Geophysical Research Abstracts
Vol. 13, EGU2011-12695-3, 2011
EGU General Assembly 2011

Morphometric analysis of scoria cones in the Persani (Persányi) Mountains, East Carpathians

Emöke Fodor, Dávid Karátson, and Tamás Telbisz
Eötvös University, Physical Geography, Budapest, Hungary (dkarat@ludens.elte.hu)

Analysis of scoria cone morphometry allowed a number of rules on evolution and degradation to be determined, using standard morphometric parameters such as cone height vs cone diameter (H/W), slope, volume, etc. (Porter 1972, Settle 1979, Wood 1980a,b, see in: Favalli et al. 2009). In our review these rules are tested on examples from Persányi (Perşani) Mts, East Carpathians.
The two successive basaltic magma intrusions in the Persányi Mts caused one of the last volcanic events in the Carpatho-Pannonian region (1,5-1,2 Ma and 0,67-0,52 Ma: Panaiotu et al. 2004). Each volcanic stages began with phreatic and phreatomagmatic eruptions, presented by fallout and base surge deposits, followed by strombolian eruptions and effusion which is indicated by scoria cones and lava flows. K/Ar ages and paleomagnetic data (Panaiotu et al. 2004) constrain the chronology of lava flows, but the stratigraphic position of the scoria cones and pyroclastic deposits is still doubtful (Seghedi & Szakács 1994, Panaiotu et al. 2004).
In our work we determined the standard parameters on 12 recognizable scoria cones using a 10 m-resolution DEM created from the 25,000 topographic map. We also examined specific geographic circumstances in the study area such as morphology of cone bases, burial of cone flank by subsequent lava flows, effect of cone volume and eruption of nearby cones, which may cause significant modifications in morphometry.
The trends in H/W ratio and slope values of the Persányi scoria cones fit well to those in other volcanic fields worldwide (Wood 1980a,b, Favalli et al. 2009). In comparison, we conclude that the cones are strongly eroded due to climate, elevation, and exposure to weathering.
We classified the cones according to age (two age groups above) and shape (well-formed and deformed cones). We found that the important morphometric parameters of degradation are better related to shape than age. The well formed cones – Hegyes (Hegheş), Tölgyes (Măguricea mare), Kerekhegy (Măguricea Mic), Bükkösd (Gruiu) and the cone at the outlet of Nádas (Trestia) Valley – have H/W=0,011, and the deformed cones – Oldalhegy nearby Mátéfalva (Matheiaş), the third cone at Hévíz (Hoghiz), the two cones in Nádas (Trestia) Valley, Samu-erdeje (Pădurea lui Samuil) and the two cones in Bogáta (Bogata) Valley – have H/W=0,075-0,040. There is smaller difference betwen the cones of the older and younger volcanic stages: H/W=0,080 and 0,090, respectively.
The slope values also show a better relation with shape, but in the shape categories there is also a good fit with age. Of the well formed cones, the younger Bükkösd has the steepest slope (17°), while the others (olders) have smaller values (14°). There is a bigger difference for the deformed cones (13-6°) without obvious separation by ages.
Cone comparison based on morphometric parameters enables us to specify relative ages different from previous ones, which calls for the re-grouping of the cones in terms of stages. The observed chronological contradictions requires further radiometric datings and a more accurate stratigraphy of pyroclastic deposits, especially with regard to the chronological division of the southern cones.

Favalli, M., Karátson D., Mazzarini, F., Pareschi, M. T., Boschi, E. (2009): Morphometry of scoria cones located on a volcano flank: A case study from Mt. Etna (Italy), based on high-resolution LiDAR data. JVGR 186, 320–330
Panaiotu, C. G., Pécskay Z., Hambach, U., Seghedi, I., Panaiotu, C. E., Tetsumaru, I., Orleanu, M., Szakács, A. (2004): Short-lived Quaternary volcanism in the Perşani Mountains (Romania) revealed by combined K-Ar and paleomagnetic data. Geol. Carpathica 55, 4, 333-339
Seghedi, I., Szakács, A. (1994): Upper Pliocene to Quaternary basaltic volcanism in the Perşani Mountains. Romanian J. Petrol 76, 101-107