

## Two distinct basalt flows within Cenozoic Central European Volcanic Province in Grabiszyce quarry (Lower Silesia, SW Poland)

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The volcanic succession at Grabiszyce quarry near Lubań in SW Poland (Fore-Sudetic Block) belongs to the Cenozoic Central European Volcanic Province and crops out near the northern tip of the Eger graben in the Bohemian Massif. Over 40 m thick Grabiszyce succession is of Oligocene age (Birkenmajer et al., 2011) and consists of two successive basaltic lava flows (ca. 20 m and up to 5 m thick) associated with auto- and pyroclastic deposits and separated by ca. 3-5 m thick horizon of clastic rocks.

The lower lava flow is significantly thicker than the upper one and reveals columnar joint mostly subvertical but locally variably inclined. Microscopic observations reveal abundant, up to 5 mm long phenocrysts of olivine, pyroxene, and sporadic amphibole in microcrystalline groundmass made of olivine, clinopyroxene, plagioclase, Fe-oxides and nepheline. Euhedral to subhedral clinopyroxene phenocrysts often show hour-glass and concentric zonation which may be the evidence for distinct episodes of crystallization at sub-volcanic conditions. The magma ascended from the mantle rapidly as suggested by the presence of xenoliths up to 5cm in size in this flow (Puziewicz et al., 2015). The rock has been classified as basanite using the total alkali - silica TAS diagram.

In contrast, the much thinner upper lava flow contains fine-grained groundmass of plagioclase, olivine, biotite, Fe-oxides, and only rare phenocrysts of clinopyroxene. The augite phenocrysts are also zoned but less commonly than in the lower flow. This may be a sign of brief and more stable sub-volcanic crystallization. On the other hand, the lower flow lacks mantle xenoliths. It contains abundant bedrock xenoliths (quartz-rich rocks) instead, suggesting a longer residence time in subvolcanic feeding system. In addition, there are euhedral phenocrysts of probably primary pargasite which are nearly completely replaced by pyroxene and magnetite indicating breakdown reaction due to decompression during the ascent of the magma. The outline of crystals is well preserved forming pseudomorphs up to 1 mm in size. Based on the chemical composition, the rock has been classified as the sodic basaltic trachyandesite – mugearite. Secondary zeolites, smectites and carbonates are products of low temperature hydrothermal alteration.

The lavas of both flows represent the sodic alkaline series of within-plate affinity. However, sedimentary intercalation between the flows suggests eruption of the lower and upper lavas in two distinct events separated by a repose and sedimentation period. The differences in petrographic and some geochemical characteristics suggest specific origin of magma, in particular different magma crystallization histories involved during the two volcanic events.

This work is partially funded by AGH research grant No 11.11.140.319.

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