Paleomagnetism of the TCDP core samples and its implication to underground geo-current

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The Taiwan Chelungpu-fault Drilling Project (TCDP) Hole B penetrated the Chelungpu fault, 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 (BM-disks), and suggested that higher susceptibility zones experienced frictional heating. Therefore, the high susceptibility implies a new generation of ferrimagnetic minerals by a seismic thermal event [Nakamura et al. 2002]. 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 (several hundred micrograms in weight) cut by a supersonic vibrating knife through superconducting quantum interference devise (SQUID) magnetometer at National Institute of Polar Research. The stepwise alternating field demagnetization reveals that there are high and low coercivity components of remanence orientations. The lower coercivity (-8mT) component may be recognized as drilling-induced isothermal remanence. The primary higher coercivity component may be employed as a core-reorientation of un-oriented drilled samples. Moreover, some gouge samples and BM-disks showed about 100 times higher natural remanence (NRM) intensity than the protolith mudstone. These higher NRM intensities approach up to 38% (normal volcanics = 0.1%) of saturation isothermal remanence of the same samples, suggesting a current-induced magnetization during ancient seismic slips. In this presentation, we will report preliminary paleomagnetic results for the core re-orientation of whole drilled samples, as well as the thermal history and the magnetization process of anomalously magnetized gouge and BM-disks through a novel scanning magnetic microscope.