

Paleointensity study of the Sakurajima 1914 and 1946 lava flows (II)

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We performed absolute paleointensity measurements on the Sakurajima 1914 (TS01 and TS02) and 1946 (SW01) lavas in Japan. The LTD-DHT Shaw and the Coe-Thellier experiments resulted in averages and standard deviations (1 sigma) of 0.98 ± 0.11 and 1.12 ± 0.13 , respectively, if the results are normalized by expected field intensities calculated from IGRF-9 ($\sim 45.8 \mu\text{T}$; Macmillan et al., 2003). Considering the standard deviations, we can say that both paleointensity methods recovered correct geomagnetic field. However, it is apparent that the LTD-DHT Shaw method has higher reliability than the Thellier method.

The high Thellier paleointensities ($55.3 \pm 5.8 \mu\text{T}$, $N=29$) were particularly obtained from both a clinker part of the site TS01 and a solid massive body of the site TS02 (group 1). On the other hand, reasonable ones ($46.8 \pm 3.6 \mu\text{T}$, $N=21$) were yielded from both a solid massive body of the site TS01 and a clinker part of the site TS02 (group 2). In the LTD-DHT Shaw results, such a lithological dependence had never been observed: samples of the group 1 gave an average of $43.7 \pm 5.2 \mu\text{T}$ ($N=28$) while those of the group 2 resulted in $43.6 \pm 4.7 \mu\text{T}$ ($N=18$). High temperature susceptibility measurements and FORC measurements suggest that the high Thellier paleointensities of the group 1 samples possibly originate from magnetic interaction between particles, which may result from the high temperature oxidation of titanomagnetite grains. Such interactions might be compensated by several processes in the LTD-DHT Shaw method.