Absolute and relative paleointensity variations at the Matuyama-Brunhes transition from the Haleakala lava sequence on Maui

Nobutatsu Mochizuki[1]; Robert S. Coe[2]; Brian R. Jicha[3]; Brad S. Singer[3]
[1] Kumamoto University; [2] University of California, Santa Cruz; [3] University of Wisconsin-Madison

Sequences of lava flows are one of the best materials to recover accurate and precise paleomagnetic field behavior across the Matuyama-Brunhes (M-B) transition, because successive lava flows can provide temporal variations of intensity as well as direction combined with 40Ar/39Ar dating. This study has made paleointensity measurements on samples from the Haleakala lava sequence on Maui, which records the M-B transition (Coe et al., 2004). The Tsunakawa-Shaw method (previously we call the LTD-DHT Shaw method) was applied to 35 specimens of 20 lavas. Ten specimens passed the selection criteria. 11.8 +/-0.1 microT (N=2) and 4.8 microT (N=1) were obtained for two lavas recording the transitional directions. 25.1 +/-0.6 microT (N=4) and 28.3 +/- 1.1 microT (N=2) were determined for two lavas recording normal polarity, just after the transitional field. It appears that the selection criteria are too strict for the samples recording the M-B transition since the samples probably acquired a weak TRM in a weak field. Thus, we also applied a slightly relaxed criteria to the results; six results passed the relaxed criteria. For the flows recording the transitional behavior, mean of paleointensity estimates is 6.0 +/- 3.9 microT (N=9). We also check paleointensity estimates without such criteria. These estimates, which are the same as Rolph and Shaw (1985) paleointensity estimates, are consistent with the estimates with the strict criteria and those with slightly relaxed ones. It should be also noted that NRM/ARM values have a good correlation with the absolute paleointensity estimates by three variants of Shaw method noted above. Thus, the NRM/ARM values can be used as another indicator of paleointensity variation. On the basis of these absolute and relative paleointensity estimates from Haleakala on Maui, combined with those from Tahiti (Mochizuki et al., 2011), we will discuss the characters of paleointensity variation across the M-B transition. We have re-dated the Haleakala lava sequence such that relative to astronomically-calibrated 28.201 Ma age of the Fish Canyon sanidine standard; the 40Ar/39Ar age of this lava sequence that records the last stage of the M-B transition is 772 $\pm$ 2 ka (2 sigma).