

NEW PALEOMAGNETIC RESULTS FROM THE HARGHITA VOLCANIC AREA (ROMANIA)

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Introduction

Volcanism in the Carpathian-Pannonian Region was active since the early Miocene (between 21 and 0.1 Ma), through various phases in variable geotectonic and magmatic settings, with a distinct migration in time from west to east (Lexa et al., 2010).

The Harghita volcanic area have been attributed to the East Carpathians volcanic arc (Calimani–Gurghiu–North Harghita and South Harghita volcanic areas), corresponding to the central and southern Tisia block. This part is characterized by the presence of large amounts of calc-alkaline rocks formed between 10 and 3.5Ma. After this period, the activity continued south-eastwards into the South Harghita area, with contemporaneous eruption of calc-alkaline, shoshonitic and alkali basaltic (Seghedi et al, 2004).

Sampling and methods

The oriented samples were collected in 27 sites from the Luci Lazu volcanic area (South Harghita Mountains) and 87 sites from North Harghita volcanic area (Fig. 1), all distributed in various volcanic rocks (andesites, basaltic andesites, dacites and shoshonites).

They were obtained using a portable drill and oriented using both a magnetic and solar compass. Up to three standard 25x22mm cylinder specimens resulted from each core.

The structure of the natural remanent magnetization (NRM) of pilot specimens was studied using both alternating field (AF) demagnetization and thermal demagnetization (Fig. 2). The remanent magnetizations measurements were made with a JR-6A Dual Speed Spinner Magnetometer. Demagnetization data were analysed using Remasoft 3.0 software (Chadima and Hrouda, 2006). On orthogonal demagnetization diagrams, individual magnetizations were identified as linear segments in both horizontal and vertical projections defined by three or more demagnetization steps. Characteristic directions were determined using principal component analysis. All accepted linear segments have maximum angular deviation (MAD) values of less than 5°. The method of Fisher, assuming circular distribution of individual magnetization directions about a true mean direction, was employed to estimate site-mean directions and associate statistics.

Results

The structure of the NRM was identified successfully both by AF and thermal demagnetizations. Some samples are characterized by a very small viscous overprint removed up to 20 mT or 250°C. After the removal of this component vector, demagnetization plots show a linear decay toward the origin.

The characteristic remanent magnetization was identified successfully in all samples. In the Luci Lazu volcanic area (South Harghita Mountains), normal polarity was identified in 14 sites, 9 sites have reversed polarity and 4 sites have intermediate directions. In the North Harghita volcanic area normal polarity was identified in 17 sites, 50 sites have reversed polarity and 13 sites have intermediate directions (Fig. 3).

We rejected 6 sites because they donnot follow the criteria for selecting data of Tauxe et al. (2003).

Conclusions

Distribution of magnetic polarities in the South Harghita Mountains is in agreement with the K-Ar ages of the volcanism (Pecskay et al., 2006) (Fig. 4). Our results are compatible with the accepted model of gradually migration of volcanic activity from north to south. The results shows the absence of important vertical axis rotation during the last 6 Ma.

Acknowledgements

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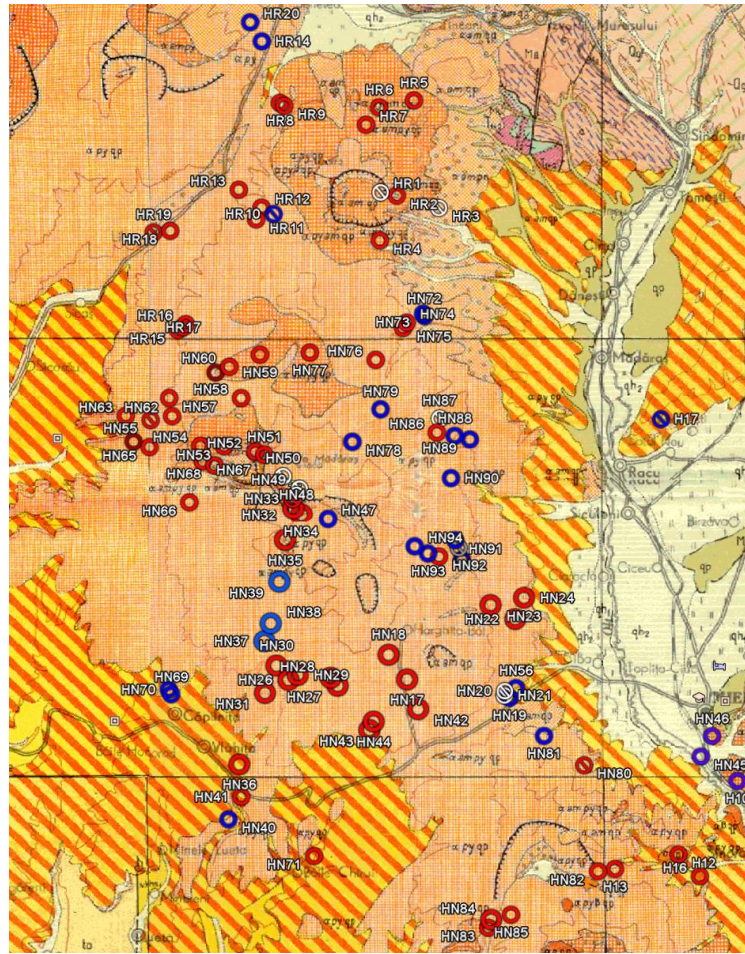


Fig. 1 Location of sampling sites: blue circle = normal polarity; red circle = reversed polarity. Map according to Odorhei geological map (1:200000).

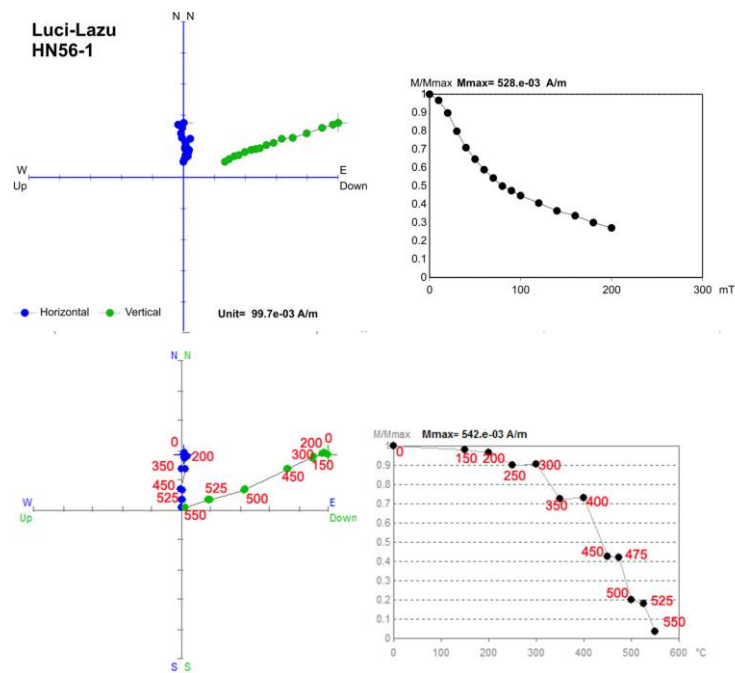


Fig. 2 Typical orthogonal diagrams and demagnetization curves of the studied samples during stepwise AF and thermal demagnetization of the NRM.

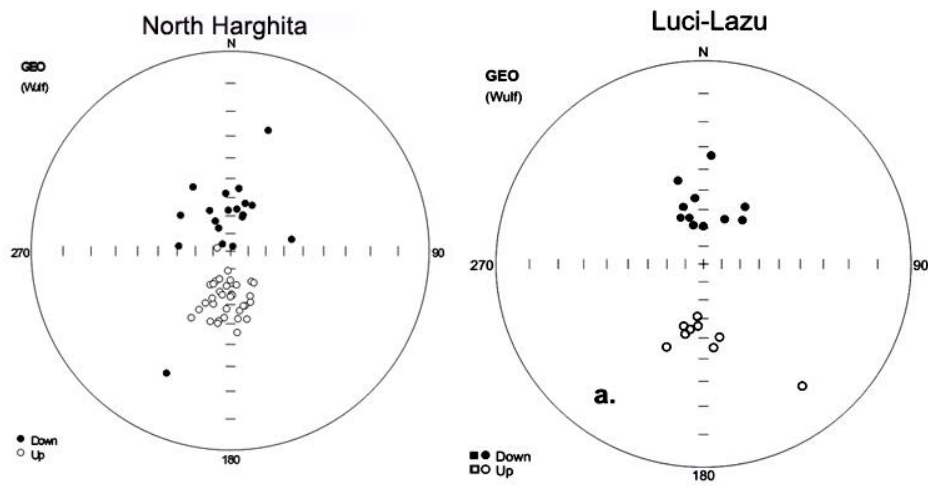


Fig. 3 Distribution of site mean directions: full dot = positive inclination; open dot = negative inclination.

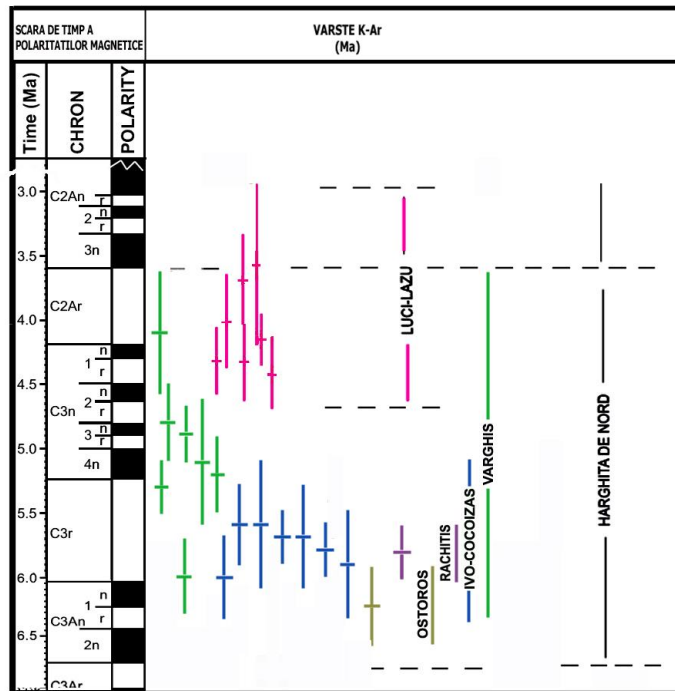


Fig. 4 K-Ar ages of studied volcanic rocks. Geomagnetic polarity time scale after Lourens et al. (2004). K-Ar ages after Peltz et al., (1987), Pecskey et al., (1995).