Geophysical Research Abstracts, Vol. 8, 05960, 2006
SRef-ID: 1607-7962/gra/EGU06-A-05960

Cooling rate correction of paleointensity determination for volcanic glasses by relaxation geospeedometry

R. Leonhardt, J. Matzka, A.R.L. Nichols and D.B. Dingwell

Department for Earth and Environmental Sciences, Ludwig-Maximilians-University, Munich, Germany

The influence of the cooling rate on paleointensity estimates was investigated for samples from a vertical profile across a 600 A.D. obsidian lava flow ramp from Lipari, Italy. The natural cooling rates at the glass transition, which were previously determined for the seven investigated samples by relaxation geospeedometry, vary by a factor of more than 4. Rock magnetic investigations indicate a magnetic microlite fraction in the single-domain grain size range and strong magnetic anisotropy. The thermoremanence anisotropy tensor was determined for each specimen to correct the paleointensity results for this anisotropy. The cooling rate dependency of the thermoremanence was determined experimentally. Extrapolation to natural cooling rates indicate an overestimate of the paleointensity by 13% to 20% during experiments with typical laboratory cooling rates. Correcting for the different cooling rates and the cooling rate dependencies within the vertical profile, significantly reduces the standard deviation of the average flow paleointensity. The average paleointensity for the 543$\pm$19 A.D. flow ramp results in 52.4$\pm$1.1 μT, corresponding to a virtual axial dipole moment of 9.2$\pm$0.2 Am^2. Uncertainties, introduced by anisotropy correction and cooling rate extrapolation, are considered by error propagation.