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Absolute paleointensities for the Aso welded tuffs extruded with tephras: Calibration points for relative paleointensity

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Paleointensities of the geomagnetic field determined by welded tuffs can be used as calibration points in relative paleointensity curves if widespread tephras which were extruded with the welded tuffs have been recognized in sediments and dated on the basis of oxygen isotope records (Takai et al., 2002). In order to provide calibration points of virtually no error in age for relative paleointensity, we have conducted absolute paleointensity measurements of four welded tuffs of 90-270 ka (Aso-1, 2, 3, and 4) which were extruded with widespread tephras.

Using these welded tuffs containing volcanic glasses, we can carry out paleointensity experiments on both glassy and rocky parts of them. Thermal and alternating-field demagnteizations indicate that blocking-temperature and coercivity of the glassy parts show narrower distribution than those of the rocky parts. These data suggest that magnetic minerals of the glassy parts are relatively uniform in size and/or titanium content compared to those of the rocky parts.

The low-temperature demagnetization (LTD)-double heating test (DHT) Shaw paleointensity method was applied to 31 glassy and 72 rocky samples, respectively. From 15 successful results of glassy samples, mean paleointensities were obtained as 19.5+/-3.0, 20.2+/-2.0, 27.7+/-4.0, and 32.7+/-3.7 micro-T for the Aso-1, 2, 3, and 4 welded tuffs, respectively. Form 33 successful results of rocky samples, mean paleointensities were obtained as 20.9+/-4.4, 23.9+/-2.5, 30.3+/-7.9, and 33.5+/-5.2 micro-T for the Aso-1, 2, 3, and 4 welded tuffs, respectively. The agreements between paleointensity values from different materials indicate that the paleointensities determined in this study are reliable. Therefore, these paleointensities can be used as calibration points for relative paleointensity curves.

Keywords: welded tuff, tephra, paleointensity, LTD-DHT Shaw method