Preliminary absolute paleointensity estimation from a single volcanic-glass grain extracted from an unwelded pyroclastic flow

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Many pyroclastic flows are distributed around Japan. They usually involve volcanic-glass grains. These grains are considered to form at the timing of volcanic eruptions and are expected to have magnetic inclusions consisting of tiny single (titano)magnetites with recording the paleomagnetic field. We have extracted single volcanic-glass grains of pumice-type with a diameter of 0.60-0.84 mm from an unwelded part of the Ito pyroclastic flow deposits (A-Ito, 26-29 ka; Machida and Arai, 2003), Kyusyu, Japan. A series of rock- and paleomagnetic measurements have been made on the grains.

Sixty-seven out of 88 grains had detectable intensities of natural remanent magnetization. Some of such grains were further investigated. Results of low-temperature magnetometry exhibited inflection points at 105-120 K, suggesting magnetite as a main remanence carrier. Stepwise alternating field demagnetization revealed an existence of stable characteristic remanence (ChRM) which was interpreted to be a primary component.

Tsunakawa-Shaw method (Tsunakawa and Shaw, 1994; Yamamoto et al., 2003), one of the latest absolute paleointensity (API) techniques to date, was applied to selected grains having stable ChRMs. On the application we newly included measurements related to an isothermal remanent magnetization (IRM). Four successful results were obtained by an adoption of IRM corrections, giving an average API value of about 25 μT. This corresponds to a virtual axial dipole moment (VADM) of about 50 ZAm², which is consistent with the contemporaneous VADM of the sedimentary record (PISO-1500; Channell et al., 2009).