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Anomalous magnetization of fault gouges recovered from Taiwan Chelungpu-fault Drilling Project (TCDP)

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The Taiwan Chelungpu-fault Drilling Project (TCDP) Hole B penetrated the Chelungpu fault in nearly 1200 meter depth, and recovered un-oriented core samples of mudstone protoliths and fault gouges that were recognized as active fault-zones. Previous core logging data [Hirono et al., 2006] revealed an anomalously high magnetic susceptibility of black gouge zones within disk-shaped black materials (BMdisks), and suggested that higher susceptibility zones experienced frictional heating, resulting in the generation of new ferromagnetic minerals. Therefore, the BM disk-including fault gouge zones may record an ambient magnetic field as a thermal remanence during an ancient seismic event. To further analysis of this magnetic susceptibility anomaly, we conduct a paleomagnetic measurement of the up-singed microchip samples cut by a supersonic vibrating knife through SQUID magnetometer at AIST, Tsukuba Japan. The intensity of natural remanent magnetization (NRM) shows three distinct layers of the 100 times higher than the mudstone protoliths nearby 1136m, 1194m and 1243m in depth, in agreement with previous magnetic susceptibility results. These higher NRM intensities approach up to 38% (normal volcanics = up to 0.1%) of saturation isothermal remanence of the same samples even in 1200m depth, implying a current-induced magnetization during ancient seismic slips. In this presentation, we report these paleomagnetic results and an identification of remanence carriers of anomalously magnetized gouge and BM-disks through a novel scanning magnetic microscope.