

Reproducibility of the paleointensity measurements using Aso volcanic rocks.

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Paleomagnetists have long accumulated paleointensity data measured with volcanic rocks. We now have organized mathematical criteria of selecting "good" results in Thellier experiments. However, we are struck when looking at the scattered results of a simple plot of paleointensity vs. age graph. The source of the error is still not understood well even now. Making the matters worse, several studies using the historic lava flows indicated that the even a Thellier result which passes all the strict criteria often gave a wrong paleointensity. To solve this problem, it is important to know how variable results the Thellier experiments give in a lava flow. Therefore, we aimed to measure many paleointensities from the same lava and compare the results within sample, site and flow.

The samples were taken from 5 lava flows (Tochinoki, Kusakanri, Kijimadake, Tateno and Komedzuka) in Aso volcano. Those eruptions were not directly dated but the stratigraphical studies indicated that they were younger than 89ka Aso-4 pyroclastic flow. We collected unoriented block samples from 15 sites of these 5 volcanic centers. The reason why we used block samples is to get core of better shape for the better reproducibility of the remanence measurements, and that why we gave up orientation is to get fresher samples. We took one block sample from each site. Those sites were selected from several tens of the centers based on the magnetic hysteresis measurements of specimens which had been collected for direction studies.

81 specimens were submitted to the Thellier experiments. The specimens behaved generally well, and 63 specimens (78%) were survived in spite of the strict criteria following Coe et al. (1978) and Selkin and Tauxe (2000). At least 4 specimens were treated for each site, and the 3 out of 15 sites yielded no paleointensity because all the specimens in the site violated one of the criteria. The resulting paleointensities varies from 25.1 to 85.9micro-T. They were generally consistent within the sites. The site mean were from 26.0 to 60.3micro-T. The standard deviation within site were less than 5micro-T except for 3 sites in the Kijimadake lava, and less than 2micro-T for 6 sites. However, site to site concordance was poor. Site mean paleointensities were mostly different well beyond the standard error calculated from the dispersion within the sites. For instance, both the two sites of Tateno lava yielded the standard error less than 0.5micro-T, and yet the mean differs 9.1micro-T. These results clearly show the necessity of criteria obtained from other than the Thellier experiment.