

Thermal history estimation of Chelungpu Fault using rock-magnetic methods

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The so-called “Black Materials” (BM) of the Taiwan Chelungpu Fault Drilling Project (TCDP) samples have magnetic susceptibility peaks (Hirono et al., in preparation). In order to understand the magnetic susceptibility peaks, we performed rock magnetic analysis on the BM and surrounding gouge samples and compared them under the assumption that the BM has the same origin as the gouge and rock-magnetically changed by the past activity of the fault.

The low temperature magnetic behavior of the BM samples are characterized in large loss of stable remanent magnetization under 30 K. Such behavior infers the dominance of very fine (less than 30 nm) magnetite grains in the BM samples.

The thermomagnetic curves of the BM samples have some minor humps, whereas those of the gouge samples have significant humps above 400 degree C. The induced magnetization of the gouge samples increase after heating to 480 degree C, and decrease after heating up to 600 degree C. These results may indicate that the humps on the thermomagnetic curves above 400 degree C are due to the alteration of thermally unstable paramagnetic mineral (such as iron sulphide) into magnetite. If we assume that the BM and gouge have the same origin, the absence of significant humps in the BM samples implies that they have already suffered such alteration above 400 degree C.