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Brittle ductile deformation triggered by fluids separated from melt

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It has been recognized the importance of fluid for the origin of crustal earthquakes. Prof. Hasagawa and his group have revealed very detailed image that liberated fluid from magma would infiltrate fault pocket causing earthquakes in Tohoku arc. Low P/T metamorphic rocks are considered to be exhumed from palaeo arc crust. Therefore careful observation and analysis from the low P/T rocks are significant for further understanding of the origin of the arc earthquakes. Higo metamorphic rock is one of the best candidate for the above research because it preserves the melt migration from the continental lower crust to mid-crust. In the Higo metamorphic rocks, migmatic textures are obvious in the granulite facies and the leucogranitic veins are concentrated in the amphibolites facies. The amphibolites facies rock suffers extensive ductile deformation (mylonitization) with retrograde metamorphism. Cataclasites are recognized along high angle faults. In the cataclasites, quartz and zeolite veins are obvious. These lines of evidences suggest that mid-crust rehydrated due to fluid separation from magma depth then cause ductile and brittle deformation.

Keywords: Arc crustal earthquake, mid-crust, seismic rupture, melt-fluid separation, Higo metamorphic rocks, migmatite