

## **Paleointensity results from Lanzarote (Canary Islands) obtained with two different techniques**

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### **Abstract:**

A paleomagnetic, rock-magnetic and paleointensity study has been carried out on 16 Miocene, Pliocene and historical basaltic lava flows from Lanzarote (Canary Islands, Spain).

Rock-magnetic experiments were carried out to find out the carriers of remanent magnetisation and to determine their thermal stability and grain size. They consisted of measurement of thermomagnetic curves — strong-field magnetisation versus temperature ( $J_s$ -T) curves —, hysteresis parameters and isothermal remanent magnetisation (IRM) acquisition curves. Mostly reversible but also non-reversible curves were recorded in thermomagnetic experiments, and low-Ti titanomagnetite was observed to be the main carrier of remanence in most studied flows.

Paleomagnetic analysis generally showed the presence of a single component, although in two sites two more or less superimposed components were observed and in another one no consistent results could be obtained. A characteristic component could be determined in 15 flows and all displayed normal-polarity.

83 samples belonging to 13 flows were chosen for paleointensity experiments. All 83 samples were cut into smaller specimens so that in each case a specimen was available to be used for a Thellier-type paleointensity determination, another one for a multispecimen paleointensity experiment and another one for rock-magnetic experiments. This allowed the measurement of thermomagnetic curves on all samples subjected to paleointensity experiments.

Thellier-type paleointensity determinations were performed with the method proposed by Coe (1967). The experiment was carried out in 12 temperature steps between room temperature and 581°C On small (0.9 cm diameter and 1 to 2.5 cm length) specimens sub-sampled from oriented standard samples. After heating

samples were left cooling down naturally during several hours. After the 3rd heating step at 215°C, pTRM-checks were performed after each heating step.

Multispecimen paleointensity determinations were carried out using the method proposed by Dekkers & Böhnel (2006). Standard paleomagnetic samples from each lava flow were cut into 8 specimens using a diamond-disk saw. These specimens were pressed into salt pellets in order to obtain standard-dimensions cylindrical paleomagnetic specimens. Eight seven-sub specimen series were formed.

A set of eight experiments were performed using laboratory fields from 10 to 80  $\mu\text{T}$ , with increments of 10  $\mu\text{T}$ . Samples were oriented in such a way that the NRM directions of each sub specimen lies parallel to the axis of the heating chamber by using a home-made special sample-holder and heated at a temperature of 450°C. The relative differences between pTRMs (gained in lab) and NRMs of specimens were calculated and the corresponding results for the different lava flows plotted; a least square fit was carried out for the data and intersections with the horizontal axis (zero difference) were calculated for the paleointensity determinations. Results obtained with both methods are compared.

**Keywords:** Paleointensity, Thellier type methods, multispecimen method, rock magnetism

**References :**

Coe, R.S. (1967). Paleointensities of the Earth's magnetic field determined from Tertiary and Quaternary rocks. *J. Geophys. Res.*, 72, 3247-3262.

Dekkers, M.J. & Böhnel, H.N., (2006). Reliable absolute palaeointensities independent of magnetic domain state. *Earth and Planetary Science Letters* 248 (1-2), 507-516.