki Masago[1]; Kazuaki Okamoto[2]; Yoshiyuki Iizuka[3]; Tzen-Fu Yui[4]; Katsuyoshi Michibayashi[5]; Yumiko Harigane[6]

[1] Earth and Planetary Scis.,Grad. Sch. Tokyo Univ.; [2] Inst. Earth Sci., Taiwan; [3] IES, Academia Sinica; [4] Inst. Earth Scis., Academia Sinica; [5] Inst. Geosciences, Shizuoka Univ; [6] Biology and Geoscience.,Shizuoka Univ

A vein concentrated zone was found just beneath the floor-thrust of duplex structure in the Central Range of Taiwan. It has exhumed from the depth approximately comparable to the hypocentre of the Chi-Chi earthquake. Hence these veins are probable fossilised fluids of the seismogenic zone. Detail descriptions of geology and outcrop-scale structures are presented by Okamoto et al. in the same session.

Numerous quartz and subordinate calcite veins are developed in a ~1 m width zone from the fault plane. Veins have random orientations and complicated cross-cutting relationship. Observations on polished slabs using scanning-XRF (SXAM) and thin sections have revealed that veins are classified into three types in terms of mineralogy: one calcite-dominant vein and two quartz-dominant veins. Calcite-dominant vein is composed almost only of calcite. Minor accessory minerals such as apatite and some sulfides exist. Quartz-dominant veins are subdivided into two. One type consists almost 100 % of quartz. On the other hand, the other type, which is less common, is composed of albite, K-feldspar and calcite as well as quartz. They are also texturally different. The former exhibits epitaxial growth texture with plastic deformation such as undulose extinction and subgrain formation. The latter is in turn, characterized by equigranular interlocking texture of quartz, albite, K-feldspar and calcite. No deformation texture was observed. Apatite, monazite, rutile and zircon were the observed accessory minerals. Calcite vein cuts pure quartz vein, and which in turn is cut by quartz-feldspar vein. This relationship suggests an almost simultaneous and/or repeated formation of veins.

Occurrence of feldspars in quartzose vein indicates high temperature source fluid. Precipitation of HFSE phase minerals such as apatite, rutile and zircon further supports this idea, although the rutile might be detrital. As the metamorphic grade of the host rock is sub- to lower greenschist facies characterized by chlorite + K-feldspar mineral paragenesis and absence of biotite, source fluids of veins are not of in situ but of exotic origin from depth. Dehydrated fluid from subducting continental crust would be thus accumulated and stored beneath the detachment zone at 10 km depth in Taiwan. Further characterization of source fluids will be done by fluid inclusion and stable isotope analyses.