Conduit processes and conditions before Vulcanian eruptions indicated by blocks and breadcrust bombs: case study from Ciomadul volcano (SE Carpathians)

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In this study, the origin and importance of dacites with cracked surfaces from the Ciomadul volcano are presented. These rock types were described for the first time by Szakács & Jánosi (1989). On the basis of their macroscopic description, they suggested that these rocks can be referred to as volcanic bombs and blocks probably representing pyroclasts of an explosive eruption. The samples of my study were collected in the valleys of the Ciomadul volcano (Disznyó Stream, Veres Stream) and some of them are highly similar to the samples presented by Szakács & Jánosi (1989), but additional types were also found.

According to the macroscopic analyses, two types of surface crack patterns were distinguished: Type 1: dendriform crack patterns, associated with broken crystals, could have been formed due to impact-related stress. Type 2: polygonal crack patterns which could have been the results of thermal contraction. Interior expansion of some bombs is indicated by wider, deep cracks.

According to the internal texture, the samples were classified into different groups. Breadcrust bombs are characterized by gray/white vesicular cores and black glassy rinds, the cores and rinds are sharply separated. The rind thickness varies from 0.5 cm to 6 cm. The foliated breadcrust bombs have poorly defined rinds and are characterized by the variation of vesicular white bands and black glassy non-vesicular bands. Continuous transition was observed from foliated bombs to core-rind breadcrust bombs. Patchy-banded bombs show gray vesicular matrix and white vesicular bands/patches without black glassy bands/rinds. Dense glassy dacite blocks without surface cracks and gray homogeneous blocks with surface cracks were also found. These blocks probably have the same origin as the bombs and are related to the same explosion. Detailed study of the microlites show homogenous microlite texture and density in the different bands or in the cores and rinds. Except in the case of the patch-foliated bombs in which the white and gray patches show differences in the microlite density and vesicularity. Additionally, at the boundary of the patches flow banding and sheared crystals were also found in these samples. These features of the patchy-foliated bombs may be related to mixing of different magma batches in the conduit. This event (i.e., arrival of fresh magma and mixing with degassed magma in the conduit) might be the trigger of the Vulcanian explosion that produced the bombs. The differences of the relative proportion of the non-vesicular black-glassy and vesicular-gray or -white rinds/bands can be interpreted as the conduit depth from which the bombs originate, using the findings of Wright *et al.* (2007). According to their results, higher proportion of non-vesicular, black glassy part in the bomb suggest that it represents shallow degassed magma from the conduit, while the bombs without black-glassy portion may expulsed from much deeper conduit level. Thus, the different bomb types at the Ciomadul suggest that its conduit was filled with variously degassed magma column before the Vulcanian explosion.

Szakács, A., Jánosi Cs. (1989): D S Ist Geol Geofiz, 74/1: 181-189.
Wright, H. M. N., Cashman, K. V., Rosi, M., Cioni, R. (2007): Bull Volc, 69/ 3: 281-300.