

PANNONIAN BASALT VOLCANO ŠIBENIČNÝ VRCH, CENTRAL SLOVAKIA

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Abstract: Pannonian high-Al basalts and basaltic andesites are the youngest products of calc-alkaline volcanism in the Central Slovakia Volcanic Field. A small volcano Šibeničný vrch is one of several scattered occurrences in surroundings of Žiar nad Hronom. The volcano is composed of a tuff cone, which is partially covered by a late stage lava lake/flow. Obviously, initial phreatomagmatic eruptions were succeeded by the Hawaiian type eruptions. The volcano includes also two feeder dykes cutting underlying conglomerates.

Key words: high-Al basalt, volcano, phreatomagmatic eruption, tuff cone, lava flow, dyke

INTRODUCTION

Pannonian high-Al basalts and basaltic andesites are the youngest products of calc-alkaline volcanism in the Central Slovakia Volcanic Field, which is of the Badenian to Pannonian age (16.5 - 8.5 Ma) (Konečný et al., 2001). Their K/Ar dating has given ages in the interval 13.2 - 8.2 Ma (Kantor et al., 1990; Balogh et al., 1998), however, their relationship to rocks of the Jastrabá Formation implies an age in the interval 11.0 - 8.2 Ma (Lexa et al., 1998). Volcanic activity of basalts and basaltic andesites was episodic, giving rise to scattered dykes, sills, laccoliths and lava flows emplaced in or overlaying rhyolite tuffs of the Jastrabá Formation. In the case of the Šibeničný vrch volcano next to Žiar nad Hronom ascending magma went into a contact with water in sediments, causing strong phreatomagmatic eruptions during the early stage in evolution of the volcano.

ŠIBENIČNÝ VRCH VOLCANO

A small monogenous volcano Šibeničný vrch (Fig. 1) is situated at the eastern part of the Žiarska kotlina basin, where it rests upon Late Sarmatian rhyolite tuffs and conglomerates of the Jastrabá Formation.

The volcano is composed (Fig. 1, Photo 1.) of three units: 1) E-W trending dykes cutting underlying tuffaceous conglomerates of the Jastrabá Formation; 2) remnants of a palagonite tuff cone; 3) remnants of a lava lake or lava flow resting upon palagonite tuffs.

It follows that the evolution of the volcano took place in two stages. The initial stage of phreatomagmatic eruptions giving rise to the tuff cone was followed by the Hawaiian type eruptions giving rise to the overlying lava lake/flow and corresponding dykes.

The tuff cone is formed of stratified and sorted fine to coarse palagonite tuffs with a variable proportion of juvenile basaltic bombs and fragments as well as accidental fragments (mostly pebbles of various andesites, quartzite, quartz, gneiss and limestone). Texture is characteristic of wet surge deposits alternating with fall deposits. Notable are bomb and fragment impact sags (Photo 1.), including impact sags created by falling large pebbles. This fact implies that phreatomagmatic eruptions were initiated by interaction of ascending magma with water in sand and gravel horizons of the Middle to late Sarmatian volcanosedimentary complex of the Žiarska kotlina basin.

According to results of drilling these horizons are in the depth 300 – 700 m. The succession of palagonite tuffs includes also an angular unconformity, which implies a change of the eruption centre following a big explosion event.

The final unexplosive outflow of magma is a characteristic feature for monogenous volcanoes of this type. It reflects a final isolation of magma from water at the depth, either due to the exhaustion of water or due to the creation of impermeable walls to the lava conduit.

References

- Balogh, K., Konečný, V., & Lexa, J., 1998: K/Ar dating of the Youngest Calc-alkali rocks in the Central volcanic Field. Abstract, XVI congress CBGA, Vienna, p. 59.
- Kantor, J., Ďurkovičová, J., Sládková, M. & Wiegerová, V., 1990: Rádiometrické datovanie niektorých horninových komplexov K/Ar metódou. In: Izotopový výskum petrogenetických procesov, II. časť. Open file report, archive ŠGÚDŠ, Bratislava.
- Konečný, V., Lexa, J., Šimon, L. and Dublan, L. 2001: Neogénny vulkanizmus stredného Slovenska (Neogene volcanism of the Central Slovakia, in Slovak). In: Šimon, L., Konečný, V., and Lexa, J., (Ed.) Banská Štiavnica-City upon volcano. *Mineralia Slovaca* 33, 3, s. 159-178.
- Lexa, J., Halouzka, R., Havrila, M., Hanzel, V., Kubeš, P., Liščák, P. & Hojstričová, V. 1998: Vysvetlivky ku geologickej mape Kremnických vrchov. GS SR, Bratislava, 308 p.

Fig. 1. Basalt volcanic products of the volcano Šibeničný vrch.

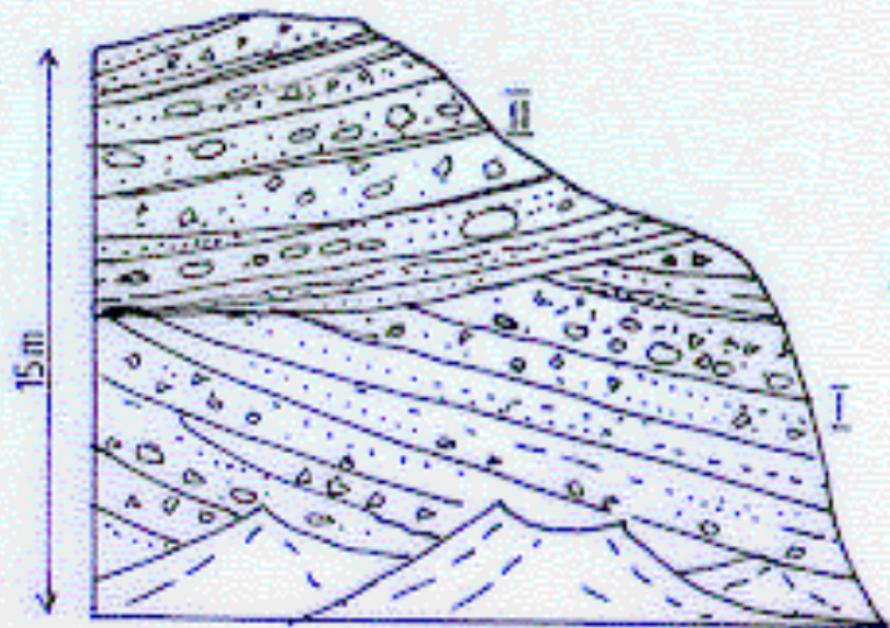
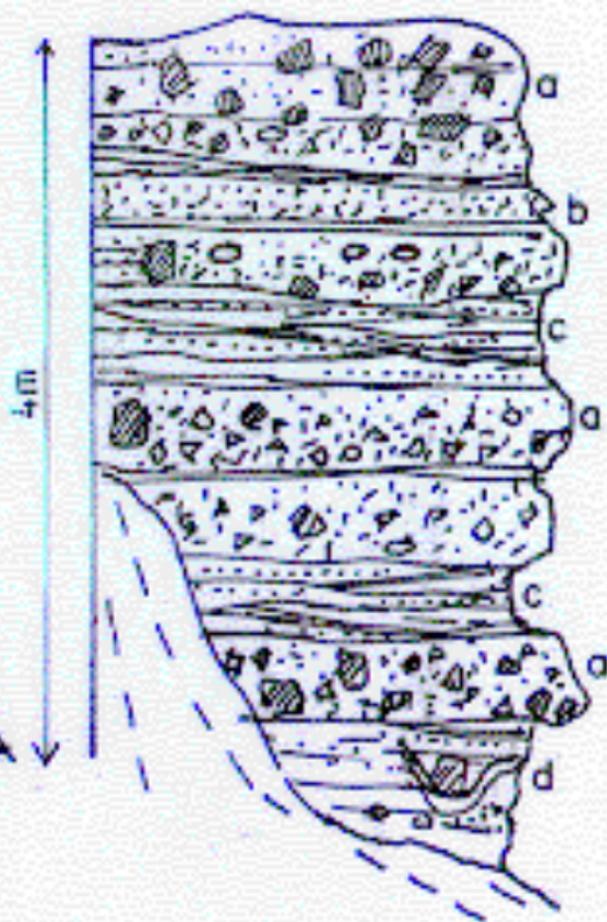
A – Phreatomagmatic tuff cone at the SW slope of Šibeničný vrch hill. I – older tuff cone with strata dipping southward 25-30°, which consists of alternating fine to coarse grained palagonite tuffs with fragments of andesite and pebbles of rhyolite, andesite and basement rocks; II – younger tuff cone with strata dipping south-westward 15-20°, which consists of alternating fine to coarse grained palagonite tuff with intercalations of breccia, consisting of basalt fragments and of polymict material with pebbles of quartz, crystalline schists, granite, rhyolite and andesite (the average diameter is 2-5 cm, often up to 30 cm).

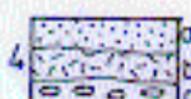
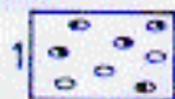
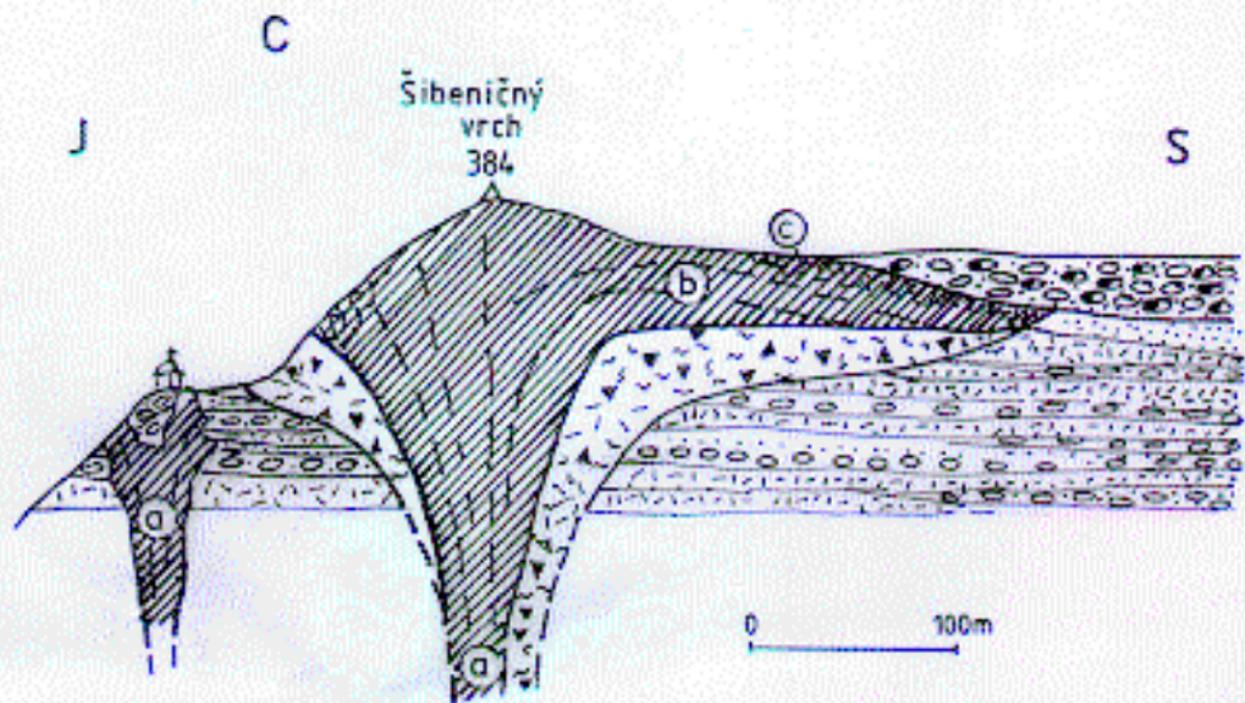
B – younger tuff cone in detail. a – fine breccias with fragments of basalt and pebbles of crystalline schists, granite, quartzite, rhyolite and andesite and with tuffaceous-sandy matrix; b – palagonite medium to coarse grained tuff; c – layers of fine grained tuff with base surge type texture alternating with layers of coarser grained tuff; d – impact structures of basalt and basement rock fragments (deformation of impacted beds).

C – Schematic geological section of the Šibeničný vrch Complex east of Žiar nad Hronom. 1 – Pliocene gravel; 2 – basalt; a – intrusion, b – lava flow, c – lava breccia; 3 - diatreme – maar, phreatomagmatic pyroclastic rocks (tuff, breccia, fragments and pebbles of basement rocks, andesite and rhyolite); 4 – products of the Jastrabá Formation, a - sandstone, b – tuff, c – conglomerate.

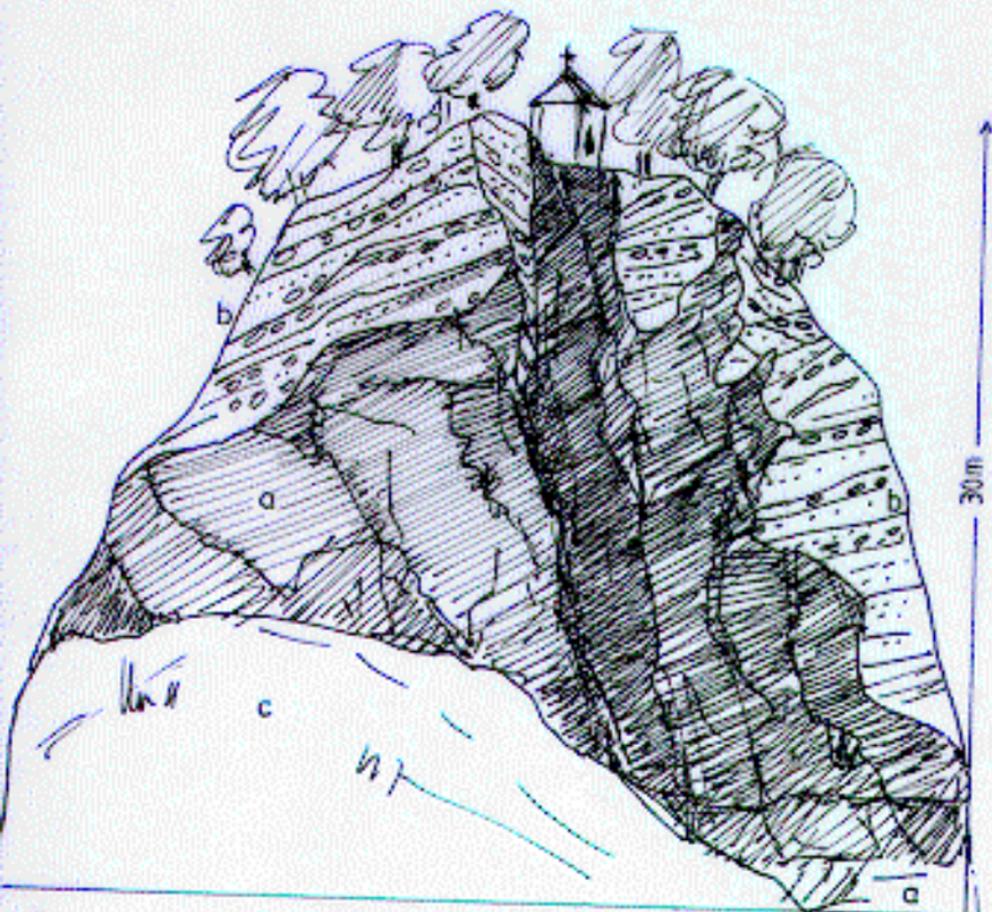
D – Protrusion of basalt through conglomerate beds of the Jastrabá Formation. a – basalt with blocky jointing; b – epiclastic volcanic sandstone, tuff and conglomerate of the Jastrabá Formation; c – debris.

Photo 1. Impact structure of basalt in the younger tuff cone (detail of the Figure 1 B).

A**B**



D



0 10m

30m

