Magnetic Fabric and Paleomagnetic Study of the Calimani Mountains' Pyroclastic Deposits (East Carpathians, Romania)

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ABSTRACT

During the last 15 Ma, in the eastern Carpathian–Pannonian region westward-dipping subduction in a land-locked basin caused collision of a lithospheric block from the west with the southeastern border of the European plate. After the main collisional events at 11 Ma, volcanism took place in the East Carpathians, forming the Călimani – Gurghiu – Harghita volcanic chain. This volcanic chain consists of calc-alkaline products that occurred along the easternmost margin of the rigid Transylvanian block, in the front of European Platform. It marks the end of the post-collisional subduction-related magmatism along the front of the European convergent plate margin. We present the first magnetic fabric and paleomagnetic study of pyroclastic deposits of the Rusca-Tihu volcano, one of the main volcanic structures from the Calimani Mountains. After a large debris avalanche event around 8 Ma, the proximal facies is represented by lava flows, pyroclastic flows, fall deposits and block-and-ash flow deposits. We have sampled 6 sites in poorly lithified pyroclastic deposits, lithic blocks of andesites from 3 sites and a lava flows interbedded in the pyroclastic deposits. The aims of study were the determination of the flow directions of pyroclastic flows and the estimation of the temperature of the block-and-ash flow deposits' emplacement. The flow directions were determined using the anisotropy of magnetic susceptibility (AMS) measurements, which can be used for determining lineations and foliations in pyroclastic deposits. The analysis of the natural remanent magnetizations using alternating field and thermal demagnetizations was used to determine the magnetic polarity and to estimate the emplacement temperature. Rockmagnetic experiments have shown Ti-poor and medium titanomagnetite as main ferromagnetic minerals. Based on the AMS measurements we have identified successfully the flow directions in fine pyroclastic deposits, which are in agreement with the supposed position of the Rusca-Tihu stratovolcano. The variability of AMS data indicates a possible topographic control on inferred flow directions. Good paleomagnetic results were obtained from the lava flow and andesitic blocks from the pyroclastic deposits, but in the samples from the poorly welded pyroclastic flows we did not obtained good demagnetization results. Since remanences from lava blocks are random distributed, the emplacement temperature is about 400°C.