

A paleomagnetic and rock-magnetic study of Pliocene and Pleistocene lava flow sequences from the Lesser Caucasus (Southern Georgia)

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Abstract:

A paleomagnetic and rock-magnetic study was carried out on 47 basaltic lava flows belonging to three Pleistocene and Pliocene sequences (Korxi-1, Korxi-2 and Apnia) from the eastern Djhvakheti Highland in southern Georgia (Caucasus) in order to study the variation of direction and intensity of the geomagnetic field.

Rock-magnetic experiments were performed to determine the carriers of remanent magnetisation, their thermal stability and grain size,

and as a pre-selection criterion to choose suitable sites and temperature intervals for future paleointensity determinations. These experiments included the measurement of thermomagnetic curves, hysteresis parameters and isothermal remanent magnetisation (IRM) acquisition curves. All experiments were performed at the paleomagnetic laboratory of the University of Burgos with a Variable Field Translation Balance (VFTB). In addition, the anisotropy of magnetic susceptibility (AMS) was measured with a kappa bridge KLY-4, and a very low degree of anisotropy was observed.

Paleomagnetic measurements were carried out at the paleomagnetic laboratory of the University of Burgos with a 2G cryogenic magnetometer and included both thermal and alternating field (AF) demagnetization. A characteristic remanent magnetisation (ChRM) could be determined in all studied flows. Paleomagnetic results reveal in most cases the presence of a single paleomagnetic component carrying either a reverse or a transitional polarity direction in the Korxi-1 section. A single component was also observed in the flows belonging to Korxi-2 sequence, which displayed normal polarity in all cases and in the Apnia section, characterised by transitional and reversed polarities.

With the purpose of analysing the behaviour of secular variation in each of the three studied sections, the scatter of paleosecular variation (PSV) of the virtual geomagnetic poles VGPs in each of the three studied sections was calculated. In order to perform this calculation, a cut-off angle of 45° was used to discriminate between secular variation and intermediate polarity directions.

Keywords: Paleomagnetism, Rock-magnetism, Paleosecular variation, Plio-Pleistocene lavas flows, Caucasus