



Volcano-stratigraphy of the extension-related silicic volcanism in the Çubukludag graben, western Turkey: implications for generation of the phretomagmatic eruptions triggered by dome emplacement

Zekiye Karacık and Ş.Can Genç

Istanbul Technical University, Faculty of Mines, Geological Engineering, Turkey (zkaracik@itu.edu.tr)

Extension-related Cumaovası silicic volcanic succession (Lower Miocene, 17 Ma) of western Turkey is a typical case to understand the nature of magma-water interactions, dome triggered phretovolcanic eruptions and their volcanic products. It is a subaerial silicic volcanism within the Çubukludag graben which is delimited by the NE-SW-orientated faults that reflects a crustal fissure-fracture zone between the İzmir and Kuşadası in west-central Anatolia. Volcanic products are mainly represented by cluster of rhyolite domes, lava flows together with the pyroclastic deposits in the graben basin, forming the upper part of the graben infill.

The initial products of the volcanism originated from the phretomagmatic explosive eruptions caused by the interaction of silicic magma body and waters of the lake that existed during the Neogene. This phase is mainly represented by fine-grained pumice and ash rich tephra deposits, which are partly deposited in a lacustrine environment and intercalated with them. They forms the base surge type deposits represent well developed traction structures such as cross bedding, sandwave beds and U-shape channels in the northeastern part of the region. Contemporaneous magmatic activities produced widespread blocky tephra deposits, which were the result of pyroclastic density flow. These are the main products of the explosive stage and formed abundant pumices, cognate and accidentally lithic fragments. Fine laminated, fine grained and planar bedded ash deposits are intercalated with flow deposits as thin layers, which are interpreted as ash cloud surge deposits.

The lava phase produced mainly rhyolitic lavas, extruded from domes forming the spacely-developed hills, and fissures. They are aligned along NE-SW trending faults and the extensional cracks nearly perpendicular to the main faults within the graben. Lavas are mainly represented by foliated stony rhyolite, rhyodacite, dacite, perlite and autobrecciated flows. Intensely vesicular rhyolite, pumiceous lava flows, spherulitic and lithophysal facies are also defined based on the style and intensity of crystallization.

The Cumaovası volcanic succession is typical example of the silicic volcanism which is co-eval with the generation and deposition of the sedimentary infill in an extensional basin. Our data and evaluations indicate that the presence of a gradual transition between the sedimentary and pyroclastic units, which are the partly eroded tuff ring resemble deposits under the rhyolitic lava flows in northern part of the Çubukludağ graben.

Considering the tectono-stratigraphical aspects and geochemical nature, we may propose that the Cumaovası silicic volcanism was produced by the crustal melting which has been triggered by extensional tectonic regime during the Late Early Miocene period (17 My).